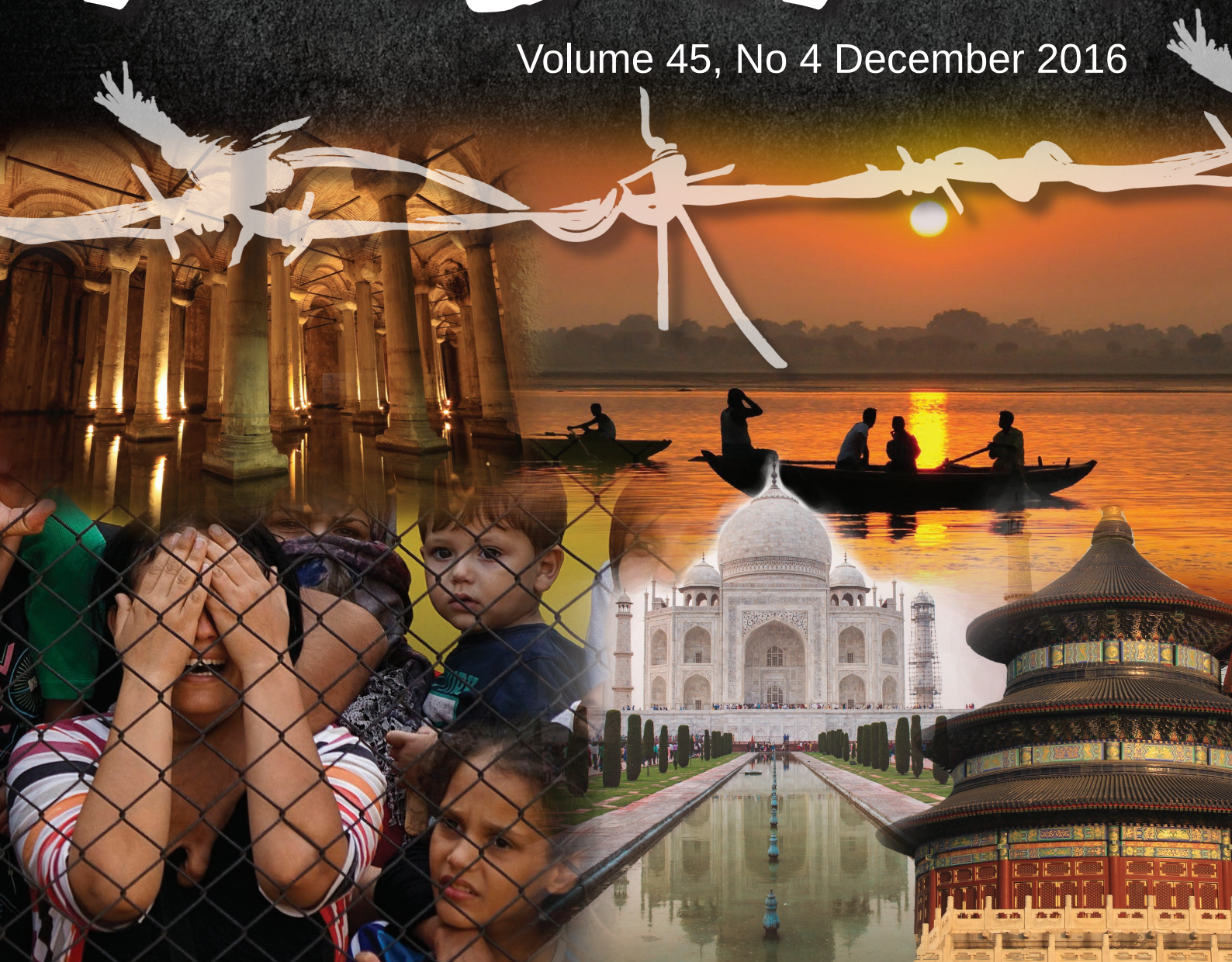




JOURNAL OF THE ASIA EDUCATION
TEACHERS' ASSOCIATION

ASIA

Volume 45, No 4 December 2016



Celebrating 40 Years – Valuing cultural diversity and promoting
intercultural understanding in a networked world



Mission Statement

AETA, a voluntary non-profit organisation, dedicates itself in this Mission Statement to endeavour to:

1. promote Asian Studies in Australian schools whether as a separate discipline, or as part of studies in other disciplines;
2. publish a journal dedicated to providing appropriate input about Asia to school teachers, as well as being a forum for the dissemination of ideas for improving Asian Studies in Australian schools;
3. publish resources which can be helpful in teaching about Asia in Australian schools;
4. promote and/or participate in conferences, seminars, or other discussions which are aimed at promoting Asian Studies or enhancing their quality
5. make representations to governmental or other bodies regarding Asian Studies courses or their content in school curricula;
6. make representations to tertiary institutions regarding Asian Studies in tertiary courses, particularly for teacher education; and
7. disseminate news about this Association's activities and its views about Asian Studies education through the media and through specialist newsletters and journals.

AETA Executive

President	Pauline Sheppard
Vice President	Jenny Curtis
Treasurer / Secretary	Judy Pilch
Editor	Diane Dunlop

AETA Committee Members

Dr Susan Bliss	Christine Cigana
Marcia Rouen	Jill Carroll
Sharon Moran	
Cec White - Advisor and Assistant to Executive (co-opted member)	

Contributions to the Asia Education Teachers' Association journal are most welcome. For policy guidelines for submission of articles to the AETA journal go to – www.aeta.org.au/journals.

Please send to:

The AETA Journal Editor
GPO Box 2393
Sydney NSW 2001

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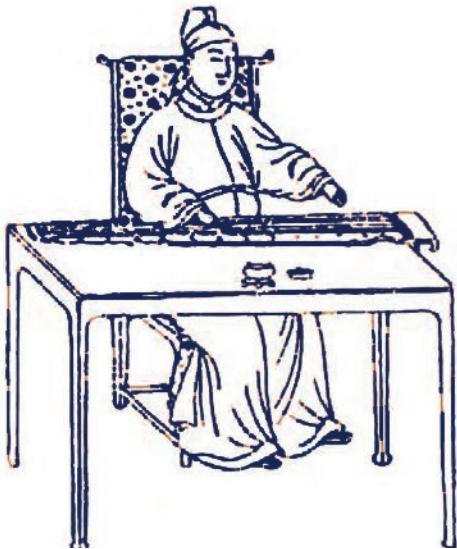
ASIA

Journal of the Asia Education Teachers' Association

Volume 46, No 4 December 2016

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From the Editor's Desk



In this Journal, we often deal with Intercultural awareness and respect, a theme that is central to what we do and why we do it. I recently read a wonderful piece in the Travel section

of the Sun Herald by Max Anderson called 'Educating Jack-san'. His premise was that travel has the power to transform young minds and he experienced this when he travelled with his twelve year- old son to Matsumoto in Japan which has a School Exchange Programme. They arranged a special tour with no swimming pools, no theme parks and no other English speaking kids. Both he and his son rose to the challenge of learning and doing 'new' things, from learning how to make soba noodles to studying the meaning of Japanese kanji. He talked of his son being overwhelmed by the 'otherness' of walking down the street of a small town with sixteenth century farmhouses but writing at length about it in his Journal. This is what education is about: giving our students the experience of 'OTHERNESS'.

Not everyone of that age can be fortunate enough to travel, but as teachers we can give them a thirst for learning about the 'DIFFERENCES' in the world while learning about what they share with others around the world. Teaching EMPATHY is central to everything that we do in Education and hopefully it inspires our students to travel and learn more.

On a similar theme, I am currently reading a wonderful book called 'Ghost Empire' by Richard Fidler. It is about his Journey with his fourteen year old son who is obsessed with history, to look at the Empire of Constantine and the Byzantine Empire based in modern day Istanbul.[another example of learning by discovery.]

In the last Journal, we focused on Turkey, the crossroads of Europe and Asia. This time our focus is still West Asia but we are looking at Syria and other countries in the region. We will examine issues such as Refugees, World Heritage sites and Water in these desert areas.

Dr Susan Bilss has compiled two units on Syria, one which examines the ongoing conflict and another that analyses the Refugee Crisis, that now challenges the whole world. Over the next year we will have about one thousand Syrian refugees entering our schools in Australia and this journal will give teachers an opportunity to learn more about their country in order to help these new students to settle into our society.

There is a History unit on the World Heritage Site of Palmyra that has been damaged by ISIS and a Geography unit by Dr Jennifer Curtis on Living with the Desert on the Iranian Plateau. The desert theme continues with a piece on the amazing area of Cappadocia in Turkey. We have a unit on World Heritage sites in Turkey and a unit which examines the issues surrounding Water in Turkey. Phillip O'Brien has produced an activity on finding World Heritage sites and our final piece is on the Management of water in India, an issue that has been in the news in recent times due to the extensive famine that India has experienced over the last two years.

I am very pleased to inform our readers about the arrival of copyright money for thirty seven of our contributors! Why not contribute an article, unit of work or activity to the Journal. For our Association, copyright always remains with the AUTHOR, therefore you will receive payment whenever your work is downloaded or copied.

Next year we will produce a Journal focusing on 'How to teach controversial issues' with lots of examples. We will also be doing a Journal that focusses on China that reflects the new Syllabus requirements.

I hope that Journal will encourage you to try some of the 'Other' of Asia when addressing the challenges of new curricula.

Di Dunlop.



Valuing cultural diversity and promoting intercultural understanding in a networked world



Syria:

West Asia

CONFLICT | BACKWARDS DEVELOPMENT | WORLD HERITAGE SITES



Top photograph: Homes after the Syrian government launched a military assault against the city in May 2011. The fighting left a large area of the city completely destroyed. Thousands died.

Before the Syrian war, Homs was a major industrial centre but had become an opposition stronghold location causing the government's military assault on the city.

http://media.indiatimes.in/media/content/2015/Oct/cover---afp-getty_1445926605.jpg

Bottom photograph: Syrian youth runs past blood stains and debris following airstrikes by government forces on the rebel-held town of Douma on August 20, 2015

<http://www.theatlantic.com/photo/2015/08/syrias-children/402583/>

Facts and map on Syria

Capital of Syria	Damascus
Population of Syria	18,000,000 estimate
Population: youth bulge	54% 0-14 years; 21% 15-24 years
Main ethnic group	Arab 90.3%
Main religion	Muslim 87% (Sunni 74%; Shia 13%)
Rate of urbanisation	58%
GDP per person	\$ \$4,020 in 2016- low
Largest cities	Aleppo, Damascus, Homs

Map of Syria <http://www.democraticunderground.com/1014146660>



Syrian Civil War

Since 2011 Syria has continued to be a depressing global news item. Headlines covered the initial pro-democracy Arab Spring protests against Syrian president Bashar al-Assad that gradually turned into a bloody Civil War. The conflict resulted in human rights violations and the development of a humanitarian crises- as millions of civilians became refugees in other countries, while others were forced to become internally displaced people (IDP). The ongoing violence against civilians has been condemned by the European Union (EU), USA, the Arab League, and other countries such as Australia.



Syrian president Bashar al-Assad

<http://www.politicoscope.com/wp-content/uploads/2016/02/Syrian-Top-Headlines-Bashar-al-Assad-650x580.jpg>

Government forces were responsible for arbitrary arrests, disappearances and torturing detainees. They carried out deliberate and indiscriminate attacks on civilians and kidnapped people.



Poster

<http://2.bp.blogspot.com/-9xgKmKeJbkg/VnEbSWHKQZI/AAAAAAAAAN-s/owiycYsi0Oo/s320/mediaislamia-Stop.jpg>

Opposition forces such as the extremist Islamic State (also known as ISIS), and Al-Qaeda's affiliate in Syria (Jabhat al-Nusra), were also responsible for targeting civilians-detention, torture, kidnapping and executions.

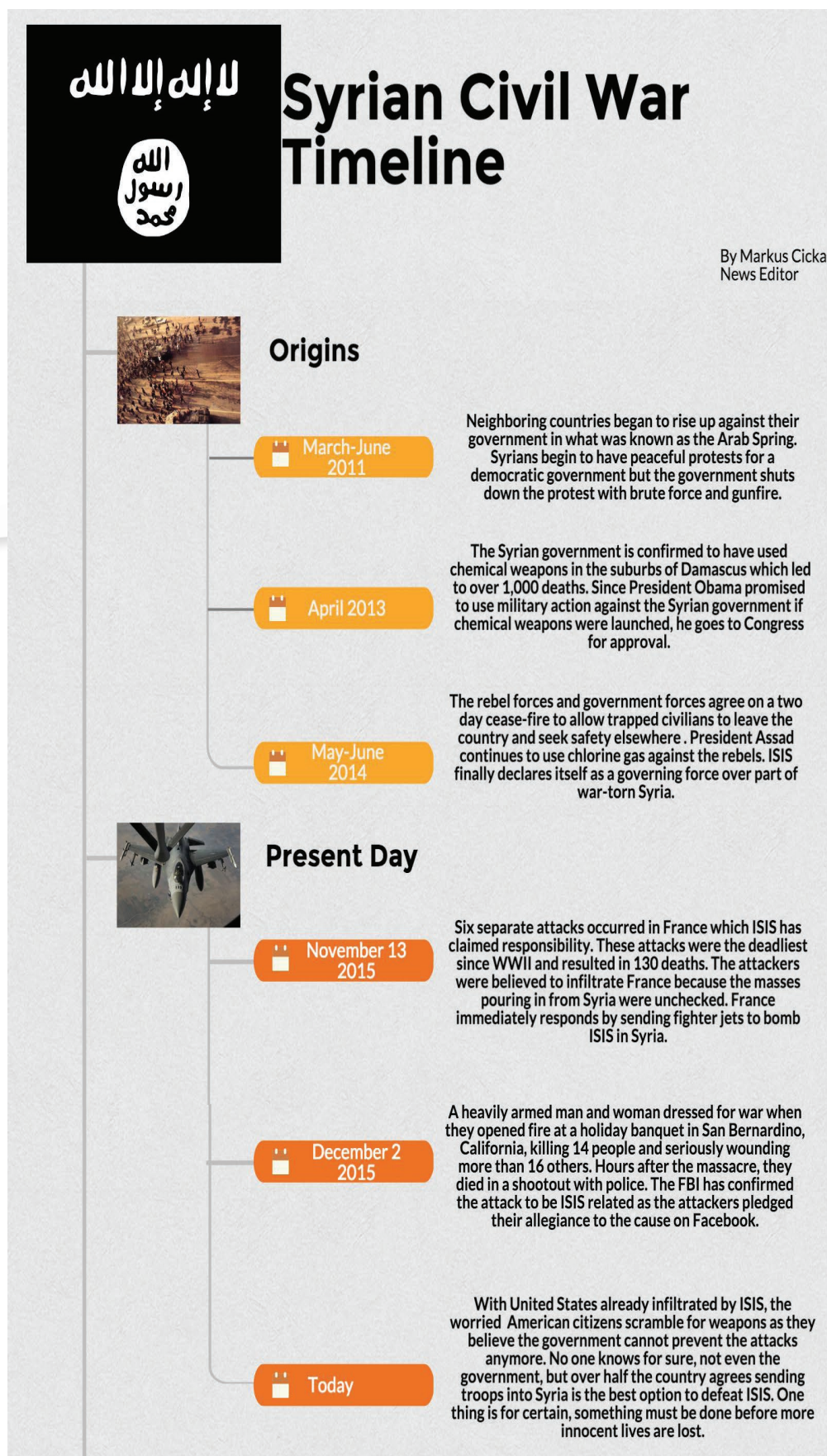
Bashar al-Assad ruled Syria as president since July 2000. His father, Hafez al-Assad, ruled Syria from 1970-2000.

'Even before the armed conflict and ongoing geopolitical chaos, Syria's government institutions lacked public accountability and were plagued by corruption. Members of the ruling family and their inner circle are said to own and control a major portion of the Syrian economy. Corruption is also present in rebel-held areas, albeit on a smaller scale. The judiciary is neither transparent nor independent'

<http://www.heritage.org/index/country/syria>

Summary of Syrian Civil War Timeline (History)

<http://www.thewildcatroar.com/wp-content/uploads/2015/12/Syrian-Civil-WarTimeline.jpeg>



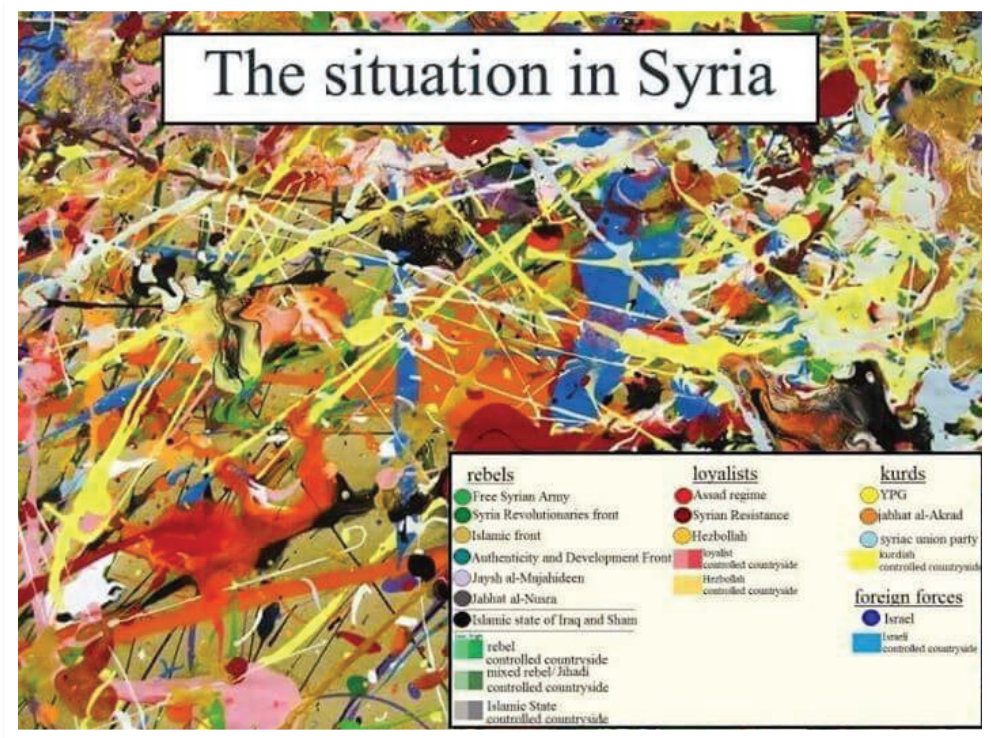
Activity

Extension: Refer to the infographic on the Syrian conflict for more details

<https://newint.org/features/2015/09/01/the-facts-of-the-syrian-conflict/>

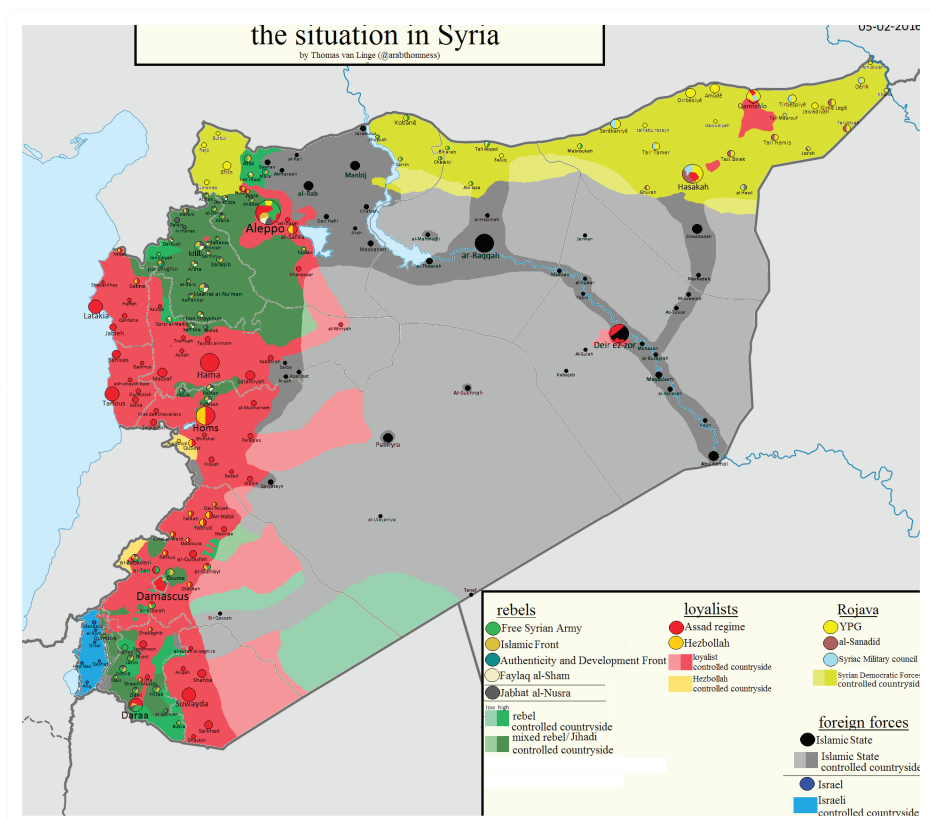
Difficult situation map of Syria January 2006

Jackson Pollock style map of *The Situation in Syria* found on DifficultyII. The map is not to be taken literally but illustrates how chaotic the situation remains <http://brilliantmaps.com/syria-situation/>



Real situation map of Syria February 2016.

Interactive map illustrates the volatility of the Civil War
https://pietervanostaeyen.files.wordpress.com/2016/02/img_3481.png



Confused person's guide to the Syrian Civil War (November 2015)

<http://www.theatlantic.com/international/archive/2015/10/syrian-civil-war-guide-isis/410746/>



Activity

Refer to the YouTube and summarise the comments:

- Who is fighting whom in Syria? BBC News <https://www.youtube.com/watch?v=sNw2e0IAk0c>
- Syria's war: Who is fighting and why? <https://www.youtube.com/watch?v=NKb9GVU8bHE>



Child of war-lost everything

Global phenomenon: ISIS

'As of December 2015, approximately 30,000 fighters from at least 85 countries had joined the Islamic State of Iraq and Syria (ISIS). Although the great majority of ISIS recruits come from the Middle East and the Arab world, there are also many from Western nations, including most member-states of the European Union, as well as the United States, Canada, Australia, and New Zealand. Thousands of fighters from Russia and hundreds from Indonesia and Tajikistan also have joined. ISIS's recruitment of foreign fighters is a global phenomenon that provides the organisation with the human capital needed to operate outside the Middle East.'

<https://fabiusmaximus.com/2016/07/18/why-people-join-isis-98349/>

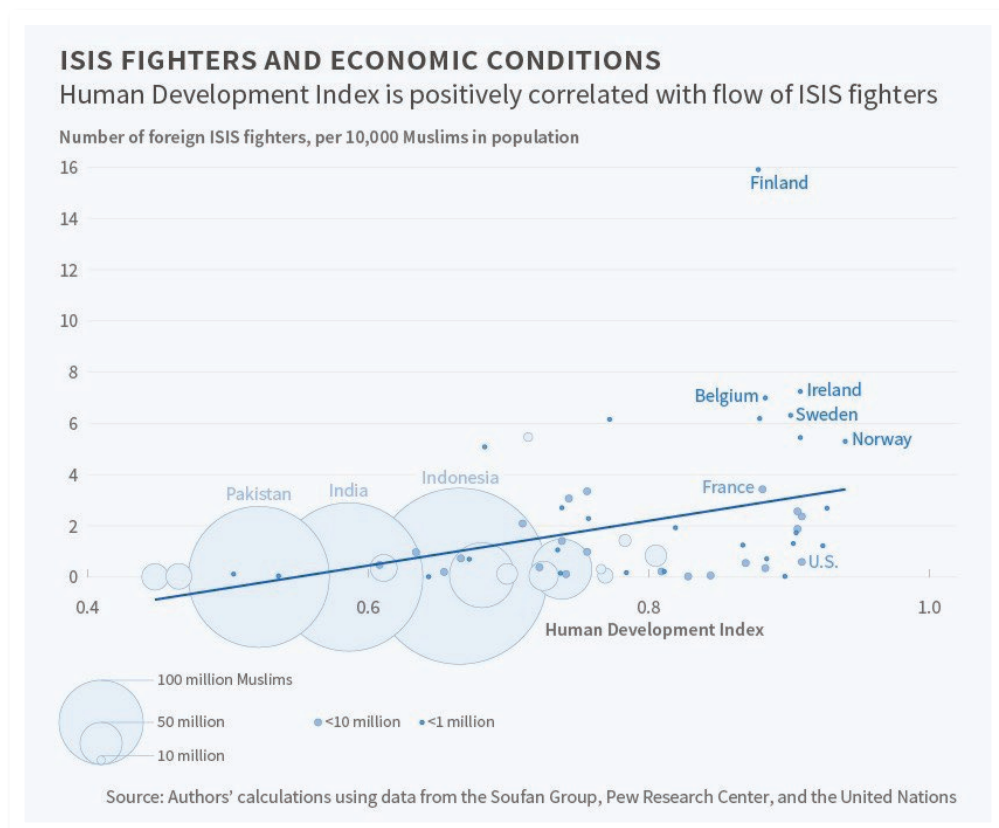


Refer to the following website that provides a perspective on 'How ISIS spread in the Middle East'

<http://www.theatlantic.com/international/archive/2015/10/how-isis-started-syria-iraq/412042/>

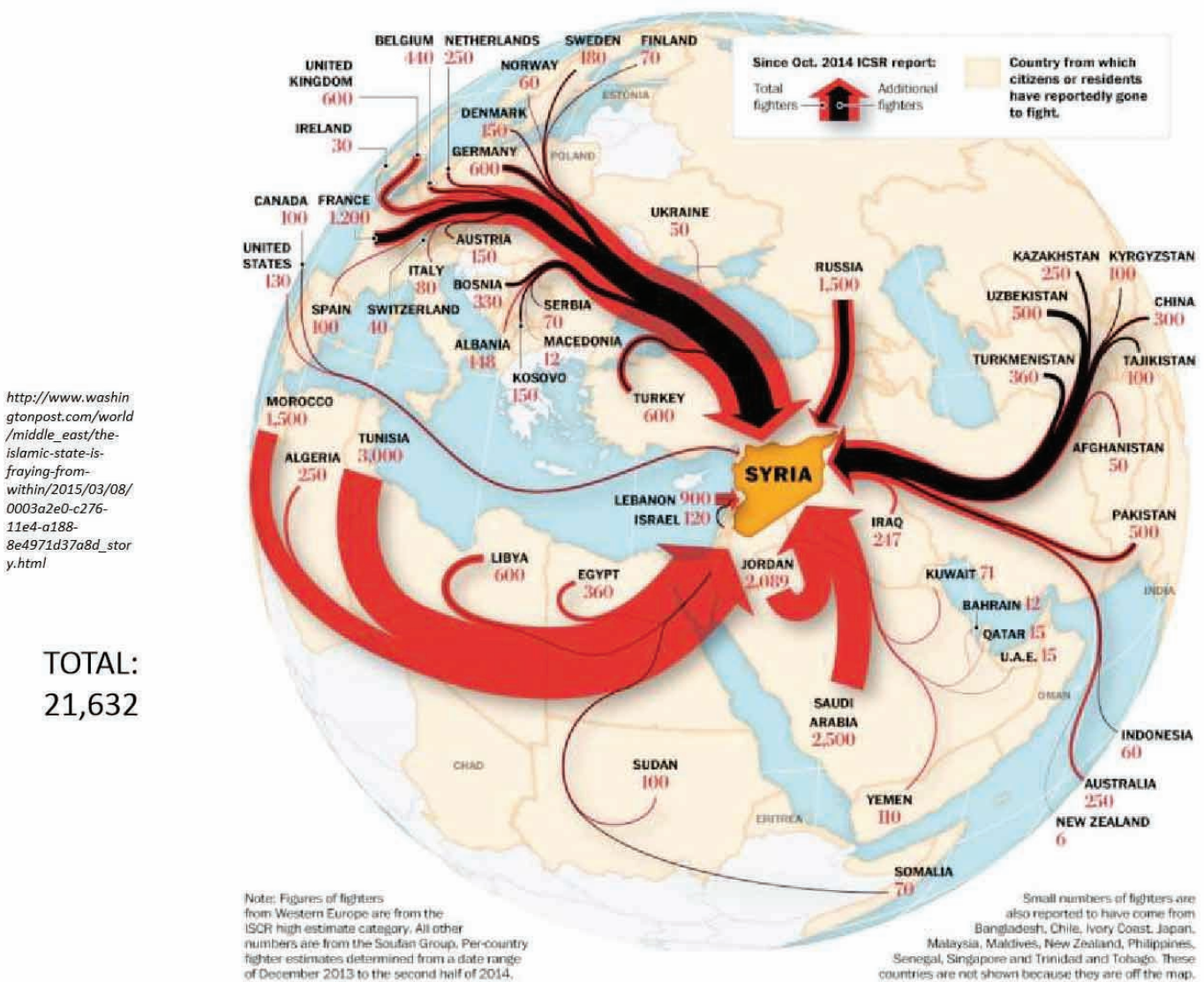
Where do ISIS fighters come from?

<https://fabiusmaximus.com/2016/07/18/why-people-join-isis-98349/>



Source of ISIS fighters since 2014

http://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/150603_Failed_State_Wars_in_Iraq_Syria.pdf



TOTAL:
21,632

What drives people to join ISIS-ideology, economic, social or political reasons?

- “They find that poor economic conditions do not drive participation in ISIS. Rather, the number of ISIS fighters from a given country is **positively correlated** with that **country’s per capita gross domestic product** and its **place on the Human Development Index**. Many foreign fighters originate from countries with high levels of economic development, low income inequality, and highly developed political institutions.”
<https://fabiusmaximus.com/2016/07/18/why-people-join-isis-98349/>
- “Other factors that explain the number of ISIS foreign fighters are the **size of a country’s Muslim population** and its **ethnic homogeneity**. Although we cannot directly determine why people join ISIS, our results suggest that the flow of foreign fighters to ISIS is driven not by economic or political conditions but rather by **ideology** and the **difficulty of assimilation into homogeneous Western countries**.”
<https://fabiusmaximus.com/2016/07/18/why-people-join-isis-98349/>

What is the message in the cartoon?

<https://au.pinterest.com/pin/296604325438881484/>



Orphaned Syrian boy sleeping between his parents' graves.

<https://au.pinterest.com/pin/30399366208959580/>



Chemical Warfare

Evidence suggests chemical warfare was a component of the Syrian conflict. For example:

- a deadly chemical weapons attack on Ghouta, near Damascus
- Syrian government helicopters dropped barrel bombs embedded with cylinders of chlorine gas on three towns in Northern Syria.
- Between February 2014 and January 2015, Human Rights Watch determined at least 450 major damage sites that showed damage consistent with barrel bomb detonations.

'Experts believe the chemical stockpile, considered to be one of the world's largest, contains the blister agent sulphur mustard, the nerve agent sarin, and the more potent and persistent nerve agent VX.'

<http://www.bbc.com/news/world-middle-east-22307705>

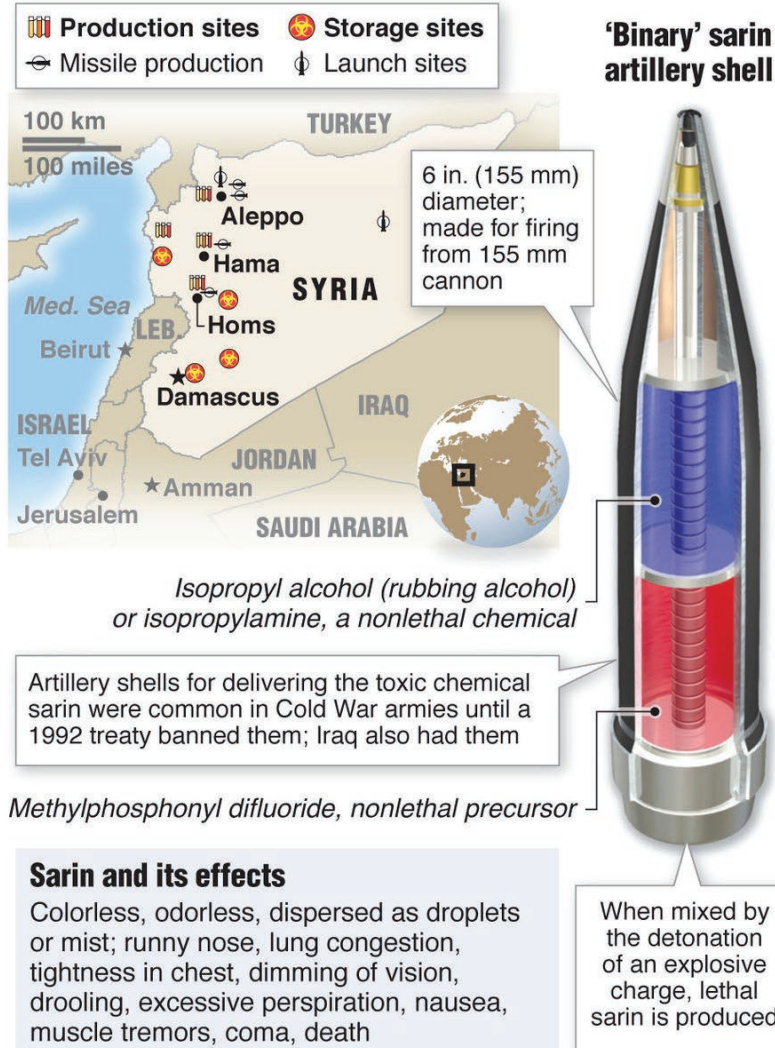
Syria signed the **Chemical Weapons Convention** (CWC) and agreed to the destruction of its chemical weapons. In 2014, all 'declared' chemical weapons were removed from Syria for destruction.

Syria's chemical weapons-infographic

<http://cdn.topsecretwriters.com/wp-content/uploads/2013/09/syria-chemical-weapon-infographic.jpg>

Syria's chemical weapons

The White House said for the first time that it has some evidence that Syria has used chemical weapons in its civil war. A look at Syria's chemical weapons facilities:



Refer to YouTube on Human Rights Watch Website

<https://www.hrw.org/world-report/2016/country-chapters/syria>



Source: Center for Nonproliferation Studies, U.S. Defense Department, GlobalSecurity.com, Journal of American Medical Association, BBC

© 2013 MCT

Impacts of Syrian Civil War on human wellbeing (Year 10 Geography)

Internal armed conflict

Violations by government forces

- indiscriminate and unlawful attacks on civilians
- denial of humanitarian access to food, medical care
- attacks on medical facilities and workers
- use of barrel bombs and chemical agents
- arbitrary arrests and detention e.g. peaceful; activists, media and humanitarian workers
- thousands died from torture and ill treatment

Abuses by non-state armed groups:

- use of indiscriminate weapons and attacks on civilians
- unlawful killings
- denial of humanitarian access
- abductions
- use of child soldiers

Islamic State (IS) carried out attacks on civilians including suicide bombings, chemical attacks and unlawful killings

International attacks by:

- US led international coalition forces: *air strikes on IS and other targets, in which civilians were killed.*
- Russian forces: *air strikes and sea-launched cruise missile attacks on areas controlled by armed opposition groups and on IS targets, in which civilians were killed*



Photo: 12 years old Kurdish YPG child soldier (Amid Botaan) killed near Tel Hamis, Hasakah province

<https://s-media-cache-ak0.pinimg.com/236x/26/43/f5/2643f56d78135a19278d00c376d0307f.jpg>

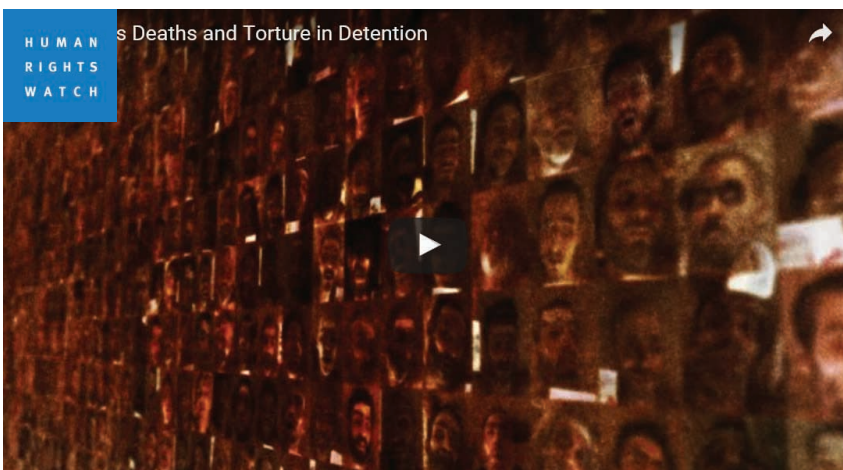
Violations of human rights-Amnesty International and Human Rights Watch Reports



Government forces and non-state armed groups committed war crimes and gross human rights abuses.

'By the end of 2015, the UN estimated that the conflict had caused the deaths of 250,000 people, forced 7.6 million people to become internally displaced and led 4.6 million people to become refugees abroad.'

<https://www.amnesty.org/en/countries/middle-east-and-north-africa/syria/>



Activity:

'If the Dead Could Speak' reveals human stories behind more than 28,000 photos of deaths in government custody that were smuggled out of Syria and came to public attention in January 2014. Refer to YouTube on Human Rights Watch website for personal stories

<https://www.hrw.org/world-report/2016/country-chapters/syria>

Economy of violence

Photo: Syria's pre-war economy-happy Syrians (S. Bliss)

In 2009, the Syrian economy was relatively stable with growing agricultural, industrial, retail, tourism and oil sectors. Since 2015, the Syrian 'economy of violence' flourished with capital relocated to war resources. As a result, the Human Development Index (HDI) tumbled from a medium to low rank, with falls in education, health and income. It is estimated the HDI fell by 32.6% of its pre-conflict value, causing a decline in its global ranking from 113th to 173rd out of 187 countries. The European Council on Foreign Relations, stated that HDI fell to the same level as it was 38 years ago. In other words the average Syrian had the same life-expectancy, education and income in 1997 as in 2015.



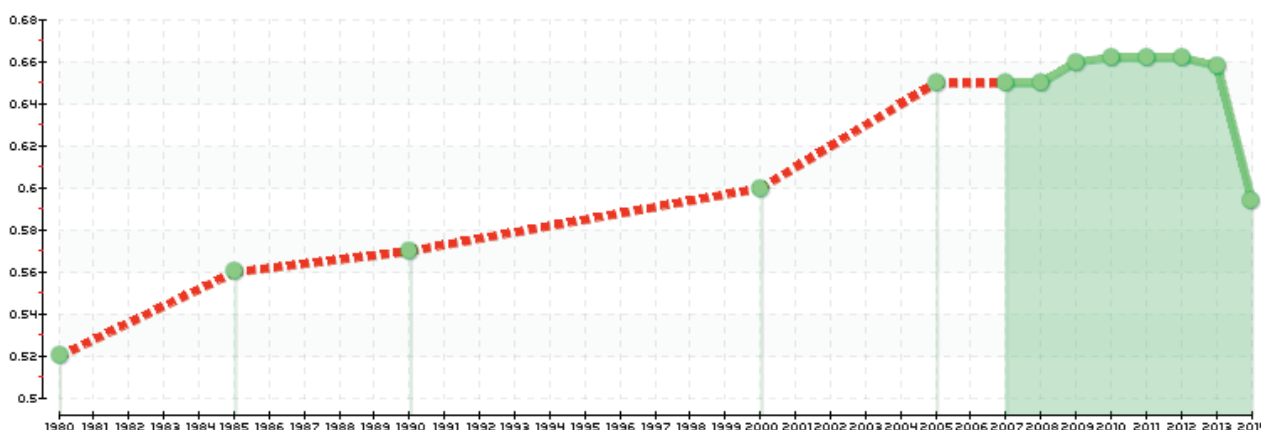
Human Development Index (HDI) declines since the conflict

Year	Life expectancy - years	Mean years of schooling	GDP per capita	HDI value
1980	66	2.5	4,400	0.516
2000	73	4.6	4,420	0.586
2010	73	6.3	5,700	0.639
2016 (est)	55	3.5	2,500	Falling

HDI changes over time-huge decline since 2013

<http://en.actualitix.com/chart/syr/syrian-arab-republic-human-development-index.png>

Syria - Human development index (1 = perfect / 0 = bad)



Source : UNDP

Date : 2015

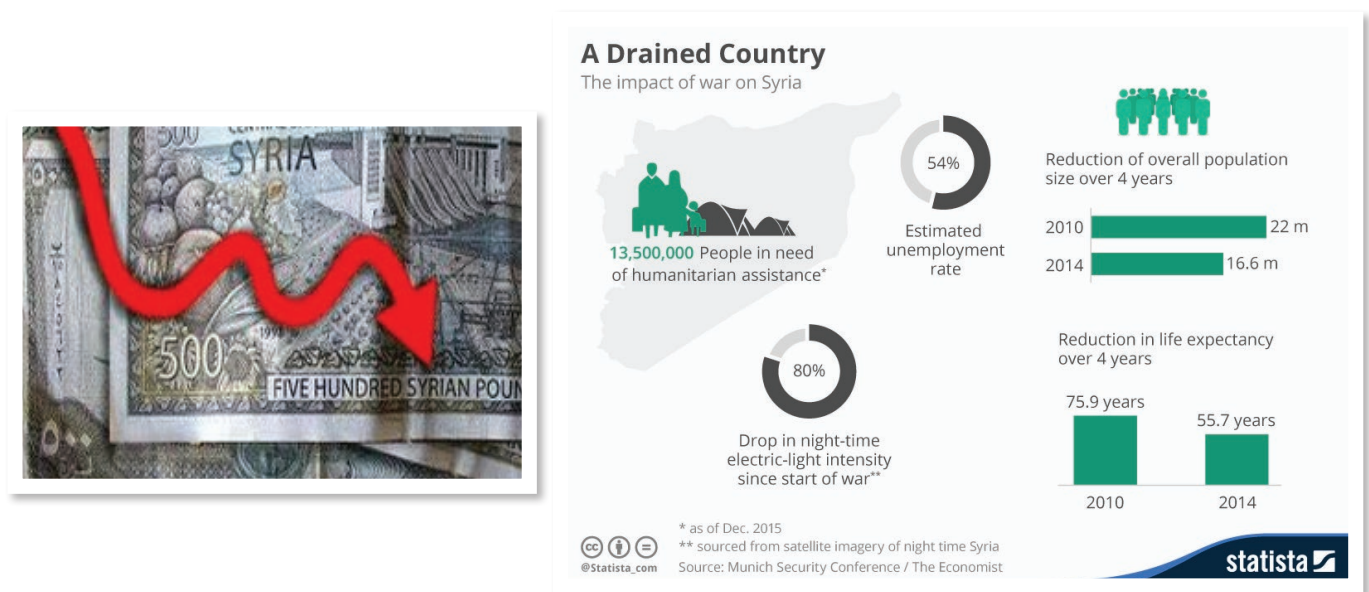
Creation: Actualitix.com - All rights reserved



Actualitix.com

Impacts of war on Syria-a drained country

https://d28wbuch0jlv7v.cloudfront.net/images/infografik/normal/chartoftheday_4419_cese_fire_war_syria_n.jpg

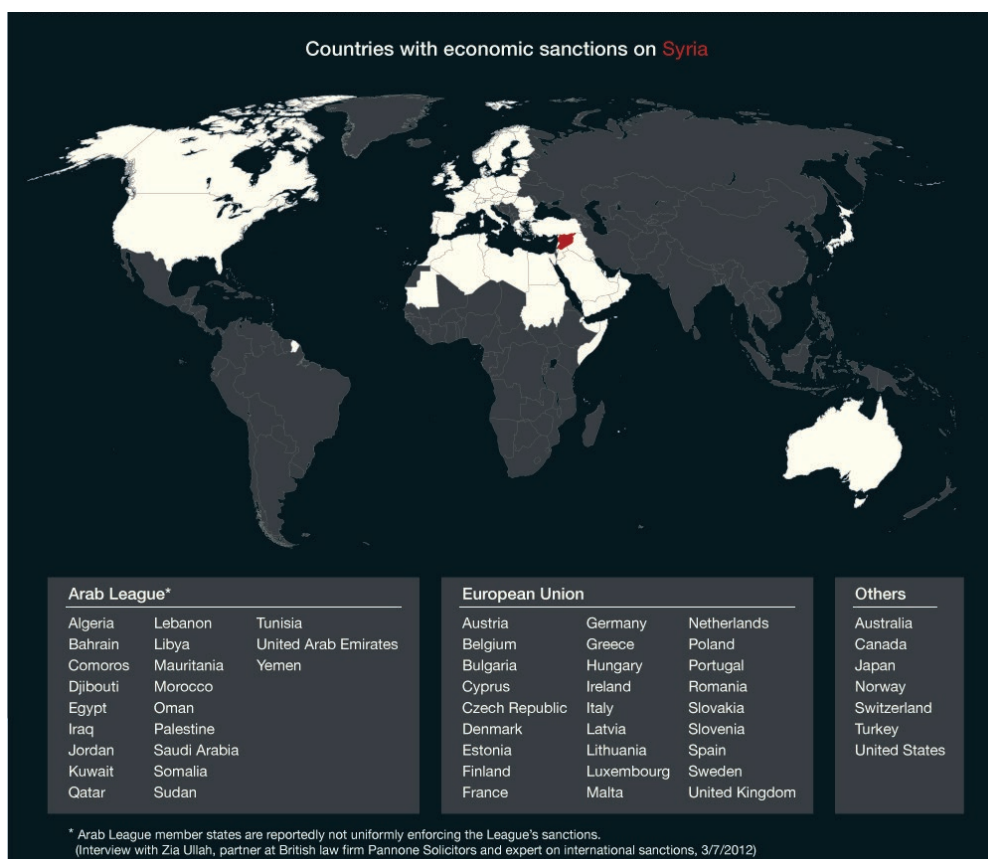


Economic sanctions

Since the outbreak of the Syrian Civil War, the country has been hit by massive economic sanctions that has restricted trade with many countries, especially the EU its largest trading partner. The sanctions aimed to stop the government's proliferation of weapons, involvement in terrorist activities and attacks on Syrian civilians. The sanctions have resulted in a reduction in revenue and a decline in human wellbeing.

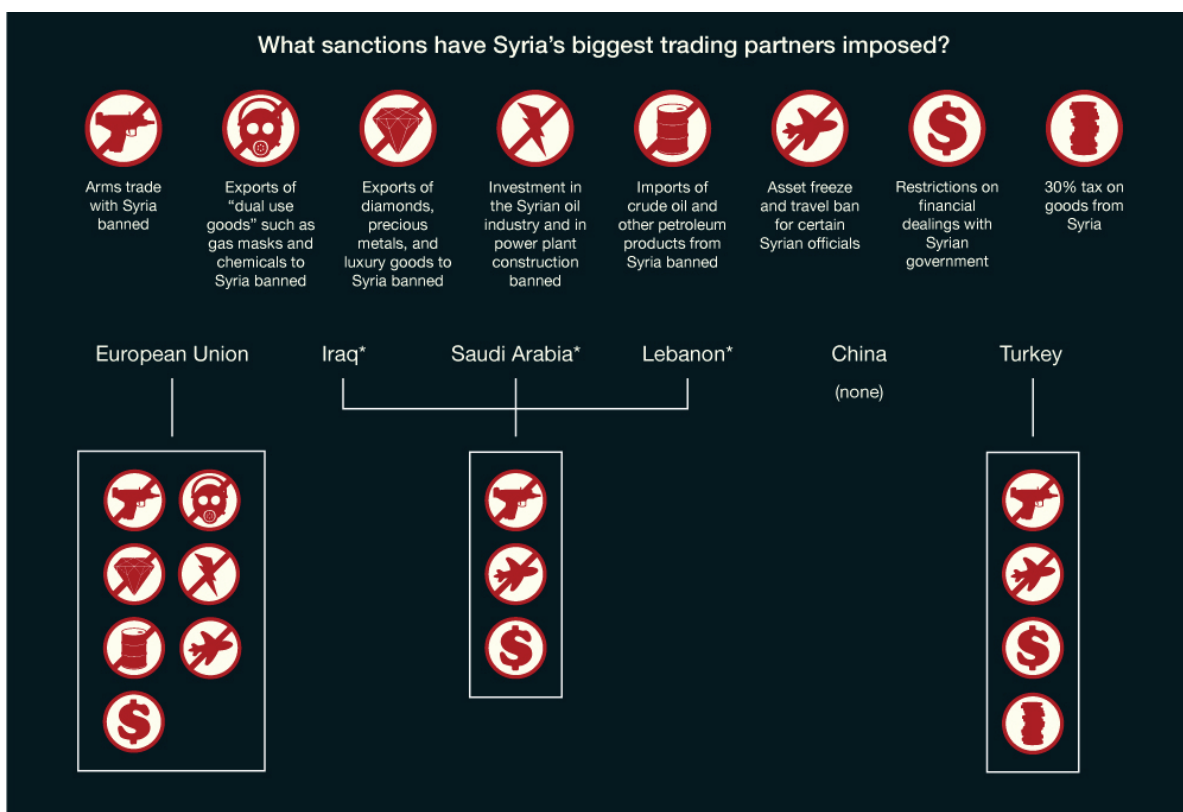
Countries with economic sanctions on Syria

<http://www.aljazeera.com/indepth/features/2012/07/201278125635873787.html>





<http://www.aljazeera.com/indepth/features/2012/07/201278125635873787.html>



<http://www.aljazeera.com/indepth/features/2012/07/201278125635873787.html>

Activity

The international community is concerned by escalating violence in Syria. In order to exert pressure on the Syrian government and to bring about an end to the violence, many countries have imposed sanctions against Syria.

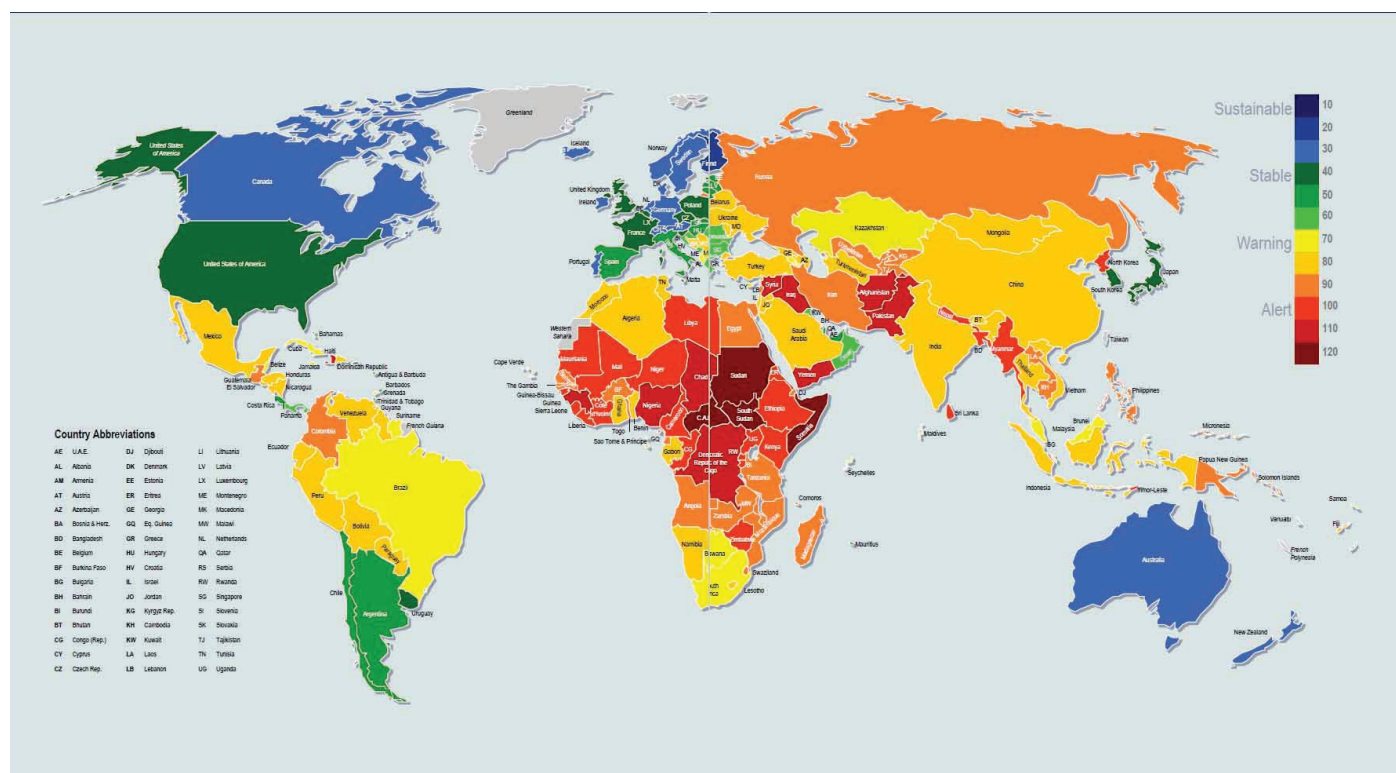
- What is an economic sanction?
- What was the aim of the economic sanction?
- List five countries that have placed sanctions on Syria.
- Name Syria's six main trading countries
- What types of goods have been restricted by the EU?
- Explain the impacts of economic sanctions on Syria and their population.

Fragile State

Syria registered high on the Fragile States Index after five years of civil war. The population, suffered at the hands of Bashar al-Assad's regime and those opposed to his rule, as well as jihadist militants from the Islamic State of Iraq and the Levant (ISIL). Over 250,000 Syrians lost their lives while others experienced human rights abuses such as torture, rape and enforced disappearances. In response the US led coalition and Russia entered the conflict.

Fragile States Index (FSI) 2015

<http://library.fundforpeace.org/library/fragilestatesindex-2015.pdf>



High Alert

	100.0	Cote d'Ivoire (=15)
	100.0	Zimbabwe (=15)
	102.4	Nigeria (14)
	102.9	Pakistan (13)
	104.5	Haiti (=11)
	104.5	Iraq (=11)
	104.9	Guinea (10)
	107.9	Afghanistan (=8)
	107.9	Syria (=8)
	108.1	Yemen (7)
	108.4	Chad (6)
	109.7	Congo (Dem. Rep.) (5)

Very High Alert

	110.8	Sudan (4)
	111.9	Central African Rep. (3)
	114.0	Somalia (2)
	114.5	South Sudan (1)

Indicators used to measure the Fragile Stages Index (FSI)

<http://library.fundforpeace.org/library/fragilestatesindex-2015.pdf>

Social Indicators		Economic Indicators	
<div> Demographic Pressures</div> <p>Pressures on the population such as disease and natural disasters make it difficult for the government to protect its citizens or demonstrate a lack of capacity or will.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Natural Disasters• Disease• Environment• Pollution• Food Scarcity• Malnutrition• Water Scarcity• Population Growth• Youth Bulge• Mortality	<div> Refugees and IDPs</div> <p>Pressures associated with population displacement. This strains public services and has the potential to pose a security threat.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Displacement• Refugee Camps• IDP Camps• Disease related to Displacement• Refugees per capita• IDPs per capita• Capacity to absorb	<div> Uneven Economic Development</div> <p>When there are ethnic, religious, or regional disparities, governments tend to be uneven in their commitment to the social contract.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• GINI Coefficient• Income Share of Highest 10%• Income Share of Lowest 10%• Rural v. Urban Distribution of Services• Improved Service Access• Slum Population	<div> Poverty & Economic Decline</div> <p>Poverty and economic decline strain the ability of the state to provide for its citizens if they cannot provide for themselves and can create friction between “haves” and “have nots”.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Economic Deficit• Government Debt• Unemployment• Youth Employment• Purchasing Power• GDP per capita• GDP Growth• Inflation
<div> Group Grievance</div> <p>When tension and violence exists between groups, the state’s ability to provide security is undermined and fear and further violence may ensue.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Discrimination• Powerlessness• Ethnic Violence• Communal Violence• Sectarian Violence• Religious Violence	<div> Human Flight & Brain Drain</div> <p>When there is little opportunity, people migrate, leaving a vacuum of human capital. Those with resources also often leave before, or just as, conflict erupts.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Migration per capita• Human Capital• Emigration of Educated Citizens		
Political and Military Indicators			
<div> State Legitimacy</div> <p>Corruption and lack of representativeness in the government directly undermine social contract.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Corruption• Government Effectiveness• Political Participation• Electoral Process• Level of Democracy• Illicit Economy• Drug Trade• Protests and Demonstrations• Power Struggles	<div> Public Services</div> <p>The provision of health, education, and sanitation services, among others, are key roles of the state.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Policing• Criminality• Education Provision• Literacy• Water & Sanitation• Infrastructure• Quality Healthcare• Telephony• Internet Access• Energy Reliability• Roads	<div> Human Rights & Rule of Law</div> <p>When human rights are violated or unevenly protected, the state is failing in its ultimate responsibility.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Press Freedom• Civil Liberties• Political Freedoms• Human Trafficking• Political Prisoners• Incarceration• Religious Persecution• Torture• Executions	
<div> Security Apparatus</div> <p>The security apparatus should have a monopoly on use of legitimate force. The social contract is weakened where affected by competing groups.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Internal Conflict• Small Arms Proliferation• Riots and Protests• Fatalities from Conflict• Military Coups• Rebel Activity• Militancy• Bombings• Political Prisoners	<div> Factionalized Elites</div> <p>When local and national leaders engage in deadlock and brinksmanship for political gain, this undermines the social contract.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Power Struggles• Defectors• Flawed Elections• Political Competition	<div> External Intervention</div> <p>When the state fails to meet its international or domestic obligations, external actors may intervene to provide services or to manipulate internal affairs.</p> <p><i>Includes pressures and measures related to:</i></p> <ul style="list-style-type: none">• Foreign Assistance• Presence of Peacekeepers• Presence of UN Missions• Foreign Military Intervention• Sanctions• Credit Rating	

Syria's ranks in the FSI

<http://library.fundforpeace.org/library/fragilestatesindex-2015.pdf>

Rankings in order of fragility and risk											
	DP	REF	GG	HF	UED	ECO	SL	PS	HR	SEC	FE
9th Syria	8.1	10.0	10.0	7.4	7.0	7.5	9.9	8.2	10.0	10.0	9.9
Total											107.9

Social and economic impacts of conflict in Syria

Civil war has had negative social and economic impacts on Syrians' wellbeing. By 2015, 7.6 million Syrians lived as internally displaced persons (IDP) and 4.6 million lived in besieged areas. Millions of refugees fled their homes, resulting in European refugee camps reaching breaking point. Turkey had the largest number of refugees in one country, housing more than 1.9 million.

The Syrian refugee crises is said to be the largest in the world, with a spiralling need for humanitarian aid as the conflict threatens stability in neighbouring countries.

Economic and social impacts of civil war in Syria 2011-2016

Photo: World Heritage Al-Hamidiyah Souq, Damascus Syria. The area has been one of the hottest flash points in the ongoing civil war. As a result of poverty and fear of attacks, fewer people walk through the previously popular souk (J. Bliss)

Declining economy:
economic loss of over
\$202 billion.

Increasing inequality:
aimed to retain power,
different parties allocated
resources to create loyalty
among their followers.

Falling life expectancy
from 75.9 years to 55.7

Changing population: 6%
of population killed,
maimed, or wounded

Declining education with
51% of children no longer
attending school

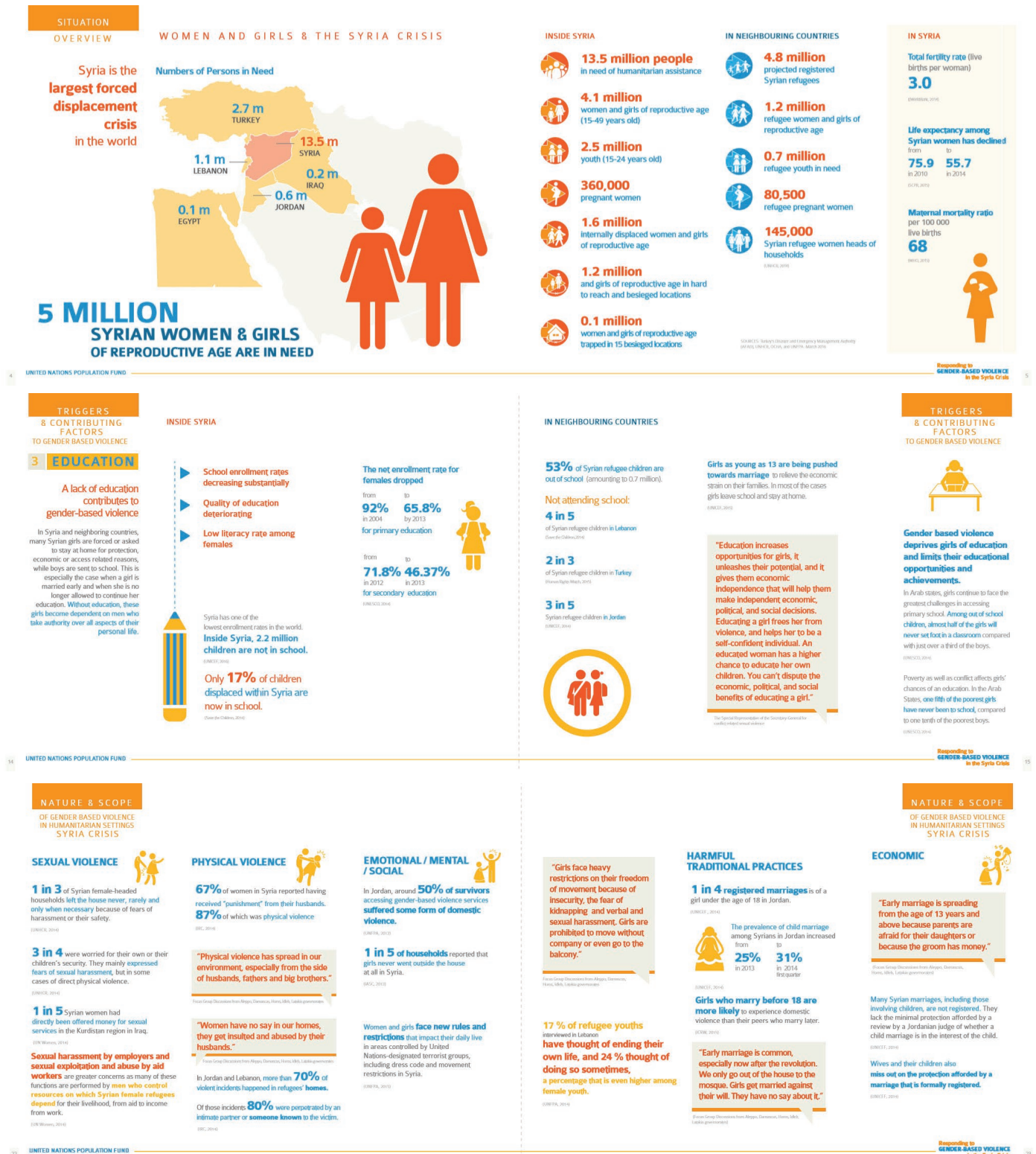
Rampant inflation: rising
prices for bread, sugar, and
oil derivatives

Increasing poverty: 80%
live in poverty and 30% in
extreme poverty. While
poverty varies among
regions, the abject poor
living in conflict zones
face additional difficulties
such as hunger and
malnutrition.

*Increasing unemployment
rate:* from 14.9% in 2011
to 58% in 2015. Some
jobless Syrians resorted to
human trafficking,
smuggling, kidnapping,
extortion, and trading in
historical objects.
'*Makework*' activities
expanded with Syrian
youths engaged in conflict-
related enterprises and
illegal activities.

Declining human wellbeing for Syrian women and girls-infographic

http://reliefweb.int/sites/reliefweb.int/files/resources/SYRIA%20CRISIS%20%20MORE%20THAN%20NUMBER%2C%20GBV%2C%20ENG%20_0.pdf



Activities

- How many million Syrian women and girls of reproductive age are in 'need' in Syria and as refugees in neighbouring countries?
- Compare life expectancy of women from 2010-2014. Explain reasons for the decline.
- Describe the education situation for females in Syria and in refugee locations, and its impacts on child labour and marriages.
- List the types of gender based violence in Syria and in refugee locations. Explain why it has increased during the conflict. Discuss how it has impacted on their wellbeing.

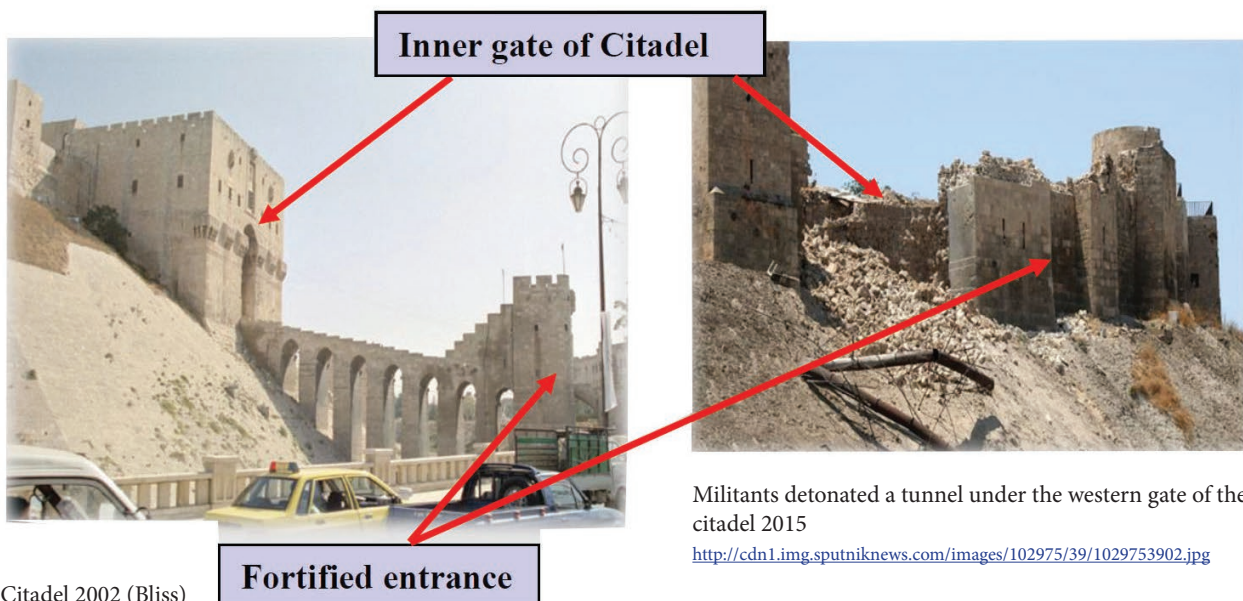
Destruction of World Heritage Sites in Syria

Aleppo is the largest city in Syria and one of the oldest continuously inhabited cities in the world. The Syrian Civil War (2011) and the Battle of Aleppo (from 2012) resulted in severe devastation. Militants detonated a tunnel under the western gate of the Aleppo Citadel. This is a huge medieval castle located in the ancient part of the city, in the shape of the acropolis.

Citadel of Aleppo



Aerial view <https://i.guim.co.uk/img/static/sys-images/Guardian/Pix/pictures/2015/3/20/1426855669495/6f9a41e9-998f-4678-ae9d-1bea7b478228-2060x1236.jpeg?w=1125&q=55&auto=format&usm=12&fit=max&s=a3bc3b1a1e082291814da051ce8277e2>



Citadel 2002 (Bliss)

Fortified entrance

Militants detonated a tunnel under the western gate of the citadel 2015

<http://cdn1.img.sputniknews.com/images/102975/39/1029753902.jpg>

Destruction of historic souq in Aleppo

The Old City of Aleppo is a World Heritage Site. Part of the Old City including the Al-Madina Souq (market place) and the Great Mosque were destroyed in 2012 when armed groups of the Free Syrian Army and the Syrian Arab Army fought for control of the city.



Traditional life in Aleppo, at al-Madina Souq 2002 (J. Bliss)



Traditional life in Aleppo, at al-Madina Souq 2002
(J. Bliss)



Damaged al-Madina Souq
http://www.aljazeera.com/mritems/Images/2014/12/24/201412240170283734_20.jpg

Destruction of the historic city of Palmyra

Roman amphitheatre stage at the historic city of Palmyra, in the Syrian Desert 2002. Formerly used for an annual festival but in 2015 was the site of an ISIL mass slaughter of 20 soldiers, using child executioners.



Historic procession on World Tourism Day 2002 at Palmyra, as Syrians walk towards Roman amphitheatre (J. Bliss). The Geographical Society of NSW lead by noted geographer Colin Sale were invited to the celebrations in 2002.



Setting up for World Tourism Day 2001 on the stage of the Roman amphitheatre (J. Bliss)



ISIS release sickening video of 'boy soldiers executing 25 captives in amphitheatre as audience watches on'
<http://i2.mirror.co.uk/incoming/article6002085.ece/ALTERNATES/s615/ISIS-Palmyra-mass-execution.jpg>

Damage to Krak des Chevaliers

Krak des Chevaliers was formerly a concentric Crusader castle. First inhabited in the 11th century, it is now one of the most important preserved castles in the world. It was declared a cultural World Heritage Site (UNESCO) in 2006 but unfortunately it was partially damaged during the recent Syrian civil war.



Krak des Chevaliers located on a 650 metre high hill
https://en.wikipedia.org/wiki/Krak_des_Chevaliers#/media/File:Krak_des_Chevaliers_01.jpg



Inside Krak des Chevaliers before the civil war 2002
(J. Bliss)



Damage to Krak des Chevaliers during the Syrian civil war
http://www.thetimes.co.uk/tto/multimedia/archive/00553/150247682_553562c.jpg

Satellite imagery

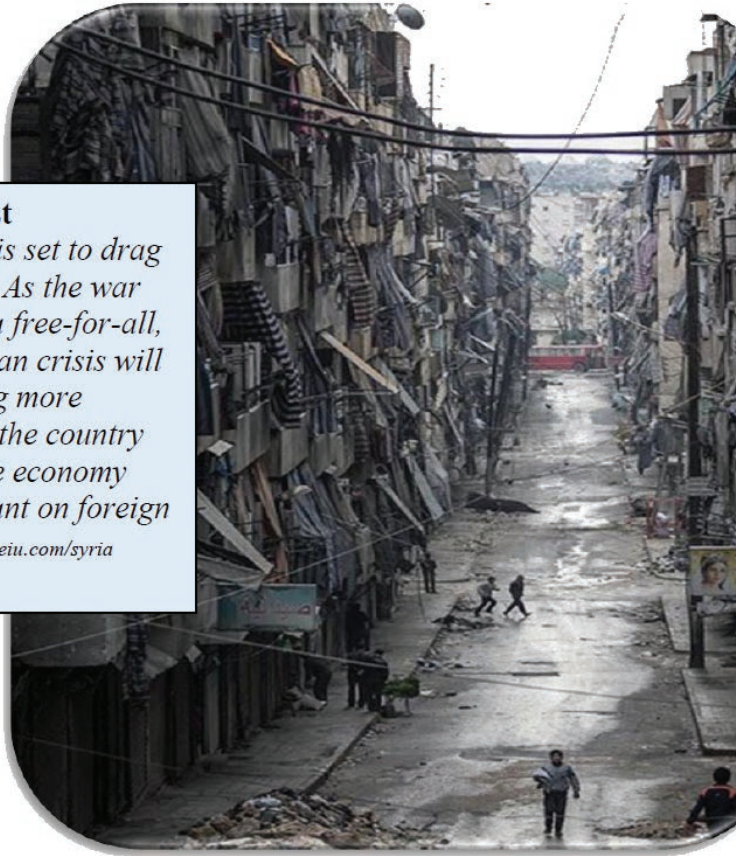
Demolition of building in the Masaa al-Arbreen district of Hama in 2012. Government forces attacked the district because its residents were regarded as opposition sympathisers by the Assad regime. More than 3,000 buildings were destroyed.

<http://www.washingtonpost.com/graphics/world/destruction-in-syria/>



The Economist

'The civil war is set to drag on in 2016-20. As the war descends into a free-for-all, the humanitarian crisis will worsen, forcing more Syrians to flee the country and leaving the economy ever more reliant on foreign aid'. <http://country.eiu.com/syria>



The World Bank

'The latest MENA Economic Monitor Report-Spring 2016, expects Syria's growth to continue to contract in 2016, by 8 %. The medium-term macroeconomic prospects hinge on containing the war and finding a political resolution to the conflict, and rebuilding the damaged infrastructure and social capital'

<http://www.worldbank.org/en/country/syria/publication/economic-outlook-spring-2016>

Photo: Aleppo <https://www.theguardian.com/artanddesign/gallery/2012/dec/08/observer-20-photographs-of-week>

Curriculum/Syllabus



Geography Syllabus-NSW

Year 7: Place and Liveability

Year 8 Interconnections

Year 9 Changing places

Year 10 Human wellbeing

Year 10 Environmental change and management

Geographical tools- maps, graphs, photos, satellite image, infographics, visual literacy
Asia, Sustainability, Civics and Citizenship

Syria mass exodus of people from Yarmouk, a Palestinian refugee camp in Damascus that has been under siege by the Assad government and military since 2013.

<https://au.pinterest.com/pin/367747125802121577/>

Activities

Knowledge and Understanding

1. Discuss why Syria has been classified as a Fragile State.
2. Describe the decline in Syria's HDI from its pre-conflict value.
3. Outline the history of the Syrian Civil War.
4. Explain why an understanding of the Syrian Civil War is complicated.
5. What countries are the major source of ISIS fighters in Syria?
6. Why do you think people join ISIS? What strategies could be implemented to reduce the flow of people to ISIS?
7. Explain how satellite imagery is an excellent geographical tool when places are unsafe to visit.

Inquiry and Skill

8. Violence, oppression and terror have squandered human lives, their basic services and livelihoods. List the social and economic impacts of conflict in Syria as a two column table.
9. The historic Roman amphitheatre stage at Palmyra was used for human rights abuses. Explain this statement
10. Describe the changes to the Masaa al-Arbreen district of Hama from 2010-2012. Explain how damaged buildings and infrastructure impacts adversely on human wellbeing
11. Investigate human rights abuses in Syria such as Kurdish forces using child soldiers. Present your research as a TV report
12. In groups update the wellbeing of Syrian people today, and explain the changes using the internet.
13. Refer to YouTube on Human Rights Watch website and summarise the agony this family suffered in the hands of ISIS.

<https://www.hrw.org/world-report/2016/country-chapters/syria>



Mohammed, 42 and three of his relatives who were orphaned in the attack on June 25, 2015 in Kobani, Syria.

Graphic organiser

Domestic actors in the Syrian Conflict	
<ul style="list-style-type: none"> What are the major domestic groups/forces in the conflict? 	
<ul style="list-style-type: none"> What do they want? 	
<ul style="list-style-type: none"> How has the Syrian government responded to opposition? 	

International actors in the Syrian conflict	
<ul style="list-style-type: none"> Who are the main international actors in the conflict? 	
<ul style="list-style-type: none"> Why did the international community intervene in the conflict? 	
<ul style="list-style-type: none"> Who are the Syrian government's most important allies? 	
<ul style="list-style-type: none"> List five countries that have spoken out against the Syrian government? 	
<ul style="list-style-type: none"> What are the views of the Arab League towards the conflict? 	
<ul style="list-style-type: none"> What measures has United Nations taken-economic, social, political? 	

Syria's neighbours	
<ul style="list-style-type: none"> Name the countries that border Syria 	
<ul style="list-style-type: none"> How many refugees have escaped to these countries? 	
<ul style="list-style-type: none"> What are the economic and social effects of refugees on poor neighbouring countries? 	

ICT

- Human Rights Watch, Syria <https://www.hrw.org/world-report/2015/country-chapters/syria>
- Failed State Wars May 2015 https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/150603_Failed_State_Wars_in_Iraq_Syria.pdf
- Failed State Index <http://library.fundforpeace.org/library/fragilestatesindex-2015.pdf>
- Syria using chlorine gas to attack town <http://www.aljazeera.com/news/2015/05/fresh-claims-chlorine-gas-attacks-syria-150502235313185.html>; <http://www.bbc.com/news/world-middle-east-31930181>
- Visual resources for teaching Syria http://www.pbs.org/newshour/extra/lessons_plans/visual-resources-teaching-syria/
- More detailed maps on Syria as well as city and topographic maps <http://www.lib.utexas.edu/maps/syria.html>

YouTube

From Arab Spring (2011) to truce (2016) <https://www.rt.com/news/335711-rt-syrian-war-timeline/>. 5 mins

Time line

<https://www.washingtonpost.com/apps/g/page/world/timeline-unrest-in-syria/207/>

TEACHING RESOURCES/LESSONS PLANS-USING THE NEWS



PBS-Public Broadcasting System
Chemical weapons spark international debate
<http://www.pbs.org/newshour/extra/2013/09/5-top-classroom-resources-teaching-syria/>



PBS: An attack on Syria: What would you do?-Lesson Plan
http://www.pbs.org/newshour/extra/lessons_plans/lesson-plan-attack-syria/. Role play-hypothetical situation. Students share their decisions.



Oxfam: <http://www.oxfam.org.uk/education/resources/syria>
Syria, a children's crises? Taking action. Analysing news items, Power Point



THE CHOICES PROGRAM



Pininterest

Pininterest has developed suggested teaching resources on Syrian to help students learn about the topic <https://au.pinterest.com/humaneeducation/syria/>

Fabulous site with photos on Syria

<https://au.pinterest.com/explore/syria/>

Syrian refugees <https://au.pinterest.com/explore/syrian-refugees/>

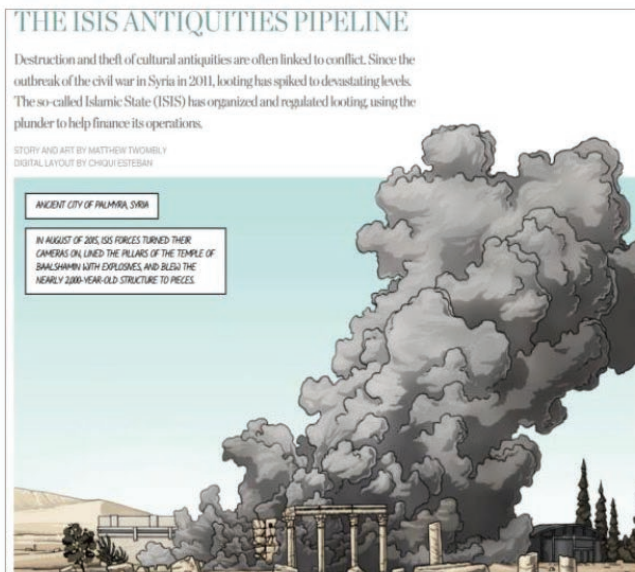
The Choices Program

Teaching with the News-conflict in Syria

http://www.choices.edu/resources/twtn/twtn_syria.php

National Geographic-ISIS Antiquities Pipeline

<http://www.nationalgeographic.com/magazine/2016/06/looting-isis-antiquities-pipeline/?sf26722853=1>



Syrian Refugee

CRISIS

by Dr. Susan Bliss

<http://www.jewishhartford.org/upload/images/syrian%20refugee%20header.jpg>

The world witnessed the largest number of displaced people on record, in 2015. About 65.3 million people had been forced from their home - nearly 21.3 million were refugees.

In 2015:

- 24 people every minute or 34,000 people per day, leave everything behind to escape war, persecution or terror. This is a huge increase compared to 6 people per minute in 2005.
- 12.4 million people were newly displaced due to conflict within their own country, and 1.8 million newly displaced refugees.
- more than 54% of refugees came from Syria, Afghanistan and Somalia.
- 86% of the world's refugees were hosted in developing countries.
- top hosting countries were Turkey, Pakistan, Lebanon, Iran, Ethiopia and Jordan.
- six wealthiest countries host less than 9% of the world's refugees - USA, China, Japan, Germany, France and UK accommodate only 2.1 million refugees (Oxfam Report).

Overview: global refugee numbers in 2015 <http://www.unhcr.org/figures-at-a-glance.html>

Global forced displacement has increased in 2015, with record-high numbers. By the end of the year, 65.3 million individuals were forcibly displaced worldwide as a result of persecution, conflict, generalized violence, or human rights violations. This is 5.8 million more than the previous year (59.5 million).

65.3

MILLION
FORCIBLY
DISPLACED
WORLDWIDE

If these 65.3 million persons were a nation, they would make up the 21st largest in the world.

21.3 million persons were refugees

16.1 million under UNHCR's mandate

5.2 million Palestinian refugees registered by UNRWA

40.8 million internally displaced persons¹

3.2 million asylum-seekers

Syrian Refugee Crisis

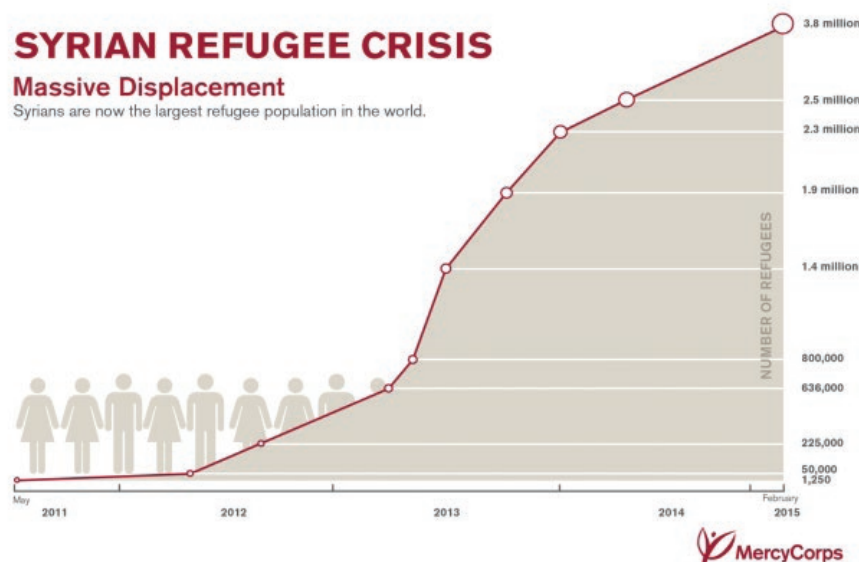
Syrians have suffered violations of human rights, tragically evolving into the biggest humanitarian disaster since the Second World War. It was declared as the '*worst refugee crises of our generation.*'

Staggering statistics:

- March 2016, death toll reached 250,000 people, including more than 100,000 civilians.
- About 8 million Syrian refugees were internally displaced (IDP) and about 4.8 million Syrian refugees had been forced to flee their home. Most escaped to neighbouring countries.
- 2.1 million Syrians are registered by UNHCR in Egypt, Iraq, Jordan and Turkey, 2.7 million Syrians registered by the Government of Turkey, and more than 29,000 Syrian refugees registered in North Africa. (UNHCR 20 July 2016) <http://data.unhcr.org/syrianrefugees/regional.php>

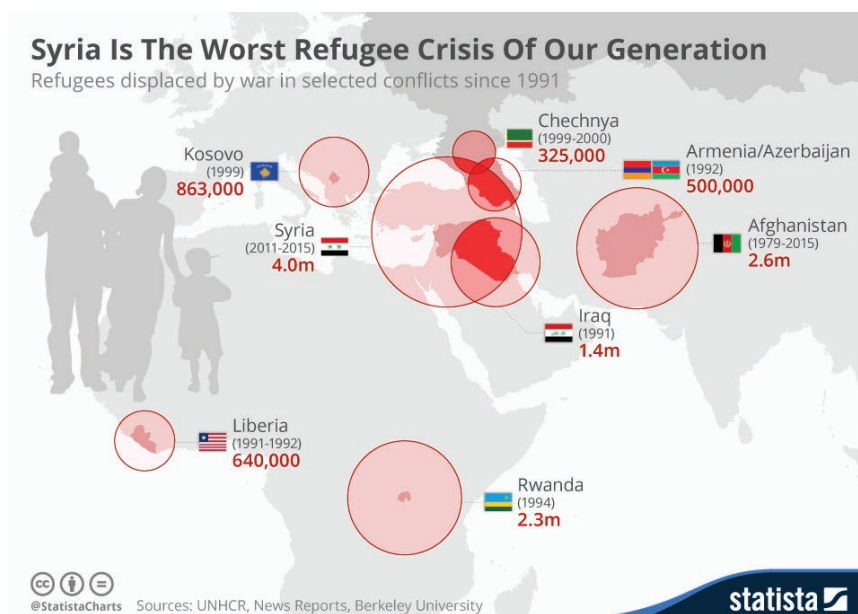
Escalating number of Syrian refugees since 2011

<https://www.mercycorps.org/articles/iraq-jordan-lebanon-syria-turkey/quick-facts-what-you-need-know-about-syria-crisis>



Map-proportional circles-Syria experienced worst refugee crises of our generation

http://xpat.s3.amazonaws.com/wp-content/uploads/2015/09/08145737/chartoftheday_3632_syria_is_the_worst_refugee_crisis_of_our_generation_n.jpg



Refugees are the poorest of the poor. Against their will they are uprooted from their homelands as a result of conflict, human rights abuses, natural disasters and hunger. They flee with all their worldly possessions on top of their heads and in their arms. On their agonising walk they climb over razor wire fences and sleep in fields. Some employ human traffickers and hide in airless containers while others travel on rickety boats across dangerous seas.

Behind the headlines are maps, statistics, photographs, and stories of tragedy and compassion. A greater global commitment to protect these vulnerable people needs to be implemented. **The Internal Displacement Monitoring Centre**, states that the movement of refugees costs \$100 billion a year - people lose homes and jobs in conflict zones, and organisations are paid to feed and shelter refugees in transit and destination countries.

What is the difference between a refugee, asylum seeker and migrant?

Refugee	Asylum seeker	Economic migrant
Refugees are people who fear persecution on the basis of race, religion, ethnicity, nationality, membership of a social group or holds certain political opinions. They are unable or unwilling to return home for fear of persecution.	Asylum seekers are refugees who apply for asylum in another country. In 2015 Germany was the largest recipient of new asylum claims. Syrians lodged the most claims, followed DR Congo and Myanmar.	Economic migrants move from one country to another for a better quality of life such as employment and educational opportunities, or reuniting with family. They are generally unskilled and semi-skilled people moving from developing countries. They are not eligible for asylum

Who are internally displaced people (IDP)

Internally displaced people (IDP)

People forced to flee their homes but still live in their own country such as Syria (story below)
They represents a special challenge for humanitarian organisation as many live in conflict zones, and providing aid is difficult



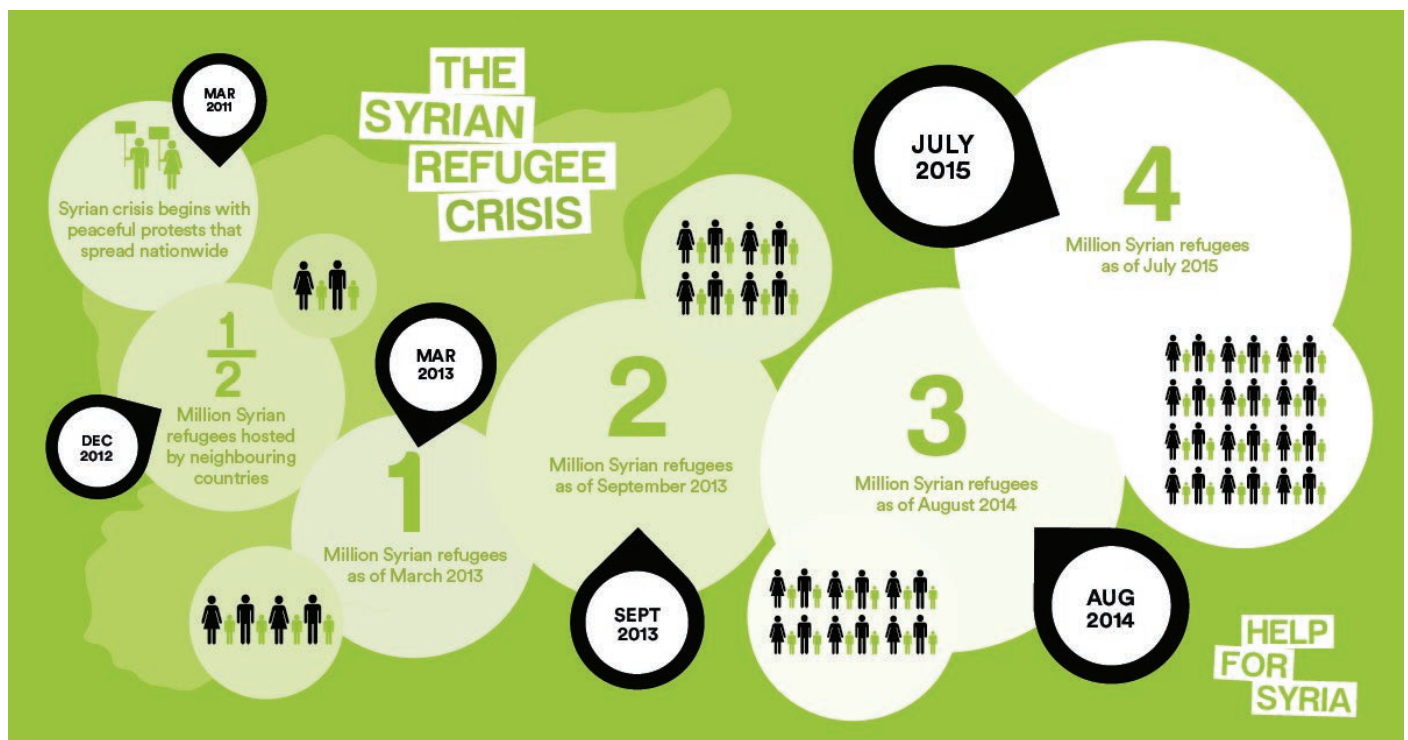
Photo: Abu Yahya, Umm Yahya and their sons- Yazin and Yahya – via Skype
 ‘The family gets up at 5am for prayers. At 9am they have breakfast. "The planes fly past at this time and usually drop four rockets. This is how we start the day’, Abu Yahya says.
 ‘The family has been living under siege in Jobar, a district of Damascus, for more than three years. Shells are dropped by planes, snipers shoot from a nearby tower, and rockets are launched from a mountain top. However, Abu Yahya won't be moving away. First, he can't afford to, and second, why should he? Jobar is his home. The whole neighbourhood is pro-Free Syrian Army, and the regime is aware of that.
 "They are giving us a very hard time," Abu Yahya says. "There is another district next to us that has also sustained heavy shooting, and they get very heavy shells. They are called elephant shells because they are so big. There is a mountain in Damascus and from here we can see all the artillery piled up there."
<http://www.theguardian.com/world/2014/jul/05/life-in-war-zone-syria>

Inquiry question:

How does this Syrian family continue with their daily life when their country is at war? No electricity, little food, no schools, children collect water and wood, and the family are unable to afford to move away. Refer to the website and describe life in Syria's war zone as a narrative.

Time line: growth in Syrian refugee numbers 2011-2015

<http://www.helpforsyria.org.uk/wp-content/uploads/2015/02/Syrian-Refugee-Crisis-Infographic.jpg>



Great Syrian escape-near and far!

The largest number of Syrian refugees live in the Middle East (West Asia). Millions have escaped to Syria's neighbouring countries such as Turkey, Lebanon and Jordan where most live in underfunded UN-run refugee camps. Others have taken a longer journey to Europe.

Where are Syrian refugees going? How are they getting there?

<http://time.com/4028055/syria-europe-refugees-graphic/>



Refugees journey via dangerous Mediterranean Sea

Refugees and migrants cross the perilous waters of the Mediterranean Sea to the EU, and on their way many die.

2015: sea arrivals traveling from a variety of countries (e.g. Syria, African countries) to Europe via the Mediterranean Sea reached 1,015,078. About 3,770 drowned.

2016: 2,990 dead/missing Jan- June 2016; 880 people from African countries died crossing the Mediterranean in one week (UNHCR)

Sea arrivals across Mediterranean Sea- to July 2016



<http://data.unhcr.org/mediterranean/regional.php>

Migrants/refugees crossing the Mediterranean Sea 2006-2014

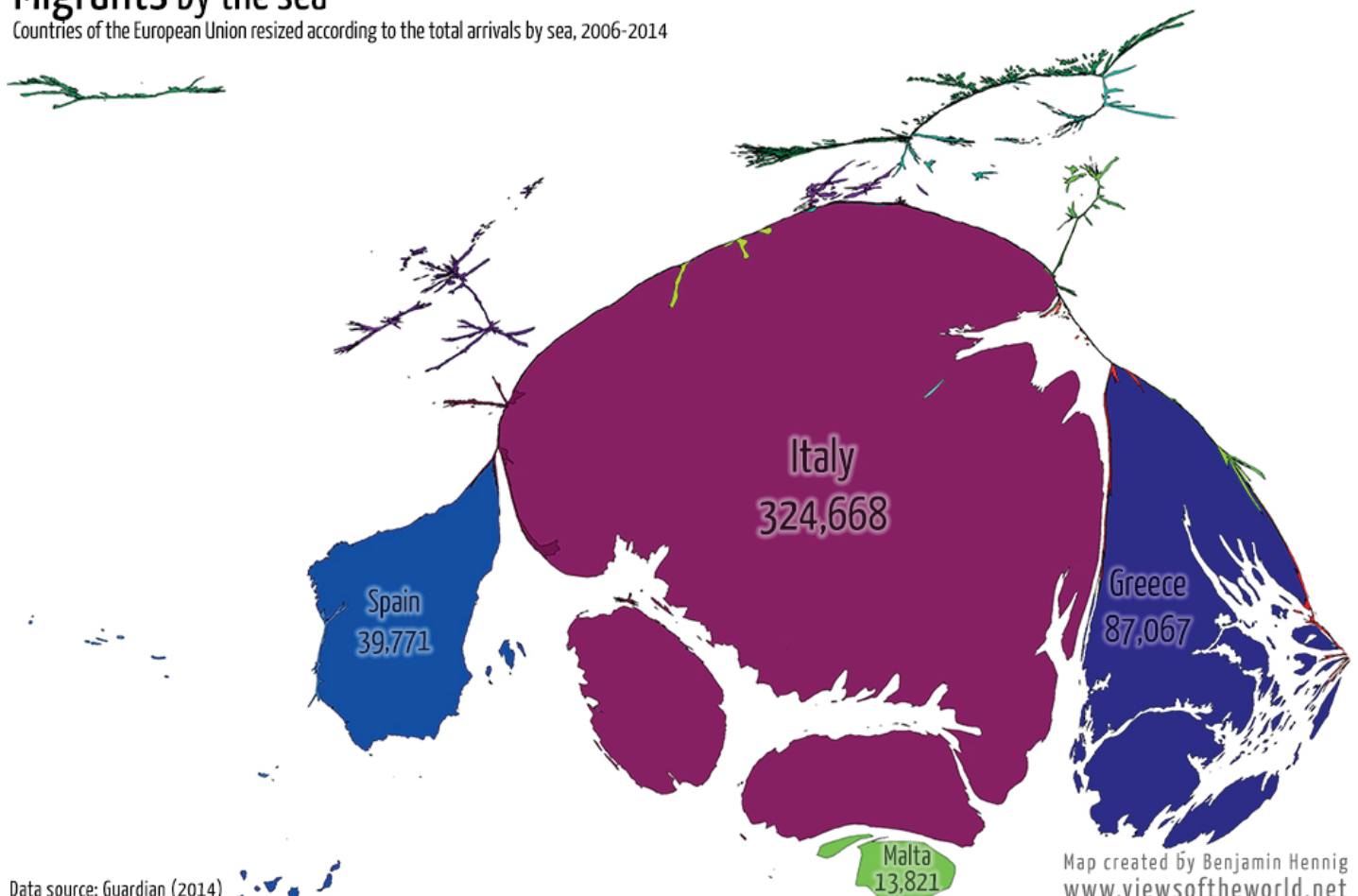
Cartogram below shows countries that receive a large number of migrants via sea 2006-2014.

The map has been resized for each country according to number of refugees received.

<http://www.viewsoftheworld.net/wp-content/uploads/2014/12/EuropeMigrationBySea2006to2014.jpg>

Migrants by the sea

Countries of the European Union resized according to the total arrivals by sea, 2006-2014



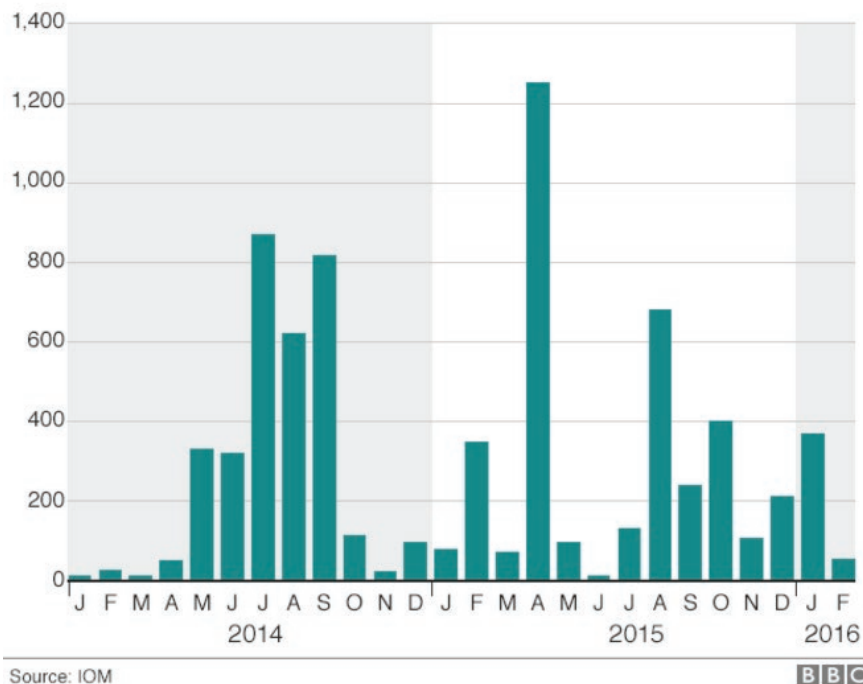
Data source: Guardian (2014)

Map created by Benjamin Hennig
www.viewsoftheworld.net

Migrant/refugee deaths in the Mediterranean Sea by Month, 2014-2016

Column graph: <http://www.bbc.com/news/world-europe-34131911>

Migrant deaths in the Mediterranean by month

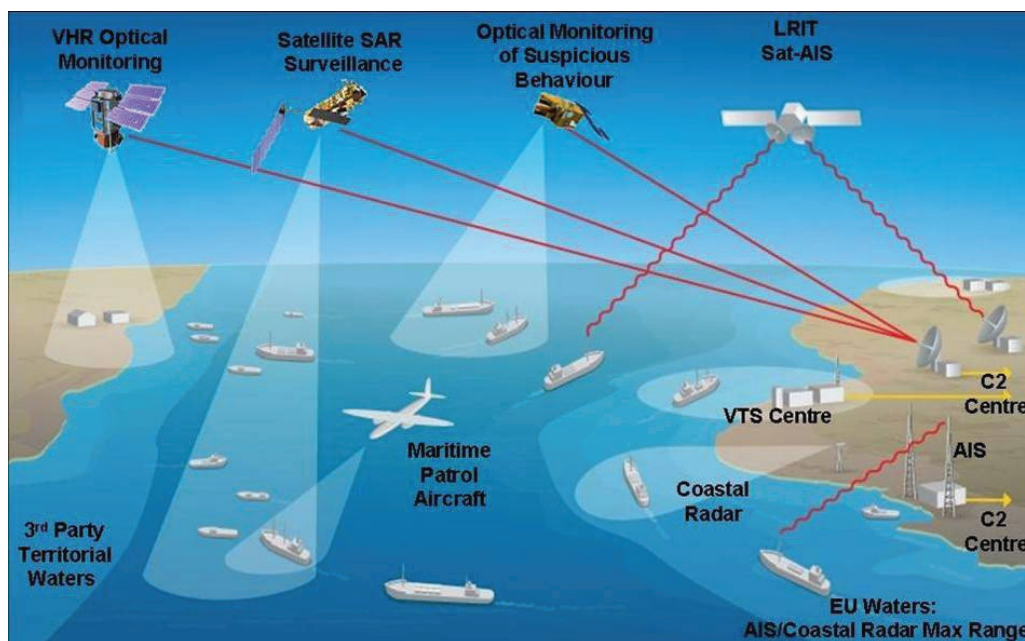


Role of satellite technology

UNHCR's Field Information and Coordination Support Section (FICSS) provides the latest information on refugees using satellite imagery, geographic information systems (GIS) and global positioning systems (GPS). This global organisation shows the location of forcibly displaced people, infrastructure in refugee camps and environmental impacts of camps on the surrounding environment.

Google Earth's mapping program takes a virtual tour of refugees located in remote areas.

Pictorial information (virtual literacy) such as maps and photographs are invaluable to UNHCR staff as they either support or refute the validity of statistics. Additionally other organisations such as Refworld contains countless maps and geospatial information at their website.



European Space Research Institute, uses satellite imagery over the sea

http://www.esa.int/var/esa/storage/images/esa_multimedia/images/2011/07/satellites_for_maritime_surveillance/9918984-2-eng-GB/Satellites_for_maritime_surveillance.jpg

Syrian refugees travelling by sea

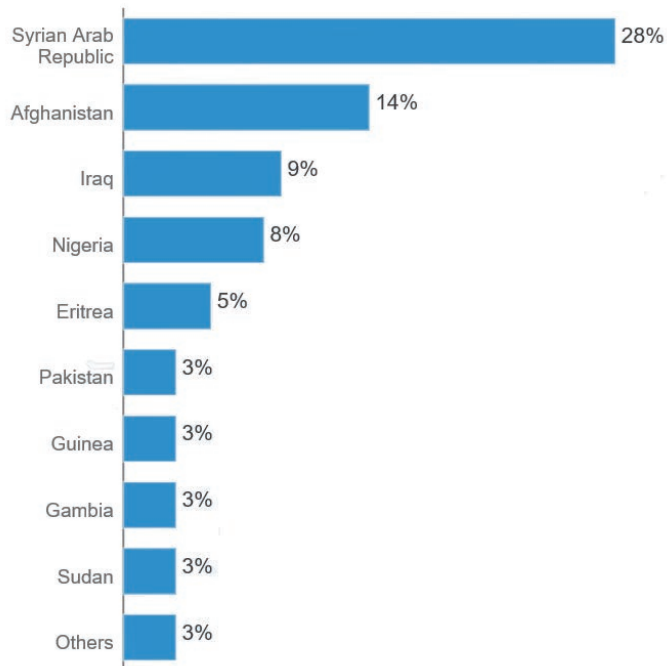
Syrian refugees in Turkey and Lebanon travel across the Mediterranean Sea to Greece, Egypt and Bulgaria in overcrowded poorly constructed dinghies. Border management agency Frontex reports that large numbers of Syrian refugees cross between Turkey and Greece via the Eastern Mediterranean route.

Top 10 nationalities of Mediterranean arrivals Jan-July 2016

Top 10 nationalities represent 83% of sea arrivals

<http://data.unhcr.org/mediterranean/regional.php>; <https://au.pinterest.com/pin/263531015673899388/>

based on arrivals since 1 Jan 2016



Syrian travels by air to Europe-the five star route

A Syrian man revealed how he avoided putting his life on the line to escape to Europe by taking a 'five-star' route. Tareq aged 26 paid £2,175. Instead of weeks of hardship and risks that most refugees face in their attempts to leave war-torn Syria, Tareq travelled from Dubai to Sweden in under a month. Tareq's journey to his new life in Scandinavia was made possible thanks to a global network of human traffickers - and his family's financial support.

By comparison, migrants and refugees pay about £500 for the sea crossing to Europe, a fee that buys them space on a packed, often unseaworthy boat run by the traffickers.



<http://www.dailymail.co.uk/news/article-3225773/For-one-Syrian-migrant-hefty-price-buys-5-star-journey-Europe.html>

UNHCR sea arrivals and onwards movements 2015

<http://maps.unhcr.org/en/view?uuid=b102a950-55c4-4dd7-bf96-0ed61692ea14>

Lesbos, a small Greek island received 8,000 refugees a day from Turkey, in November 2015. On dangerous overloaded dinghies they cross the perilous Aegean Sea. Government officials stated that Greece was experiencing problems coping with the large influx of people.

Greece already suffering a financial crisis, has been unable to process the thousands of migrants — forcing refugees in places like Lesbos to set up impromptu tent cities near the port.



Refugees disembark from a boat after making the five mile crossing from Turkey. More than 30,000 refugees reached the Greek island of Lesbos during August 2015



Moria refugee camp on Lesbos, Greece, holds mostly Afghani, Somali, and SE Asian refugees. It has no services, little food or water. People wait daily for transit papers.

Photo 1: Refugees disembark from a boat after making crossing from Turkey to Lesbos

<http://www.corbisimages.com/stock-photo/rights-managed/42-76124362/almost-one-thousand-refugees-per-day-arrive?popup=1>

Photo 2: 24th August 2015 -- Moria refugee camp on Lesbos,

<http://www.corbisimages.com/stock-photo/rights-managed/42-76109959/moria-camp-in-lesbos-crowded-with-hungry?popup=1>

European refugee crises

In 2015, over half a million refugees and migrants entered the European Union (EU), via the Mediterranean Sea or through Southeast Europe. The top three nationalities came from Syria (54%), Afghanistan (15%) and Eritrea (6%). Germany estimates that 30% of migrants claiming to be Syrian citizens came from other countries. The inflow of refugees are anticipated to increase with continuing political conflicts, fake passports and growing people trafficking.

Syrian refugee flows to EU

<https://pbs.twimg.com/media/COUBh5NVEAAzyn2.png>

Syrian asylum applications in Europe

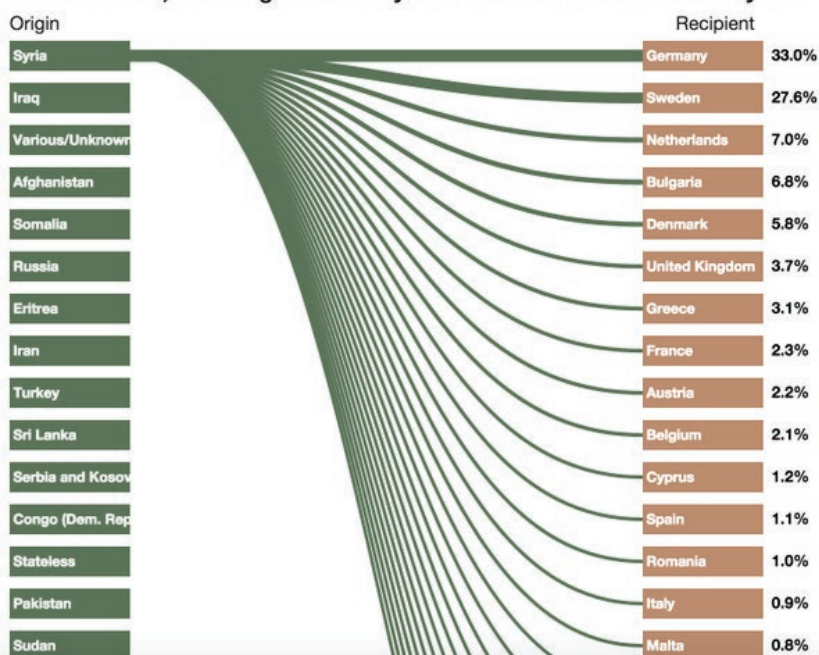
Between April 2011 and May 2016
1,066,844 Syrians applied for asylum in Europe. Most wanted to live in Germany.

http://icchef-1.bbc.co.uk/news/560/cpsprodpb/F2DE/production/_85447126_syrian_refugees_all.png

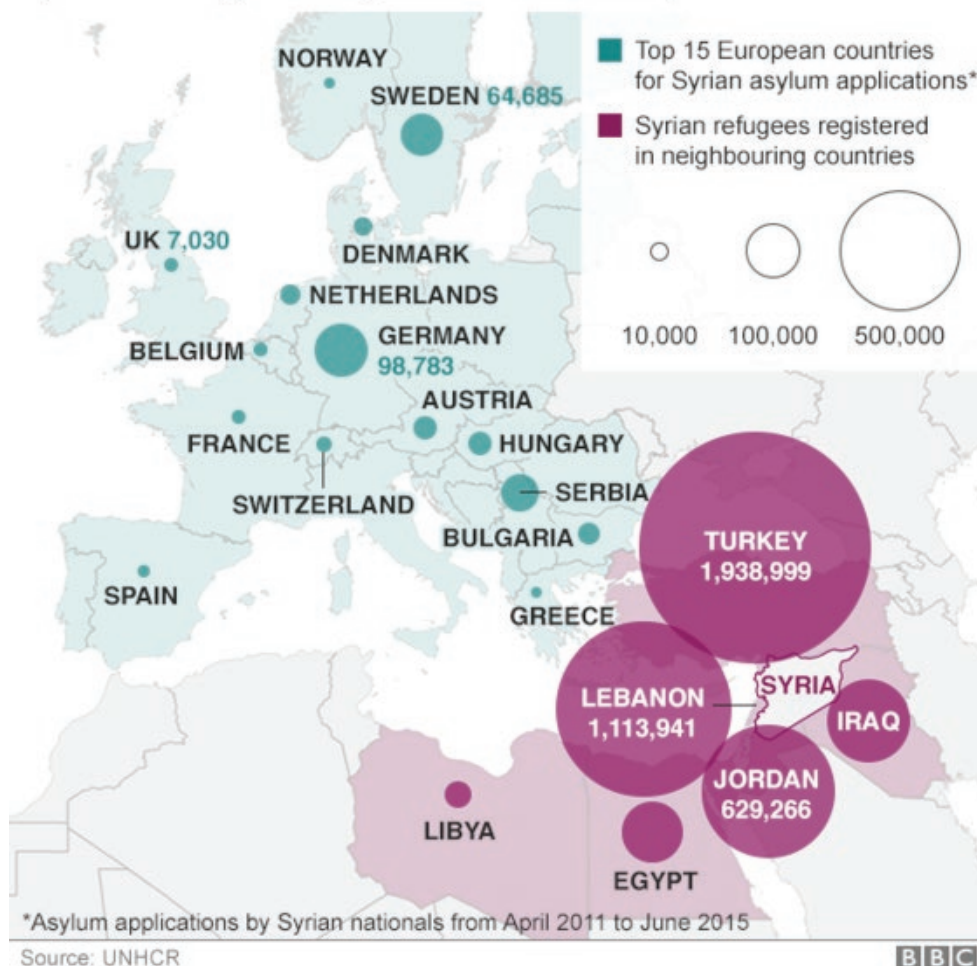
Refugee flows to the EU

#flykt

There are 124,374 refugees from Syria in the EU. Here's where they live.



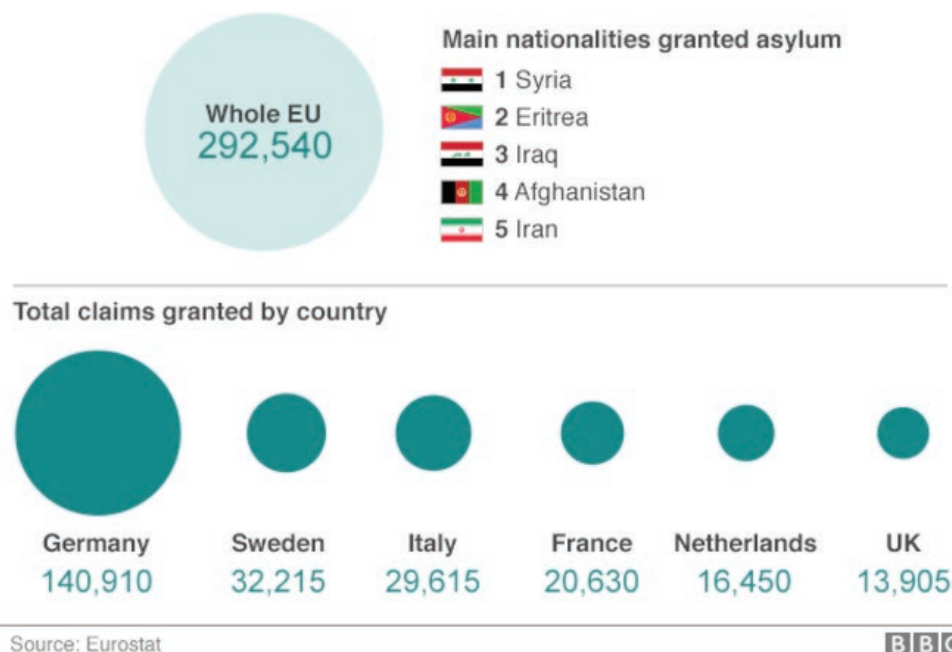
Syrians in neighbouring countries and Europe



How many asylum claims were approved?

<http://www.bbc.com/news/world-europe-34131911>

Asylum applications approved 2015



Cartoons-mass migration tsunami and mixed messages (Welcome and Visa Denied)

<https://s-media-cache-ak0.pinimg.com/736x/c3/57/4d/c3574d14555f2d02213170769c99b246.jpg>

<http://www.middleeasteye.net/sites/default/files/main-images/Tragedy%20of%20immigration%20to%20Europe%20Middle%20East%20Eye.gif>



What are the messages in these cartoons?

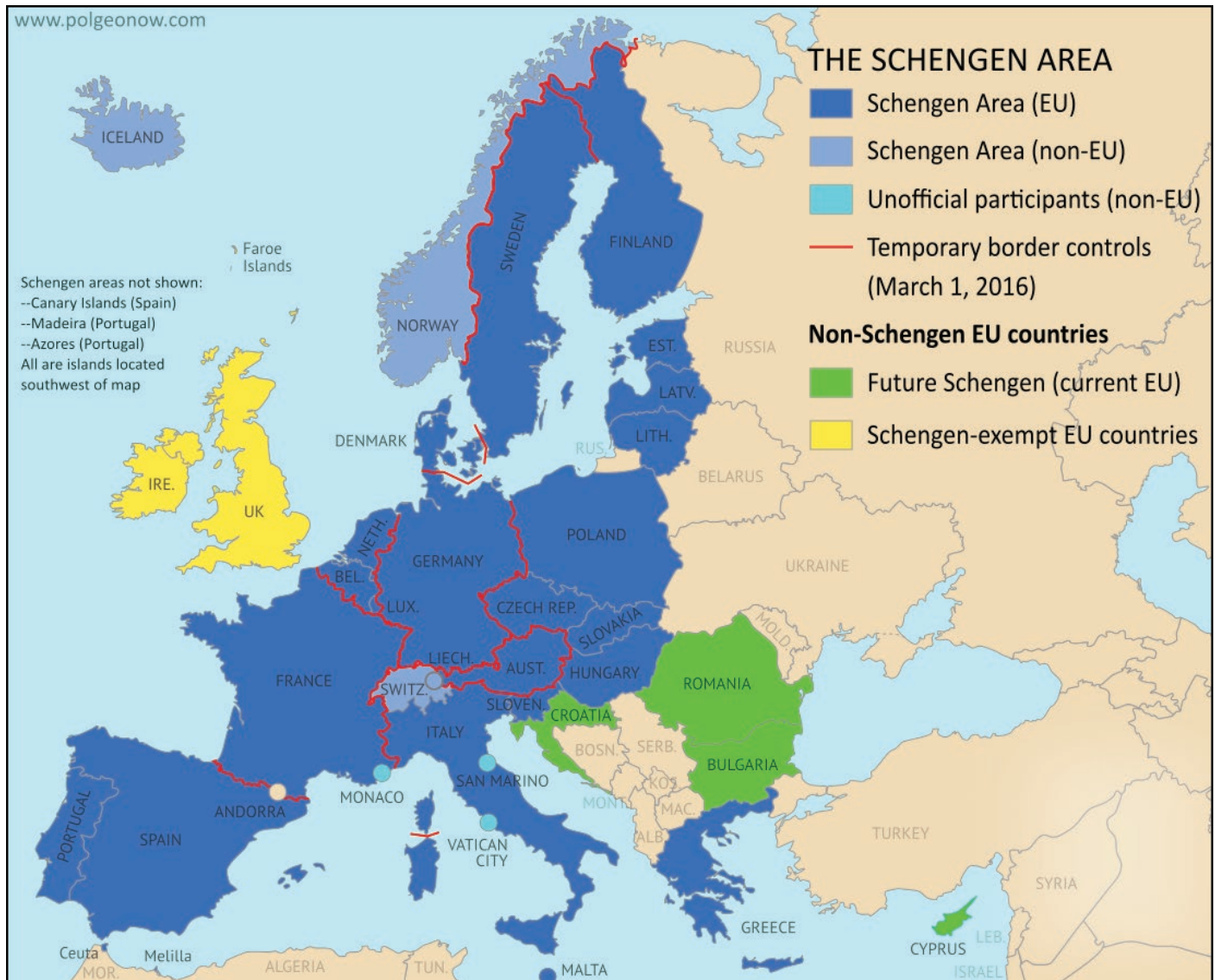


Economic Union border controls

Refugees must confront a number of European countries that are working to keep them out, or keep them from moving freely across Europe. Hungary has built a fence on its border to keep out refugees. Border controls are against the spirit of the Schengen Area countries. These countries are supposed to allow free movement of people across one another's borders. At the beginning of March 2016, seven Schengen countries imposed 'temporary border controls': Denmark, Norway, Sweden, Austria, Germany, France, and Belgium.

Border controls in Schengen Area

<http://www.polgeonow.com/2016/03/map-schengen-temporary-border-controls.html>



Migrants stand in front of a barrier at the border with Hungary near the village of Horgos, Serbia, September 15, 2015. © Marko Djurica / Reuters

War next door: Syrian refugees flee to neighbouring countries

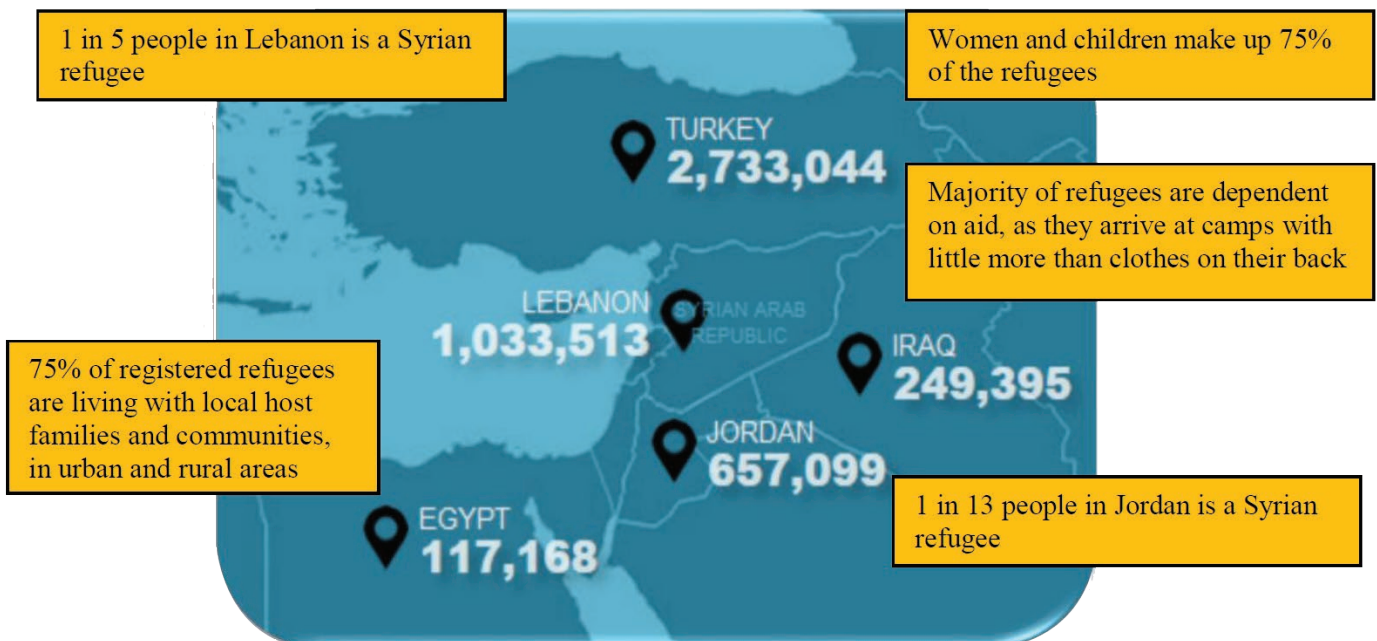
Syria's neighbours have recently been making it harder for migrants to cross into their territories, as they cannot accommodate the millions of people with adequate services and basic needs.

However, wealthy Gulf States are refusing to accept Syrian refugees, despite religious and cultural links and geographical proximity. "Surely," wrote Lord Carey in *The Telegraph* on 5 September, "if [Gulf States] are concerned for fellow Muslims who prefer to live in Muslim-majority countries, then they have a moral responsibility to intervene."

The Gulf States are some of the wealthiest countries in the world, much wealthier than Syria's neighbouring countries that are accommodating millions of Syrian refugees.

Syrian refugees fled to neighbouring countries

<http://data.unhcr.org/syrianrefugees/syria.php>



Cartoon: Syrian refugees flee to neighbouring countries

<https://s-media-cache-ak0.pinimg.com/736x/0b/65/af/0b65afb346e0b8c7a4403c6a2072e7f5.jpg>



Syrians fleeing through border fences with southern Turkey. Under an 'open door' policy Turkey has taken millions of refugees since the conflict in Syria 2011 <http://www.unhcr.org/thumb1/558131956.jpg>

Eroding stability?

The Syrian Civil War is eroding stability in neighbouring countries such as Lebanon, Jordan and Turkey. The spill-over effects of the war are:

- **Millions of refugees** - all three countries have maintained a generous 'open door' policy.
- **Spread of militancy** - growth in number of fighters and weapons due to transnational ambitions of ISIS and some of their population fighting in the Syrian War.
- **Economic** cost of managing refugees (shelter, food, education, health services, employment, social services), and decline in investor confidence and tourism. Government's budget deficits require support from foreign aid.
- **Political rifts** from domestic power struggles. Turkey is threatened by a well-entrenched ISIS network and immersed in conflict with its Kurdish population. Both of these issues have been exacerbated by the war in Syria.

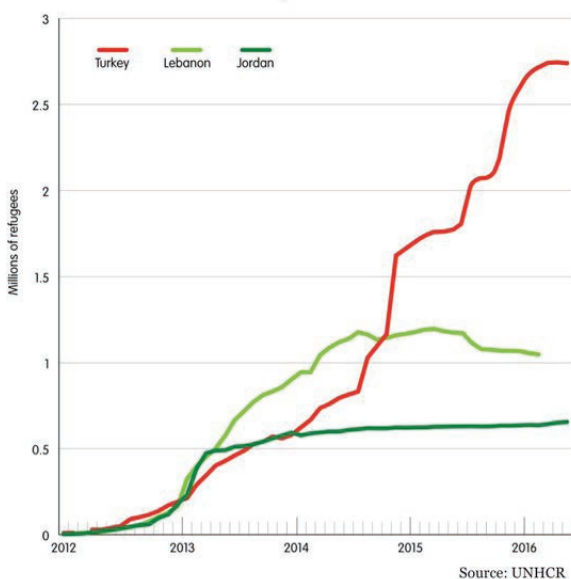
ISIS has posed challenges to these countries, as evidenced in:

- **Turkey:** terrorist attacks in Istanbul and Ankara.
- **Lebanon:** multiple suicide attacks in a Christian village in North-East Lebanon.
- **Jordan:** five intelligence officers shot dead.

Europe's response:

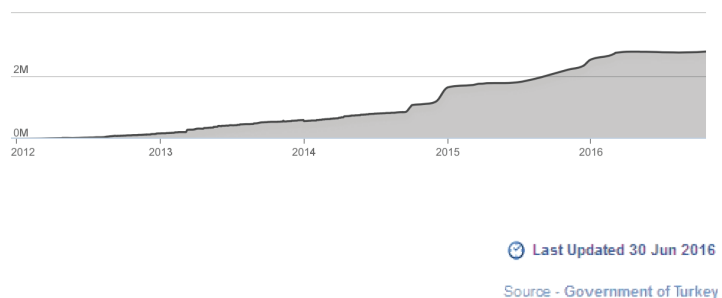
Recognising Europe's limited influence over the warring parties in Syria, they have concentrated on supporting the country's neighbours-Jordan, Lebanon and Turkey.

Refugee numbers in Jordan, Lebanon and Turkey, 2012-2016



Turkey

2,733,044 registered Syrian refugees 30 June 2016



Demography

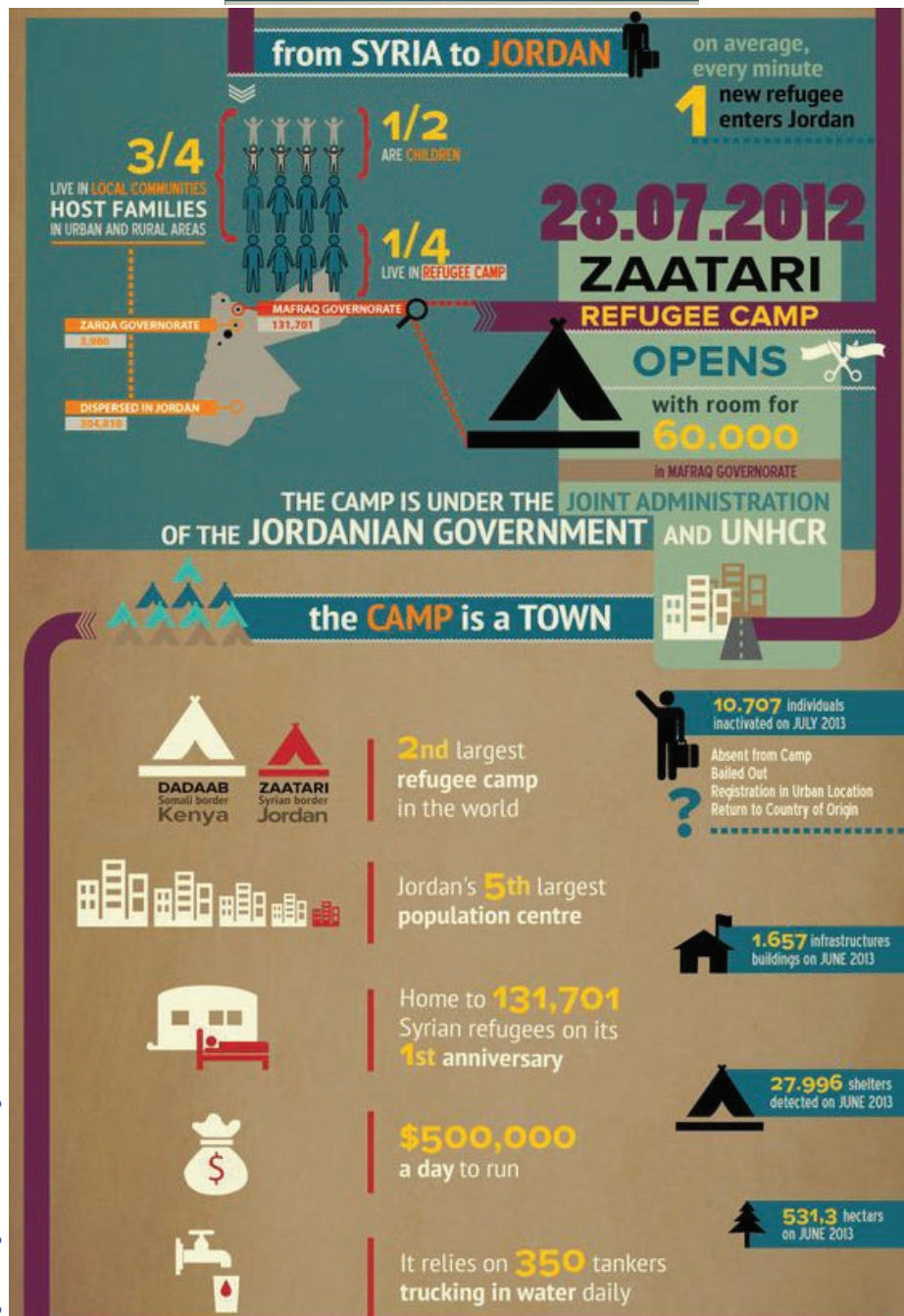
Male (50.8%)		Age	(49.2%) Female
10.4%		0 - 4	9.5%
10.4%		5 - 11	9.9%
7.2%		12 - 17	6.8%
21.1%		18 - 59	21.3%
1.7%		60 +	1.8%

Many refugees are children!

<https://au.pinterest.com/pin/439523244863113992/>



DO YOU KNOW ZAATARI refugee CAMP?

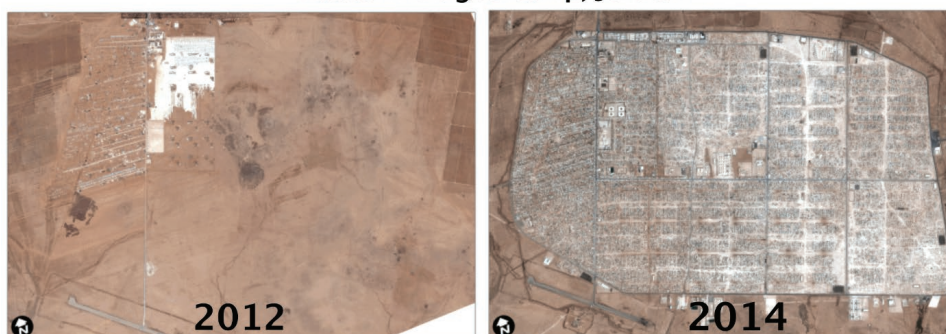


<https://au.pinterest.com/pin/370350769328142889/>

Satellite image showing growth of Zaatari refugee camp

<https://www.washingtonpost.com/news/worldviews/wp/2014/11/06/can-these-satellite-images-save-lives-the-u-n-thinks-so/>

Zaatari refugee camp, Jordan



Zaatari refugee camp evolves as a 'Do-It-Yourself City'

<http://www.nytimes.com/2014/07/05/world/middleeast/zaatari-refugee-camp-in-jordan-evolves-as-a-do-it-yourself-city.html?smid=fb-share&r=1>

Zaatari Refugee Camp

A young Syrian salesman stopped into Ahmad Bidawi's barbershop for a shave the other day. Music wafted on fan-cooled air. Outside, on what has become the main commercial strip here in one of the world's largest refugee camps, workers steered handcarts packed with lumber and kitchen appliances through sun baked crowds hanging out in front of shops. Zaatari is becoming an informal city: a sudden, do-it-yourself metropolis of roughly 85,000 with the emergence of neighbourhoods, gentrification, a growing economy and, under the circumstances, something approaching normalcy, though every refugee longs to return home. Mr. Kleinschmidt ticked off numbers: 14,000 households, 10,000 sewage pots and private toilets, 3,000 washing machines, 150 private gardens, 3,500 new businesses and shops. Not far from Mr. Bidawi's barbershop, Zaatari has a pet store, a flower shop and a homemade ice cream business. Refugees tote rotisserie chickens from a takeout joint on the main street, called the Champs-Élysées.

<http://www.nytimes.com/2014/07/05/world/middleeast/zaatari-refugee-camp-in-jordan-evolves-as-a-do-it-yourself-city.html?smid=fb-share&r=1>



Refugee voices- at Zaatari camp

'On this first day of Ramadan, Ziad, 31, returns to his family's caravan, after working a shift as a door guard in Za'atri refugee camp. "Last Ramadan I was in prison," this father of 3, told me. His wife and children would call him. "Come home papa, come home," but each time he would have to tell them, "I can't, the door is locked." He becomes emotional as he remembers those days, recalling that he was unable to buy gifts for his children. Last year he was in a prison and this year he's a refugee. "It's like death" Ziad says. "My parents and all my brothers and sisters are still in Syria." As I speak with him, the TV in the background reports bombing in his home village. It's a constant internal struggle not to pick everything up and return, but the safety of his young family, and another baby on the way, keeps him rooted. "Every day my son Tarek prays with me," he says. Ziad is far from being home, but at least he is with his children this Ramadan.' <http://data.unhcr.org/syrianrefugees/syria.php>



Did you know?

- In the Zaatari refugee camp in Jordan there is only 1 toilet for every 50 refugees.
- In Lebanon only 2% of Syrian refugee children of secondary school age are enrolled in schools.

Humanitarian aid and response: civics and citizenship

Aid organisations

'Financial aid from government, non-government, and private donors support Syrian refugees' These organizations and agencies deliver aid to refugees in the form of food, education, housing, clothing and medical care, along with migration and resettlement services.' United Nations Office for the Coordination of Humanitarian Affairs 2015.

There are 600-700 local and diaspora groups providing life-saving aid to Syrian civilians. Diaspora groups are succeeding in providing aid to civilians in areas where international agencies struggle to reach them.

United Nations agencies (UN)	Intergovernmental Organisations (IGO)
<ul style="list-style-type: none">• Food and Agriculture Organisation• Office for the Coordination of Humanitarian Affairs• UN Children's Emergency Fund• UN Development Program• UN Educational, Scientific and Cultural Organisation• UN Higher Commissioner for Refugees• UN Population Fund• World Food Programme• World Health Organisation	<ul style="list-style-type: none">• International Organisation for Migration
	International Non-Governmental Organisations (NGO)
	<ul style="list-style-type: none">• CARE International• International Committee of the Red Cross• International Red Cross. Red Crescent Societies• International Medical Corps• Mercy Corps• Oxfam• Save the Children International
National Organisations	National/Regional Governments
<ul style="list-style-type: none">• Danish Refugee Council (Denmark)• IHH Humanitarian Relief Foundation (Turkey)• Islamic Relief Worldwide (UK)• Norwegian Refugee Council• Red Cross (7 branches)• Red Crescent (6 branches)	<ul style="list-style-type: none">• EU, USA, UK, Norway, Iran, Israel, Russia, Germany• Australian aid to Syria (DFAT) Humanitarian funding-\$213.2 million since 2011, \$220 million – three year commitment to respond to crises starting FY2016-2017

International Red Cross and Red Crescent Movement in Syria and neighbouring countries

<http://blogs.redcross.org.uk/emergencies/2013/08/syria-infographic-the-crisis-and-how-were-helping/>



Responders to Syrian tragedy

<http://data.unhcr.org/syrianrefugees/syria.php>



A doctor from **Caritas Lebanon** examines a young Syrian refugee



People in Need (PIN) is a Czech-based, non-profit organisation providing assistance and development aid



International Medical Corps is a non-profit organisation dedicated to saving lives through health care training



World Health Organisation (WHO) is the directing and coordinating authority for health within United Nations



CARE Jordan is a non-political international organisation, having worked in the country for more than 50 years



Arab Women Organization of Jordan (AWO) is a non-profit advocacy women's NGO established in 1970.



Médecins du Monde is a humanitarian organisation providing medical care to vulnerable populations affected by war, natural disasters, disease, famine and poverty



Terre des hommes is an international humanitarian federation which concentrates on children's rights. In Lebanon it focused on education through provision of remedial classes

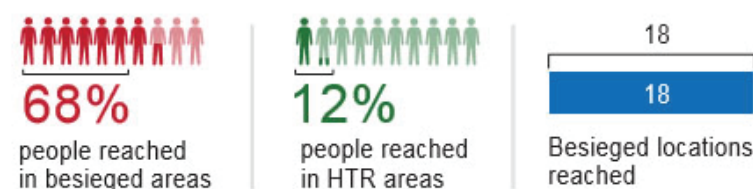
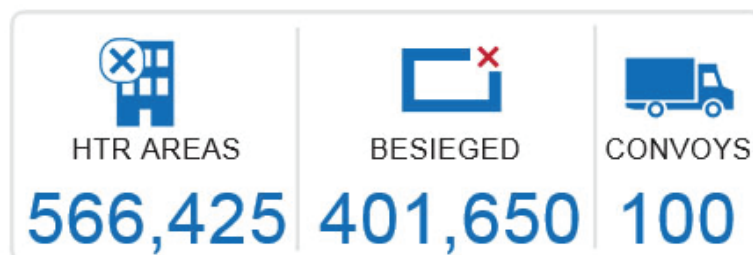
UN Inter - Agency Humanitarian Operations in Syria as of 20 July 2016

http://reliefweb.int/sites/reliefweb.int/files/resources/2016_un_inter-agency_operations_as_of_20_july_2016.pdf

***HTR-Hard to Reach**

PEOPLE REACHED**

 **1,055,575**

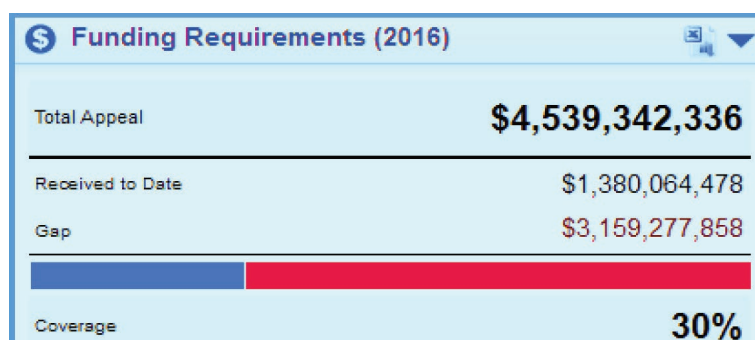


Regional, Refugee and Resilience Plan

The Regional, Refugee and Resilience Plan (3RP) in response to the Syrian Crises is a co-ordinated region response of more than 200 partners, including UN, NGOs and international and national organisations/governments. The plan covers countries in the region such as Turkey, Lebanon, Jordan, Iraq and Egypt.

Big gap-funding requirements for 3RP-June 2016 -

<http://data.unhcr.org/syrianrefugees/regional.php>



3RP (Regional Refugee Resilience Plan)-Achievements Dashboard May 2016

<http://data.unhcr.org/syrianrefugees/regional.php>



PROTECTION

91% Syrian refugees (above 7 years old) with updated registration records including iris scan enrolment

512,739 girls and boys participating in structured, sustained child protection or PSS programmes



FOOD SECURITY

1,902,517 individuals receiving food assistance (cash, voucher or in-kind)

6,009 individuals received food & agricultural livelihoods support



EDUCATION

702,878 targeted children (5-17) enrolled in formal education (primary or secondary)

552 educational facilities constructed, renovated or rehabilitated



HEALTH & NUTRITION

1,698,070 primary health care consultations provided to target individuals

296 health facilities supported



BASIC NEEDS

124,717 HHs received core relief items in-kind

135,870 HHs receiving unconditional, sector-specific or emergency cash assistance



SHELTER

34,087 HHs outside of camps received assistance for shelter or shelter upgrades

3,033 HHs in camps received assistance for shelter or shelter upgrades



WASH

878,576 individuals benefiting from improved access to adequate quantity of safe water

705,185 individuals assisted to access to appropriate sanitation facilities and services



SOCIAL COHESION & LIVELIHOODS

5,192 individuals assisted to access wage employment opportunities

148 community support projects implemented

Activities



Jan. 31, 2014, residents of the besieged Palestinian camp of Yarmouk, queuing to receive food supplies, in Damascus, Syria (UNRWA via AP, File) http://i.cbc.ca/1.3215851.1441381460!/fileImage/httpImage/image.jpg_gen/derivatives/16x9_620/syrian-refugee-crisis.jpg

Syrian refugees arrive across the border into Jordan.

Photo: UNHCR/A. Harper <http://www.un.org/apps/news/story.asp?NewsID=49742#.VkLY179BmjE>

What were the causes of Syria's population movement?

How is the international community responding? Should other countries take in refugees? Whose responsibility is it?

What were the consequences of the conflict?

Why are Syrians going to Europe—especially Germany?

How risky is the journey to another country?

What would you do if you were in charge of a European country? How would the country's politics shape your approach?



1. Interactive activity: Begin your Syrian journey - choose your escape route

<http://www.bbc.com/news/world-middle-east-32057601>



The Syrian conflict has torn the country apart, leaving thousands dead and driving millions to flee their homes. Many seek refuge in neighbouring countries but others pay traffickers to take them to Europe - risking death, capture and deportation.

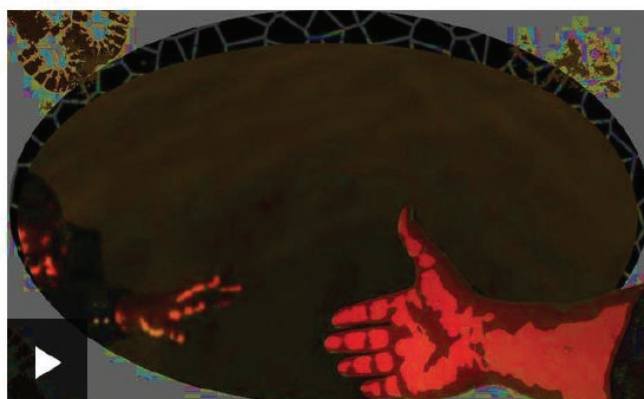
- If you were fleeing Syria for Europe, what choices would you make? Take the journey to understand the dilemmas refugees face.
- Put yourself in the shoes of a Syrian migrant and see whether you make the right choices on the journey to Europe

See what Syrian migrants who made the journey **took with them**



Survivors' stories

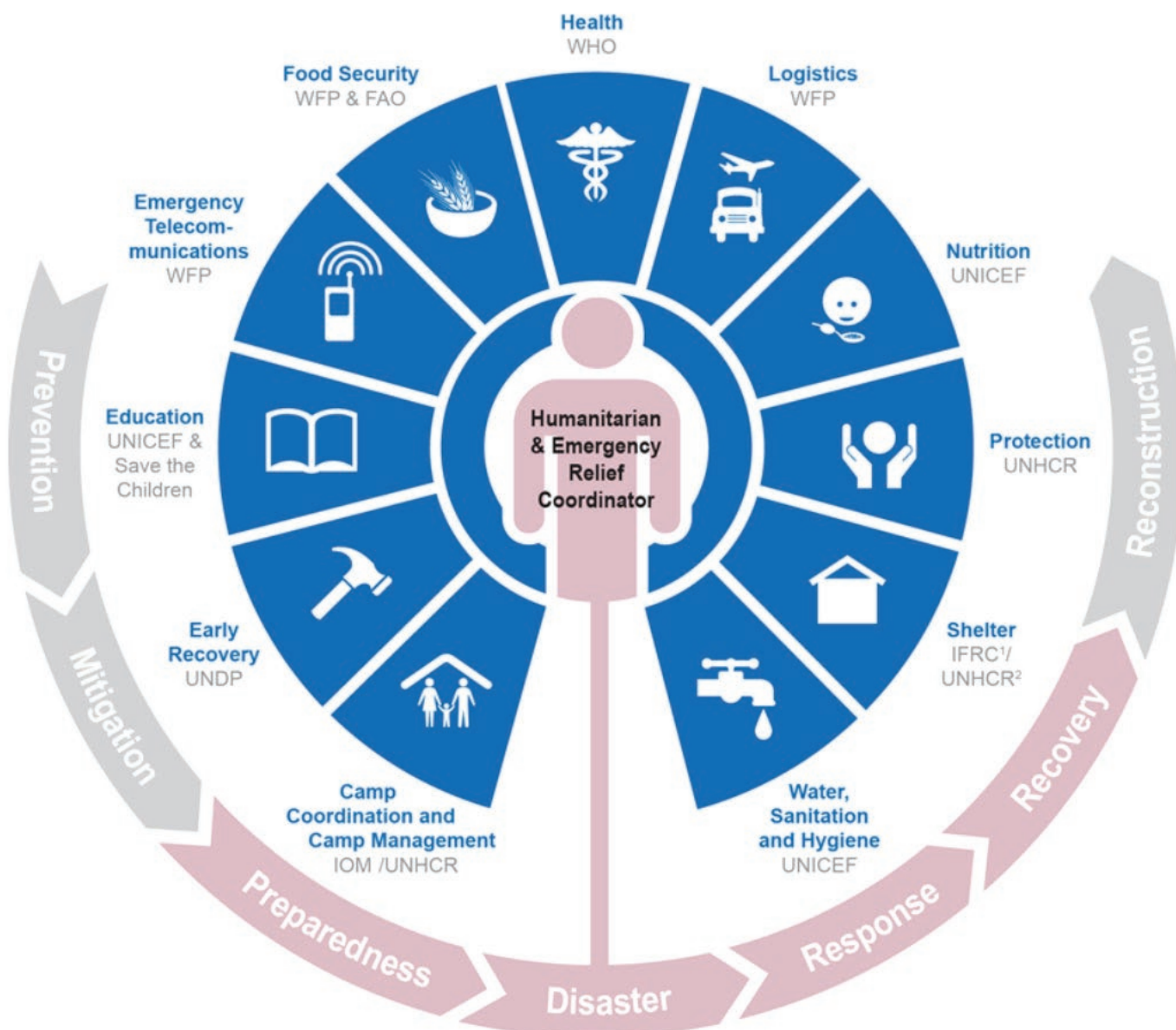
Real stories from people who risked the journey from Syria. A Syrian refugee tells how **he nearly drowned in a lorry** of melted chocolate as he tried to enter the UK.



2. In groups: List items you would take with you if you had five minutes to flee your home.



3. More than 4 million refugees fled Syria. About 1.8 million departed to Turkey, 600,000 to Jordan and 1 million to Lebanon—a country with only 4 million people. In groups investigate the strains of a larger population on one of these developing countries. Present as an oral report.
4. Syrian refugees are suffering at Jordan's border.
<http://www.aljazeera.com/news/2016/07/syrian-refugees-suffering-jordan-border-160721024521992.html>. Why are they shutting their borders?
5. Sex slavery is rife among Syrian refugees in Lebanon
<http://www.sbs.com.au/news/article/2016/07/20/sex-slavery-rife-among-syrian-refugees-lebanon?cid=trending>. Why is this occurring? What is being done about it?
6. Investigate the current Syrian refugee flows for the year as an oral report
7. Describe how technology monitors movements of migrants and refugees crossing the Mediterranean Sea.
8. A TV reporter follows the route of refugees from Turkey. Explain how refugees experience low human wellbeing on their long journey. Present as a narrative.
9. Research how 'boat people' are monitored travelling to Australia. Present as a report.
10. Distinguish between a refugee and an economic migrant.
11. 'Humanitarian activities of the International **Organisation for Migration (IOM)** are carried out in coordination with its humanitarian partners. In groups investigate one organisation and how they have supported and protected Syrian refugees. <http://humanitariancompendium.iom.int/overview>



The Cluster Approach

12. Worldview

Read the infographic and summarise its content. What are your thoughts on the topic?

<http://worldview.unc.edu/resources-for-teaching-the-syrian-refugee-crisis/>



A COUNTRY WITHOUT KIDS

"About 3,500 children have arrived at the [refugee] camps unaccompanied by adults, and two million children are displaced within Syria. Imagine a country without children. It's the equivalent of Boston without a child population. The country is emptying out."

—Sarah Crowe, spokesperson for the executive director of UNICEF.

13. Germany has an open-door policy towards refugees and asylum seekers. Its ability to admit trainloads of asylum-seekers and manage a staggering half a million asylum-seekers per year for several years, has problems. Research the problems and solutions. Present findings in a two column table.

14. About 11,000 Icelanders have volunteered their homes to Syrian refugees. Investigate countries willing to host Syrian refugees and what they have promised.

15. Research Australia's policy on refugees, asylum seekers, economic refugees, people smugglers, 'boat people' and Syrian refugees, as a report.

16. Frontex found statistics on migrants crossing EU's borders has been **double counted** leading to overinflated statistics. Investigate this statement and comment on validity of statistics.

17. Oxfam teaching resources

<http://www.oxfam.org.uk/education/resources/syria>

Inside Jordan – Za'atari Camp:
making a living



Inside Lebanon –
where families
live



36 Syrian refugee cards with information and questions that can be answered. Fantastic overview of living as a Syrian refugee

<http://www.oxfam.org.uk/education/resources/syria>

SYRIA REFUGEE CARD 1



SYRIA REFUGEE CARD 4



18. YouTube-listen to Syrian refugees



<http://www.oxfam.org.uk/education/resources/syria>



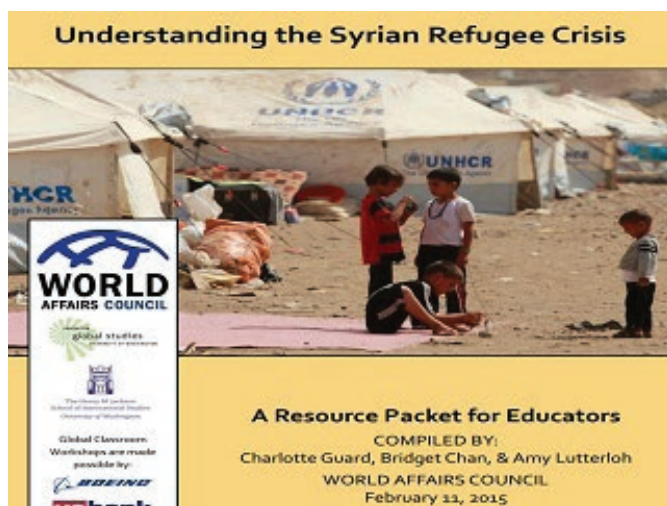
<http://hosted.ap.org/interactives/2012/syria/>

19. Other teaching resources



Excellent: Interactive on Syrian refugee crises - the Uprooted – ESRI
<http://storymaps.esri.com/stories/2016/the-uprooted/>

Teaching about Syrian refugees-Geography Education
<https://geographyeducation.org/articles/teaching-about-syrian-refugees/>



Understanding the Syrian refugee crises – fabulous website with web links <https://www.world-affairs.org/wp-content/uploads/2015/02/Understanding-the-Syrian-Refugee-Crisis-Full-Version.pdf>

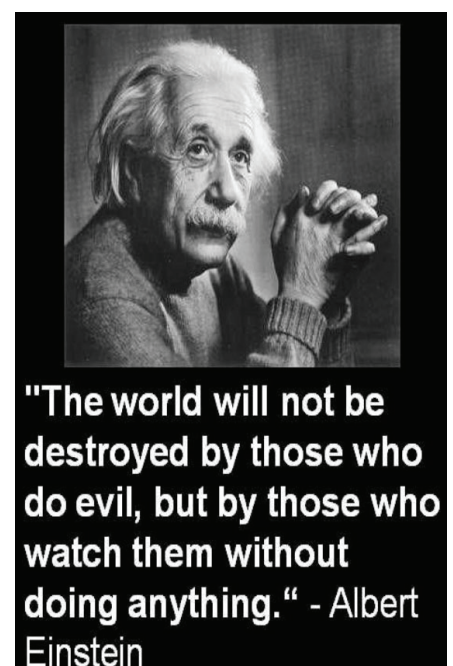
- Unit overview- teacher program
- Syrian refugee crises
- Life in a refugee camp
- Humanitarian response
- Refugees in Turkey, Jordan, Lebanon, Iraq
- Refugee resettlement
- Syrians' generation out of school–education, child marriage, child labour, child soldier recruitment
- Organisations respond
- Lesson plans

ICT

- Refugees of the Syrian civil war https://en.wikipedia.org/wiki/Refugees_of_the_Syrian_Civil_War
- UNHCR map portal <http://maps.unhcr.org/en/search>
- SE Europe movement of refugees and migrants <http://maps.unhcr.org/en/view?uuid=e549f026-e9ff-46db-9cb2-d8d33756017f>
- RefWorld maps <http://www.refworld.org/type,MAP,,,,,0.html>
- Geotagging photo, creating maps in PowerPoint, style guide for GIS users <http://data.unhcr.org/imtoolkit/chapters/view/mapping/lang:eng>
- Frontex <http://migrantsatsea.org/2015/10/14/clarification-of-frontex-data-on-persons-detected-at-eu-external-borders-includes-significant-double-counting/>
- The Guardian- How to teach about refugees <https://www.theguardian.com/teacher-network/2015/may/25/how-to-teach-refugees>
- Refugee stories: mapping a crises <http://www.choices.edu/resources/twtn/twtn-refugees.php>

ICT

- Where are the Syrian refugees- Hans Rosling https://www.youtube.com/watch?v=0_QrlapiNOW
- Why boat refugees don't fly-Hans Rosling <https://www.youtube.com/watch?v=Y00IRsfrPQ4>



<https://au.pinterest.com/pin/214202526000961109/>

Curriculum - Where can I teach this topic?

History, Society and Culture, Geography

NSW Geography syllabus 7-10

Geography 7-10 (Stage 4/5)

- Year 7: Place and liveability
- Year 8: Interconnections
- Year 9: Changing places
- Year 10: Human wellbeing

General Capabilities

- **Literacy**-personal stories, visual literacy
- **Numeracy**-figures on Syrian refugee numbers and trends
- **ICT**-links, YouTube, use of web2.0 tools
- **Ethical understanding**-being a refugee-walking in their shoes
- **Intercultural understanding**
- **Civics and citizenship**-aid, response-action
- **Work and enterprise**-UN, volunteers, NGO, businesses in refugee camps, people traffickers
- **Personal and social capability** of refugees

Geographical concepts:

- **Place** (Syria)
- **Space** (spatial distribution of refugee camps)
- **Change** (economic development and human wellbeing before and after Syrian Civil War)
- **Environment** (impacts of Syrian Civil War on agriculture, and urban-rural environments)
- **Interconnection** (support from international humanitarian organisations, countries participating in the conflict)
- **Scale** impact on local rural communities, Syrian cities, national (Syria) and global (countries accepting refugees and asylum seekers)
- **sustainability** (social, economic)

Cross Curriculum priorities

- **Asia** (West Asia)
- **Sustainability** (social, economic)

Geographical tools

Maps, graphs, statistics, ICT, satellite imagery, GIS/GPS, visual literacy, infographics, web2.0 tools.

A group of Syrian refugees arrive on the island of Lesbos after traveling in an inflatable raft from Turkey, near Skala Sykaminias, Greece. © UNHCR/A.McConnell <http://www.unhcr.org/thumb1/55c4c5246.jpg>

Mapping World Heritage Sites in Asia

by Phillip O'Brien

For geographers, the concept of place is very important. Geographers recognise that places hold different importance to individuals, groups and nation. UNESCO (The United Nations' Educational, Scientific and Cultural Organisation) plays an important role in identifying sites of cultural significance around the world.

For this task, you will work with UNESCO data to develop a representation of a selection of sites of special global significance.

You will need to:

- 1) Explore the UNESCO website's interactive map: <http://whc.unesco.org/en/interactive-map/>
- 2) Select a nation (such as Australia) or a region (such as Southeast Asia)
- 3) Identify five significant sites within that nation or region
- 4) Using a blank map of your chosen location, label or annotate your significant sites
- 5) For each site, consult the criteria for UNESCO recognition (<http://whc.unesco.org/en/criteria/>) and suggest which apply to your chosen sites.
- 6) Include your suggestions alongside your annotations.
- 7) Finally, create a summary paragraph – what do your selected sites share in common in regards to UNESCO recognition? Why are they significant and to whom? (100-200 words)

Your finished product will be a poster and...

- Will include annotations on a map of your chosen scale to show your chosen sites.
- Each location will need to be accurately located and annotated
- Standard mapping conventions (including BOLTSS) will be applied
- Will include the UNESCO criteria that you feel best apply to each site.
- Include a summary paragraph about the significance of sites.

See the 'World Heritage: South America' example for layout ideas...



WORLD HERITAGE: South America

Los Katiós National Park

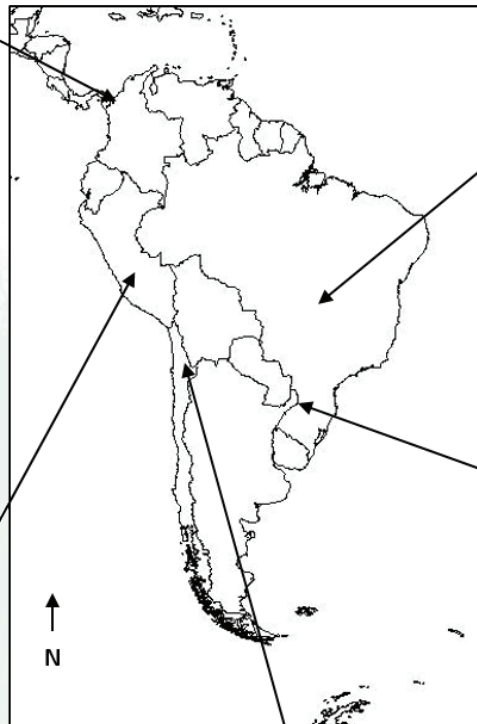
Colombia

#9 – A significant site for bio-geographical history
#10 – Unique and protected endangered species' habitat.

Pantanal Conservation Area

Brazil

#7 – Areas of exceptional beauty and natural significance
#9 – Important natural cycles in action.
#10 – Extreme biological diversity.



Historic Sanctuary of Machu Picchu

Peru

World Heritage Criterion:
#1 - A masterpiece of human architecture.
#3 - A unique testimony to a civilisation.
#9 – Unique elevated biomes.

Iguazu National Park

Brazil/Argentina

#7 – Natural phenomena of exceptional beauty
#9 – Important natural cycles in action, notably fish migration.

Sewell Mining Town

Chile

#2 – A significant example of town-planning in a hostile environment.

SUMMARY:

South America is blessed with a range of significant sites. The overwhelming common elements among them are the broad biodiversity the region features. These are seen across the many sites listed above, as well as in Machu Picchu and Sewell Mining Town, which are both examples of human architecture in spectacular natural settings. These sites are significant reminders of the achievements of the people of South America and the enormously rich biodiversity and topography that remain there.

Rubric for Assessment

	Excellent (Four Marks)	Very Good (Three Marks)	Average (Two Marks)	Not Bad (One Mark)	Needs Work! (Zero Marks)
Map <ul style="list-style-type: none"> • BOLTSS • Map Accuracy • Five locations identified 					
Annotations <ul style="list-style-type: none"> • Clear descriptions • Criterion applied • Accurate annotations 					
Data <ul style="list-style-type: none"> • Relevant • Accurate • Criteria addressed 					
Use of Class Time <ul style="list-style-type: none"> • On task • Practical 					
Paragraph <ul style="list-style-type: none"> • Thorough • Accurate • Specific • Varied 					

Feedback

Total Score:

/20

Notes for the Teacher

This task is a nice introduction to Place and Liveability in Year 7. Students have to opportunity to explore the wider world and present information in a summarised visual form. It can be run either as an individual task or assigned as group work, perhaps with each group tackling a different continent. If time permits, it would also be appropriate to have students present their work t the class. In the paragraph description, challenge students to express themselves using their geographic literacy skills and to integrate their own indeas and findings into their response.



With National Curriculum in schools, Geography now has a nationally standardised structure – for this purpose of this task, the following curriculum standards for Year 7 have been addressed:

National Curriculum Standards (By the end of Year 7, students:)	Relevant Task Elements
<ul style="list-style-type: none"> describe geographical processes that influence the characteristics of places and how places are perceived and valued differently. 	<ul style="list-style-type: none"> Students identify key locations based on specific geographic characteristics, including human/natural features and how they are used.
<ul style="list-style-type: none"> explain interconnections between people, places and environments and describe how they change places and environments. 	<ul style="list-style-type: none"> Students must summarise data and information to describe their chosen locations, including specific usages and characteristics.
<ul style="list-style-type: none"> identify geographically significant questions to frame an inquiry. 	<ul style="list-style-type: none"> Students must select locations based on key criteria – they will need to understand these criteria in order to identify targets.
<ul style="list-style-type: none"> locate relevant information from primary and secondary sources to answer inquiry questions. 	<ul style="list-style-type: none"> Students will work independently to find suitably appropriate locations for their work.
<ul style="list-style-type: none"> represent data and the location and distribution of geographical phenomena in a range of graphic forms, including large-scale and small-scale maps that conform to cartographic conventions. 	<ul style="list-style-type: none"> Students present their work in poster format, applying BOLTSS and using annotation skills to make information clear and structured.
<ul style="list-style-type: none"> present findings and arguments using relevant geographical terminology and graphic representations in a range of communication forms 	<ul style="list-style-type: none"> Students use specific geographic language and conventions in their work.



Palmyra:

Studying history through
architecture and history

Palmyra was until recently, relatively unknown as a World Heritage site that was visited by scholars and students of History. In recent times, parts of the amazing ancient city have been damaged or destroyed by ISIS. There is much to learn about this ancient civilization that was part of the SILK ROAD.

by Di Dunlop

- Palmyra is an ancient city in the desert region of Syria in West Asia which gained World Heritage status in 1980. Archaeologists have dated parts of Palmyra to Neolithic times and it has been documented as early as the second millennium BCE.
- It was a special trade centre close to the Silk Road [the main trade route between China and Europe] that followed the nearby Euphrates River and it gained its wealth from the Caravan traders.
- Palmyra was an oasis with up to twenty different varieties of palms available for food as well as agricultural products such as barley, olives, figs and pistachios, vegetables and corn. The water was sourced from the al-Kabur wadi which flowed from the western hills and irrigated about 1,000 hectares as well as providing water for the citizens through stone pipes throughout the city. They raised animals, camels and donkeys for the caravan merchants.
- Caravanserais, were lodgings provided for the traders by the “Patrons” who provided guards for the traders and often led the caravan groups between Palmyra and the Euphrates connection of the Silk Road.



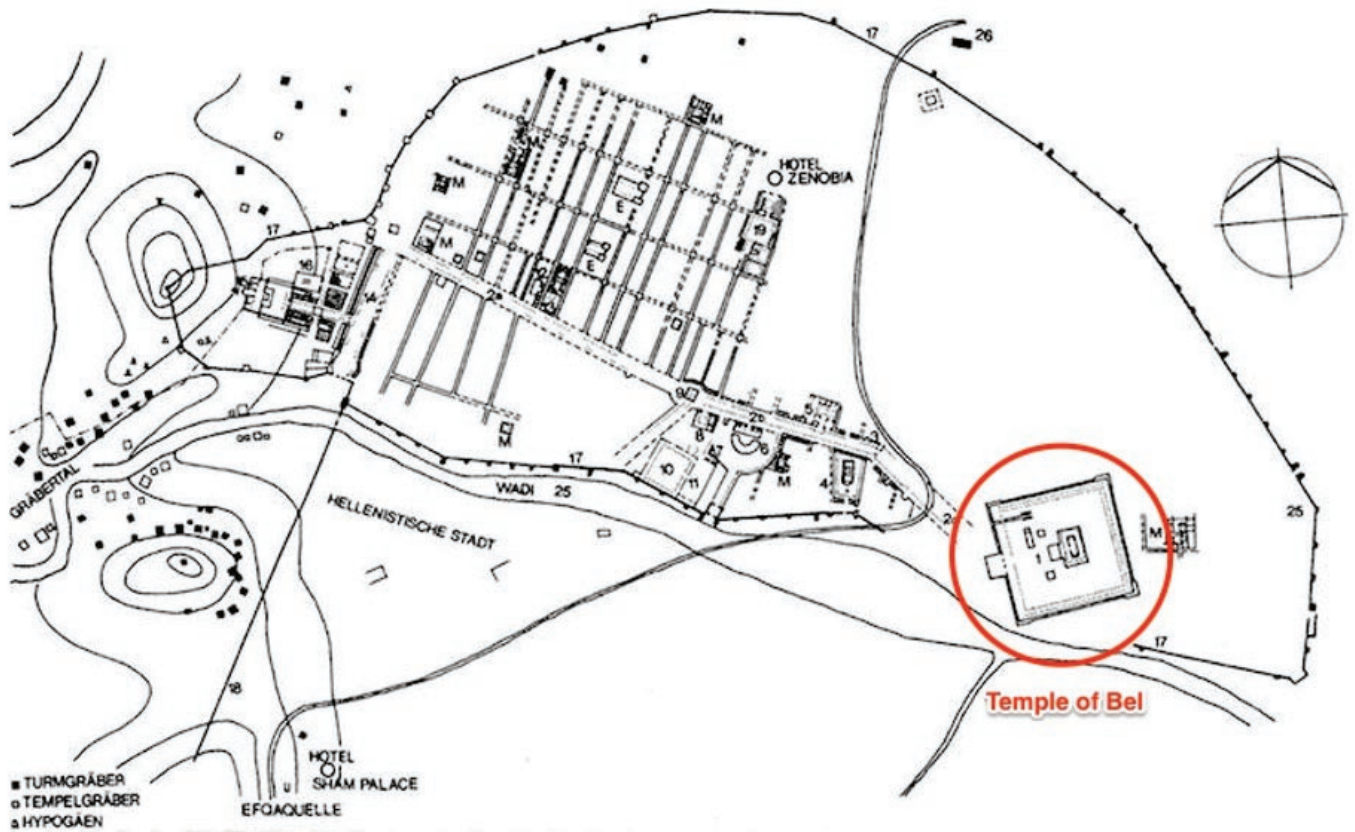
- The main trading commodity was SILK from China, on its way to the courts of Europe. Other commodities being traded were perfumes, spices, jade, muslin, precious stones, ivory and ebony.
- Palmyra also imported for domestic use, slaves and prostitutes. Goods were imported from India by Palmyran ships to the port of Charax Spasinu on the Persian Gulf.
- An important part of the economy of Palmyra was Taxation as the

- Caravaneers had to pay for goods sold at the domestic market or exported from the city. This was done at the Tariff Court where the law regarding taxation was displayed. [instituted in 137 CE.]
- From the first century CE, Palmyra was an independent city within the Roman Empire with a Council of about six hundred members headed by a President. It was responsible for taxation, public works including temples and public spaces such as the amphitheatre.
- The Council appointed the military leaders, who protected the city and its economy. By the third century CE, it had an army of 10,000 men equipped with sword, spears, lances and shields. The soldiers were fully armored as well as their horses.
- The people spoke a language called Palmyran, which was related to Aramaic however Greek was used for commerce as the society was heavily influenced by Greco-Roman tradition.
- The Empire of Palmyra was established by Queen Zenobia when she rebelled against Rome in 267 CE. For a short period of time she ruled part of Egypt until captured by the Romans and taken to Rome in chains where she died.
- Palmyra was part of many Empires during its long history, including being part of the Roman Empire, destruction by Timurid rulers, rebuilt under the Ottoman Empire under Turkish rule and domination by the French when the Ottoman Empire was partitioned in 1932. From 1516 CE, when it became part of the Ottoman Empire, it has been a Moslem centre and remains so as part of modern day Syria.
- The architecture of ancient Palmyra is a hybrid of West Asian influences and the Greco-Roman tradition. It was laid out with a principal East-West main street, the Grand Colonnade which was a mile long. The street was lined with fifteen hundred hundred Corinthian columns with a monumental Arch at the entrance to the city.



Queen Zenobia





- To the south of the Colonnade was the AGORA, where the commerce of Palmyra was carried out, the SENATE HOUSE the AMPHITHEATRE and DIACLETIAN'S CAMP. [a military camp when the Roman's defeated Zenobia.]
- To the south of the Colonnade was the AGORA, where the commerce of Palmyra was carried out, the SENATE HOUSE the AMPHITHEATRE and DIACLETIAN'S CAMP. [a military camp when the Roman's defeated Zenobia.]
- Outwardly, the temple resembled Hellenic-Greek architecture with CORINTHIAN columns and FRIEZES along the roofline and a colonnaded PORTICO by which to enter the temple. When the worshippers entered the temple, they turned ninety degrees to view the offering area. [a bent axis approach]. The central chamber or CELLA was accessed by a ramp and stairs where there sat a statue of BEL. At each end of the CELLA were IONIC half ceilings were COFFERED and CRENELLATED.





- The temple was at the centre of religious life and until it was partially destroyed by ISIS in 2015, it was the best preserved section of Palmyra.



- Knowledge about the religious life surrounding the worship of these gods comes from the iconography and inscriptions found at the sites. Religious rites included the burning of incense in censers, offerings of libations from bowls and cups and offerings of fruits, birds and animals.
- In the Temple of BEL, [Baal] there is evidence of a Lustration Basin but little more is known about ritual bathing and purity. Spring and Winter Festivals are believed to involve rituals designed to bring the community together. The Priests were important civic leaders not just religious functionaries and the city often paid for dedications to the Temples as well as setting up statues of the benefactors.
- "It was Palmyra's prosperity as a trading city which enabled it to invest heavily in not only civic but also religious architecture which required large groups of skilled artisans. This was central to the Mediterranean concept of Urbanism where presentation architecture helped to define and advance the status of the city." Dr J.A. Baker
- The wealthy of Palmyra buried their dead in grand family mausoleums where there were rows of burial chambers. They did not use headstones but a relief of the person formed part of the wall decoration. The deceased were often embalmed in away that was similar to that of the Egyptians. They would be fully dressed and have jewellery upon them.



- Burial chambers were underground and bust reliefs sealed the openings of burial chambers. The reliefs characteristically emphasised clothing and jewellery. Along the Great Collonade there were bronze statues of prominent citizens but none of these have survived. To the west of the city walls was the Valley of the Tombs consisting of more than fifty towers. The most recent tower is dated at 128CE and the tombs were primarily underground.
- In 2015, ISIS captured the area around Palmyra and used the amphitheatre as the place of execution for twenty prisoners. They also executed Khaled al-Asaad, the retired Antiquities chief who refused to give his captors any information about the city and its treasures. The militants destroyed the Lion of Al-lat and the temple of Baalshamin and then all of the Temple of Bel apart from the outer walls.



Activities

- Conduct research and construct a timeline of the historical development of Palmyra. Include the changes that occurred over time in regard to the religion of the people.
- Research the life and role of Zenobia in the history of Palmyra. What part did she play in the history of the Roman Empire in the region?
- Examine the importance of the Silk Road in the history of Palmyra.
- Research the history of archaeological digs in Palmyra. Who were the big “players”. What was the impact of these digs?
- What role did the Timurids play in the history of Palmyra?
- When did Palmyra become part of the Ottoman Empire? Examine the legacy of the Ottomans in the region.
- Research the importance of water in the location of Palmyra.
- Analyse the impact of “Silk Road” traffic in the region.
- What were the CARAVANSERI and why were they so important on the Silk Road?
- Examine the importance of the “Tariff Court” in the commercial life of Palmyra.
- Research and sketch the types of Greco-Roman columns...Doric, Ionic and Corinthian. What impact did they have on architecture throughout the world?
- Examine the picture of the three gods. What can you surmise about their clothing and persona?
- What are the meanings of the following terms: Semitic, Neolithic, Mesopotamia, deity, oasis, amphitheatre, sarcophagi, agora, tell, wadi, mosque, cella, iconography, lustration, libation, funerary, urbanisation.
- Examine the following photos. What do they tell you about life in Ancient Palmyra?

Decorative carvings



Carvings near the Temple of Bel



Door lintel at Temple of Bel



Priest of Bel, carvings in the temple



WORLD HERITAGE SITES

Turkey

by Dr. Susan Bliss

Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration.

<http://whc.unesco.org/en/about/>

What is a World Heritage Site?

'Site is a place (such as a building, city, complex, desert, forest, island, lake, monument, or mountain) that is listed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) as being - outstanding cultural and/or physical significance.'

https://en.wikipedia.org/wiki/World_Heritage_Site

As of July 2015, 1031 sites are listed: 802 cultural, 197 natural, and 32 mixed properties, in 163 state parties (countries).

What is the role of UNESCO?

'The United Nations Educational, Scientific and Cultural Organization (UNESCO) seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. This is embodied in an international treaty called the Convention concerning the Protection of the World Cultural and Natural Heritage, adopted by UNESCO in 1972.'

<http://whc.unesco.org/en/about/>
Since then, 191 states parties have ratified the Convention, making it one of the most important international agreements.



What is the World Heritage Fund?

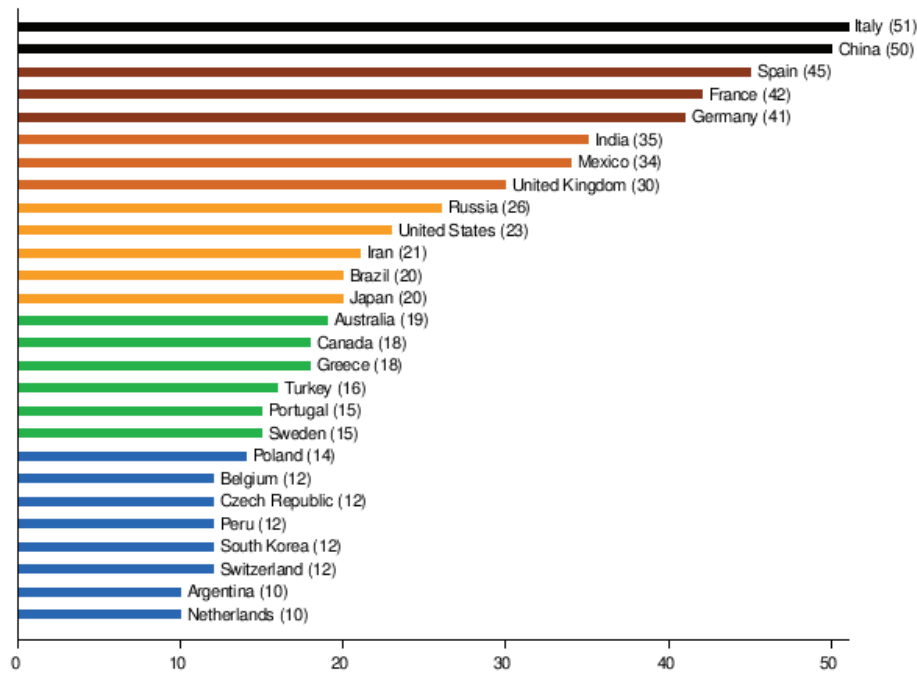
'The World Heritage Committee allocates funds according to the urgency, with priority given to the most threatened sites. The World Heritage Fund provides about US\$4 million annually to support activities requested by countries in need of assistance. The Funds come from compulsory and voluntary contributions from countries, and private donations.' <http://whc.unesco.org/en/funding/>

What is meant by conserving World Heritage Sites?

Refers to the processes of maintaining, preserving, restoring and reconstructing World Heritage Sites.

Photograph: World Heritage Ephesus in Turkey, Roman ruins, Celsus Library (S. Bliss)

Countries with ten of more World Heritage Sites such as Turkey



World Heritage Sites in Turkey

UNESCO World Heritage is the greatest legacy of humans and Mother Nature. In Turkey, there are 15 UNESCO World Heritage Sites and 60 nominated sites on the Tentative List. The Turkish government raises awareness of its natural and cultural heritage and promotes their conservation.

Geographical distribution of WHS in Turkey

https://en.wikipedia.org/wiki/List_of_World_Heritage_Sites_in_Turkey











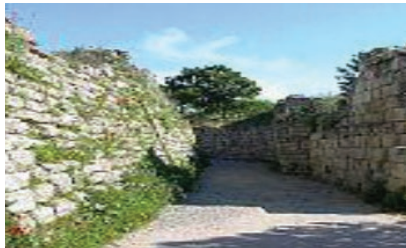



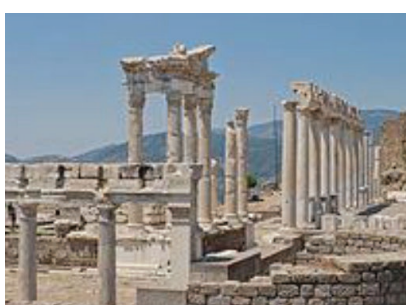
Location of World Heritage Sites within Turkey



World Heritage Sites in Turkey

https://en.wikipedia.org/wiki/List_of_World_Heritage_Sites_in_Turkey;

For the criteria see the Selection criteria at https://en.wikipedia.org/wiki/World_Heritage_Site#Selection_criteria

Name	Year (Inscription)	Criteria	Image
Göreme National Park and Rock Sites of Cappadocia Goreme was originally a Byzantine monastic settlement. It then became a pilgrimage site, and is now a tourist attraction. The area contains ancient artwork and erosion- sculpted rock formations	1985	I, III, V, VII	
Divriği Great Mosque and Hospital Built in 1229, the Great Mosque and Hospital of Divriği contains beautiful architecture and exquisite carvings.	1985	I,IV	
Historic Areas of Istanbul Istanbul is the cultural heart of Turkey. It includes Topkapi Palace, the Hagia Sophia, the Sultan Ahmed Mosque, the Suleymaniye Mosque, and the ancient Walls of Constantinople.	1986	I,II,III,IV	
Hattusha: the Hittite Capital Hattusha was once the capital of the Bronze Age Hittite Empire. It encompasses Royal palaces, temples and army buildings.	1986	I,II,III,IV	
Nemrut Dağ The ruined temple and lonely heads is thought to be a burial site of a first century king, Antiochus I Epiphanes. The statues, which are around 8-10 metres high, are thought to depict figures such as Apollo and Zeus.	1987	I,III,IV	
Hierapolis and Pamukkale Hierapolis was originally a spa centre for wounded Roman soldiers. Nearby Pamukkale contains calcium deposits that formed a series of natural terraces.	1988	III,IV,VII	

Name	Year (Inscription)	Criteria	Image
Xanthos and Letoon Xanthos was the capital of the Lycian Empire. The site dating back to the 8th century BC, contains an obelisk, amphitheatre, Acropolis and Roman streets. Neighbouring Letoon encompasses a sanctuary dedicated to Leto, Zeus's lover and was also mother of Apollo	1988	II,III	
City of Safranbolu Safranbolu is one of the best preserved Ottoman cities. It was an important caravan location and trading centre on the East–West trade route.	1994	II,IV,V	
Archaeological Site of Troy Excavations revealed 9 layers of buildings, constructed from 3000 BC to 500 AD.	1998	II,III,IV	
Selimiye Mosque and Social Complex Built in 1574, the mosque of Selimiye has 18 domes accompanied by four 71 metre high minarets. The religious building stands at the centre of a large social complex which includes a hospital, school, library, Islamic academy and some shops.	2011	I,IV	
Neolithic Site of Çatalhöyük Around 9000 years ago up to 8000 people lived in this highly organised settlement. The mound is comprised of 13 levels of buildings, each with about 1000 structures.	2012	II,IV	
Bursa and Cumalıkızık: birth of the Ottoman Empire Bursa: There are a number of remaining monuments, including 127 mosques, 45 tombs and 37 hamams (Turkish bathhouse). Cumalikizik: 10 kilometres from Bursa, is a rural location with a 700-year-old history.	2014	I,II,III,IV,VI	
Pergamon and its Multi-Layered Cultural Landscape Pergamum contains a Roman medical centre and the mountainside Acropolis, Pergamum reached its peak of power during the time of Alexander the Great, when it was considered one of the Middle East's wealthiest and most powerful small kingdoms. Pergamum's legacy includes the invention of parchment	2014	I,II,III,IV,VI	

Name	Year (Inscription)	Criteria	Image
Diyarbakır Fortress and Hevsel Gardens Cultural Landscape Diyarbakır contains 8000 year old city walls, gardens, castle, gates and towers. The city and surrounding landscape has been a strategic site since the Hellenistic period and through the Roman, Sassanid, Byzantine, Islamic and Ottoman times until today.	2015	IV	
Ephesus Ephesus contains a grand theatre, the Celsus Library which once held 12,000 scrolls, and preserved Roman houses. Ephesus was a vibrant city with a quarter of a million inhabitants. Archaeologists estimate that only 20% of the city has been excavated.	2015	III, IV, VI	

The World Heritage Conservation Process

<http://whc.unesco.org/uploads/activities/documents/activity-54-19.pdf>

The World Heritage conservation process

The conservation of World Heritage is a lifelong process and involves a number of important steps. At the beginning of this process countries commit themselves to World Heritage conservation, by becoming States Parties to the Convention and then nominating sites for inclusion in the World Heritage List. The illustrations below show the **nomination** process.



1 A country becomes a State Party by signing the World Heritage Convention and pledging to protect their cultural and natural heritage

2 A State Party prepares a tentative list of cultural and natural heritage sites on its territory that it considers to be of outstanding universal value



3 A State Party selects sites from its tentative list for nomination to the World Heritage List



4 The completed nomination form is sent to the UNESCO World Heritage Centre

5 The UNESCO World Heritage Centre checks that the nomination is complete and sends it to IUCN and/or ICOMOS for evaluation



6 Experts visit sites to evaluate their protection and management

ICOMOS and/or IUCN evaluate the nominations using the cultural and natural heritage criteria



8 ICOMOS and/or IUCN make an evaluation report

9 The seven members of the World Heritage Bureau review the nominations and evaluations and make recommendations to the Committee



10 The final decision by the 21-member World Heritage Committee: inscribed – deferred – rejected

Sustainable Tourism

'Tourism can contribute to qualitative and sustainable development if it is based on the commitment and participation of the local populations, who must be involved in its conception and execution, and if the natural and cultural resources upon which tourism is based are preserved on a long-term basis.'

UNESCO Culture, Tourism and Development Crucial Issues for the Twenty-first Century

The World Heritage Tourism Program encourages sustainable tourism actions at World Heritage Sites. The International Council on Monuments and Sites (ICOMOS) noted an increase in visitor numbers as well as increase in visitor fees and donations to restore and protect Turkey's WHS. It also promoted cultural values by supporting local handicrafts and economic values as it provided employment to Turks involved in transport, restaurants and hotels. However, tourism has had an adverse impact on the environment such as the wear and tear from large numbers of tourists, and an increase of terrorist threats has led to security and safety costs at WHS. Development projects have caused damage to the cultural heritage of Turkey such as the construction of bridges, motorways, dams and airports. In Istanbul an increase in the number of tankers transporting petroleum on The Bosphorus Strait (narrow sea channel) are a threat to the environment and the population. Natural threats include floods in ancient Antioch, and earthquakes damaging ancient monuments and leaving cracks in historic mosques. The need to balance economic gain with undesirable impacts is important for the sustainability of a WHS.

Tourism at Ephesus, Roman Ruins



Ephesus, Roman ruins, Great Theatre, tourism
(J. Bliss)



Ephesus, Curetes Street, Celsus Library, tourism
(J. Bliss)

Sustainable management

‘The management structure for the protection and conservation of WHS of the Historic Areas of Istanbul, includes the national government, local administration and several state institutions. The approval of the Conservation Council has to be obtained for physical interventions and functional changes in registered buildings and conservation sites.’

<http://whc.unesco.org/en/list/356>

About 36 million foreign tourists visit Turkey a year. Approximately 48% of tourists who visit Turkey spend time in Istanbul. In 2016, terrorist attacks in Istanbul’s Sultanahmet area reduced tourism by over 20%.

Photograph: Istanbul, Sultanahmet Mosque, Blue Mosque (J. Bliss)

Stakeholders involved in the managing of WHS includes governments, conservation experts, local authorities, communities, amenities (.g. water, electricity and roads), businesses and tour companies.



Photograph: Restoration of Ephesus, Roman ruins (S. Bliss)

World Heritage Sites (WHS) Across the curriculum

Art	Languages/English	History	Mathematics	Religious Studies	Technology
<ul style="list-style-type: none"> • Use photographs • Make scale models • Advertise a campaign to raise awareness of the importance of conserving WHS • Use WHS to teach architectural styles • Draw or paint WHS 	<ul style="list-style-type: none"> • Information pamphlets on natural and cultural heritage sites in Turkey or other countries • Write articles on the need to conserve WHS and publish the articles on the school website. • Produce a historical play on one WHS- such as Troy • Read short stories or novels on a WHS 	<ul style="list-style-type: none"> • Time line of WHS inscriptions in one Asian country. • Study a WHS and its archaeological excavations 	<ul style="list-style-type: none"> • Carry out a survey on the physical characteristics (number of species, size and age of buildings) or number of tourists at a WHS • Present results such as statistics as a graph. 	<ul style="list-style-type: none"> • Exhibit photographs of WHS relevant to different religions and belief systems 	<ul style="list-style-type: none"> • Use the internet to research WHS • Present research using web 2.0 tools.

Activities

Refer to the notes and the internet

- What is a World Heritage Site (WHS)?
- How many WHS in Turkey?
- Summarise the criteria for selection as a WHS.
- Research one WHS in Turkey. Include in your research: name; where it is located (country, latitude and longitude); date it was inscribed; criteria for its selection; what would you see as a tourist; and how it is sustainably managed.
- Explain the WHS conservation process.
- List the threats to WHS. Select a WHS that has been hit by a natural disaster. Name the WHS. Where is it located? What were the impacts on the WHS? What has been done to reconstruct the WHS? How can this disaster be avoided in the future?
- Too many tourists have visited WHS causing erosion and damage to the natural and cultural environment. List three advantages and three disadvantages of tourism to a WHS.
- Research one WHS in Danger in an Asian country such as Syria and Iraq. Explain why it is on the Danger List and what is being done to conserve this site.
- The World Heritage Committee will hold its next meeting in Istanbul, Turkey, from 10 to 20 July 2016. What were the outcomes of the meeting?
- The ICOMOS five year review is critical to the conservation of a WHS. Discuss the outcomes of the last review for one WHS in Turkey.

<http://www.icomos.org.tr/?Sayfa=AnaSayfa&dil=en>

<http://www.icomos.org/risk/2001/turk2001.htm>

ICT

The KIT: World Heritage in Young Hands Educational Resource Kit for secondary school teachers

<http://whc.unesco.org/en/educationkit/>

Convention Concerning the Protection of World Cultural and Natural Heritage

<http://whc.unesco.org/en/conventiontext/>

Turkey in the World Heritage List

<http://tripplannerturkey.com/turkey-in-unesco-world-heritage-list/>

Turkey in World Heritage

<http://www.kulturvarliklari.gov.tr/Eklenti/27154,turkeyinworldheritage.pdf?0>

Turkey in the
UNESCO World Heritage List



The Iranian Plateau:

LIVING WITH THE DESERT

by Dr. Jennifer Curtis

Iranians, through the invention of wind towers and *qanats*, for example, have lived collaboratively with the desert for centuries.

The following information summarises the physiology of the desert, and the impact humans have made.

The desert

The heart of Iran is a vast desert covering many thousands of square kilometres, at a height of between 500 m and 1500 m above sea level. This desert is crossed by few roads, and shunned by many.

Its medieval Arabic name was *mafazah* (wilderness). It is one of the driest and, in summer, one of the hottest places on the earth's surface.

Yet on the edge of this desert most of the great cities of Iran have flourished, from Siyalk (circa 4000 BC) to modern Tehran.

People have chosen to remain here, living with the desert on their doorstep. They have managed to come to terms with the ferocity of the sun's heat discovering over 2500 years ago how to exploit the water resources deep below the surface, and developing a simple style of building notable for its climate, and harmony with its surroundings.

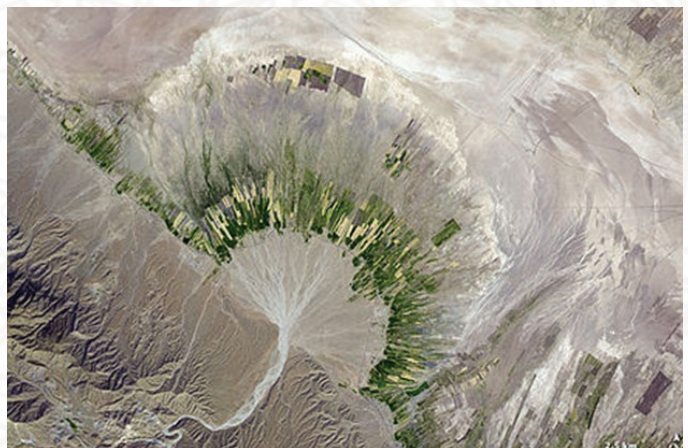
The desert and its raised rim constitute the Iranian Plateau. It is bounded on the north by the Alborz Range, on the west by the Zagros Mountains, and on the south by the wide belt of mountains that shut off Kerman from the Persian Gulf and the Gulf of Oman.

So the Plateau looks east across the less dramatic highlands near the modern boundary of Iran to the Dasht-i Naumid and Dasht-i Margo (deserts of the hopelessness and death) in Afghanistan.

Most travellers between Central Asia and the Near East have endured the rigours of the Plateau. Merchants on the Silk Road and Mongols followed in the footsteps of the Aryan Iranians who, early in the second millennium BCE, entered the Plateau at its north eastern corner and moved westward into Iran along the northern fringe of the central desert.

The Plateau resembles an archipelago: a sand sea, out of whose barren expanse occasional villages and great ridges of rock protrude like islands. The various settlements knew little of each other until the last decade, which has brought electric light and television to their teahouses and linked them with the large towns by bus and truck.

They were, in fact, very similar, because climate and geography imposed the same conditions for survival on each of these isolated communities.



Types of desert on the plateau



Namak (salt) lake

https://commons.wikimedia.org/wiki/File:Namak_Lake_5.JPG

Wherever green has been bleached out of the landscape -, which is true of most of the Plateau for much of the year- Iranians, will refer to the land as *biaba* (without water) or *dasht* (closely connected with our word “desert”).

There are, several distinct classes of desert on the Plateau, with only the great area of loose sand near its southeastern edge answering the description of wind-blown, round-shouldered dunes typical of the Sahara Desert.

The term *dasht* is restricted to the dry, gravelly country interspersed by short ranges of jagged mountains, which is so characteristic of the Plateau and which can be traversed without difficulty.

Kavir, which has given its name on most maps, to the northern part of the desert, is an expanse of viscous mud, frequently overlaid by a salt crust whose varying thickness makes it quite treacherous.

Namak (salt) is a sea lake, of which there are several large ones, that may contain open water after winter rainfall. It is a reliable shelter for the caravanserais north and south aside a *namak*.

Lut, sometimes used to describe the entire central desert but generally restricted to the most barren southern section, means “bare”, “naked”. It is indeed land without life and it shares this Persian name with another of the harshest features of western Asia, the Dead Sea (*bahr-I lut*).

Kavir-I Namak and Dasht-I Lut give Iran its immense dead heart, and occupies nearly one-third of the whole country. The salinity of the desert has been increasing for millennia due to the action of the sun on the seasonal watercourses. These find no drainage outlet, but are evaporated or sucked down by the parched earth. Therefore the population has been driven to the fringes where mountain snow provides water for people, animals and crops.

Crumbling ghost villages remain, spaced out along the few long-established caravan routes across the desert which merchants and pilgrims followed for centuries. In the summer they journeyed mainly by night and sought refuge from the heat of the day in the caravan-serais, which offered shade, protection and water sufficient for the occasional caravan, but seldom enough for a settlement. Marco Polo passed this way. These routes still carry today traffic from Nain, Yazd or Kerman north towards the great Shia shrine at Mashhad.

A century ago travellers on the main road from Tehran to Mashad along the northern edge of the desert depended for their survival upon well-appointed caravanserais.

At Miandshat, water is abundantly provided. Within the courtyards and outside the walls are some half-dozen large underground tanks with brick domes built over them to prevent evaporation and to keep the water fresh and cool. A flight of forty wide steps gives access to the cisterns, which are closely guarded by the caretakers of the establishment. Each traveller is allowed all they need for their personal use, but the fluid cannot be wasted, nor is it allowed to be given to the animals.

There were tanks of poorer quality for the animals located some way off, but the subterranean channels feeding all these cisterns dried up in the summer. Only careful forethought and discipline enable people to live with the desert.

A climate of extremes

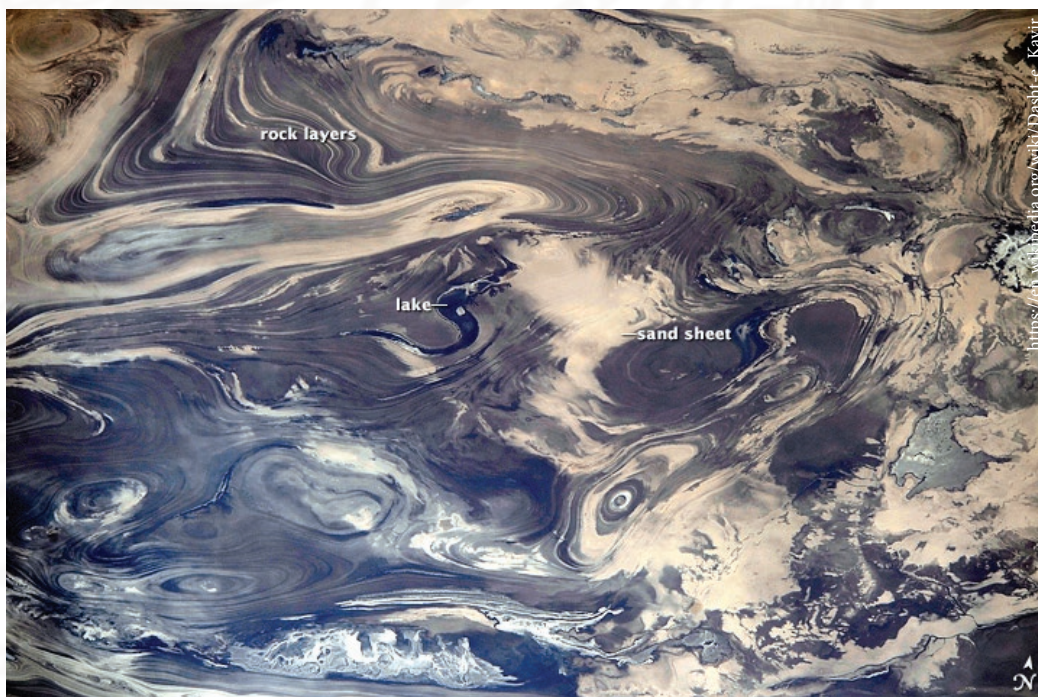
The minerals in the rocks and sands of the Plateau produce marvellous colour early and late in the day, but (with the infrequent exceptions noted below) there is no trace of moisture in the landscape. It has been desiccated beyond redemption by the sun and wind.

Medieval Arab geographers divided Iran into the *garmsir*, the Hot Lands, and the *sardsir*, the Cold Lands, by an imaginary line drawn east to west roughly following the southern boundary of the Plateau from Baluchistan to the head of the Persian Gulf.

The bitterly cold winter, turning to snow in the mountains and occasionally in the desert too, justifies the Plateau's inclusion in the *sardsir*. However, its summer temperatures almost match those of the Persian Gulf, and in places surpass them. In mid-winter the temperature in the central desert can range from -5°C to 40°C in the space of the six morning hours.

The aridity of the land is maintained and emphasised by the wind, whose prevailing direction over much of the Plateau is from the northeast. The notorious “120 day wind” blows through eastern Khorasan and Sistan during the summer months, gusting regularly at Gale Force 9 and sometimes reaching Hurricane Force 12. It is also nicknamed “the black wind” and “the wind that kills oxen”. Its greatest intensity coincides with the heat and somnolence of the afternoon, when many people retire indoors and sleep. Outside the gale scours with grit all that stands in its path.

Settlements are orientated for shelter from the wind, while also seeking to tap its power in certain ways. At Yazd the winds are known by distinct names: *shomali* from the north, *khorasani* from the northeast, *kermani* from the southeast and *isfahani* from the south-west.



Dasht-e Kavir desert: astronaut photo from International Space Station, 2014

The use of water in the desert

The parching quality of the wind, combined with the summer heats and scanty rainfall on the Plateau makes the conservation of water vital.

The annual precipitation over much of the Plateau seldom exceeds 126mm, and may well fall in one or two torrential storms, causing houses to collapse and the topsoil to be washed away.

Irrigation must be practised for any reliable harvest. For this reason the Iranian farmer has acquired remarkable expertise in the channelling and distribution of water; as well as tenacity in defending their water rights.

No rivers reach the sea from the Plateau and only three really sizeable rivers flow across corners of it for any distance: the Zayandeh Rud, which creates and sustains Isfahan before seeping away in a swamp eighty miles further east; the Hari Rud which serves Herat and is doomed to trickle away in the sands of the Kara Kum desert; and the Helmand, which swells the Hamun in Sistan in the spring.

Water drawn from these rivers ensures agricultural prosperity of the long oases upstream from Isfahan and downstream from Herat. No more than eight kilometres from each river, however, the greenery gives way abruptly to desert.

Away from these few rivers, which provide enough water for rice cultivation as well, fields are few and the green or gold strip between oasis village and desert is slender. The sudden appearance of agricultural prosperity in the midst of a desert landscape is explained by the straight lines of giant molehills or bomb craters heading from distant mountains. This is the *qanat* system that creates the oasis culture, which is a key feature of the Plateau away from the immediate proximity of mountains. Every drop of water counts and is preserved by shading it from the sun in tunnels, cisterns and in the shelter of trees until it is spread through a network of miniature channels over the fields it has helped to create.



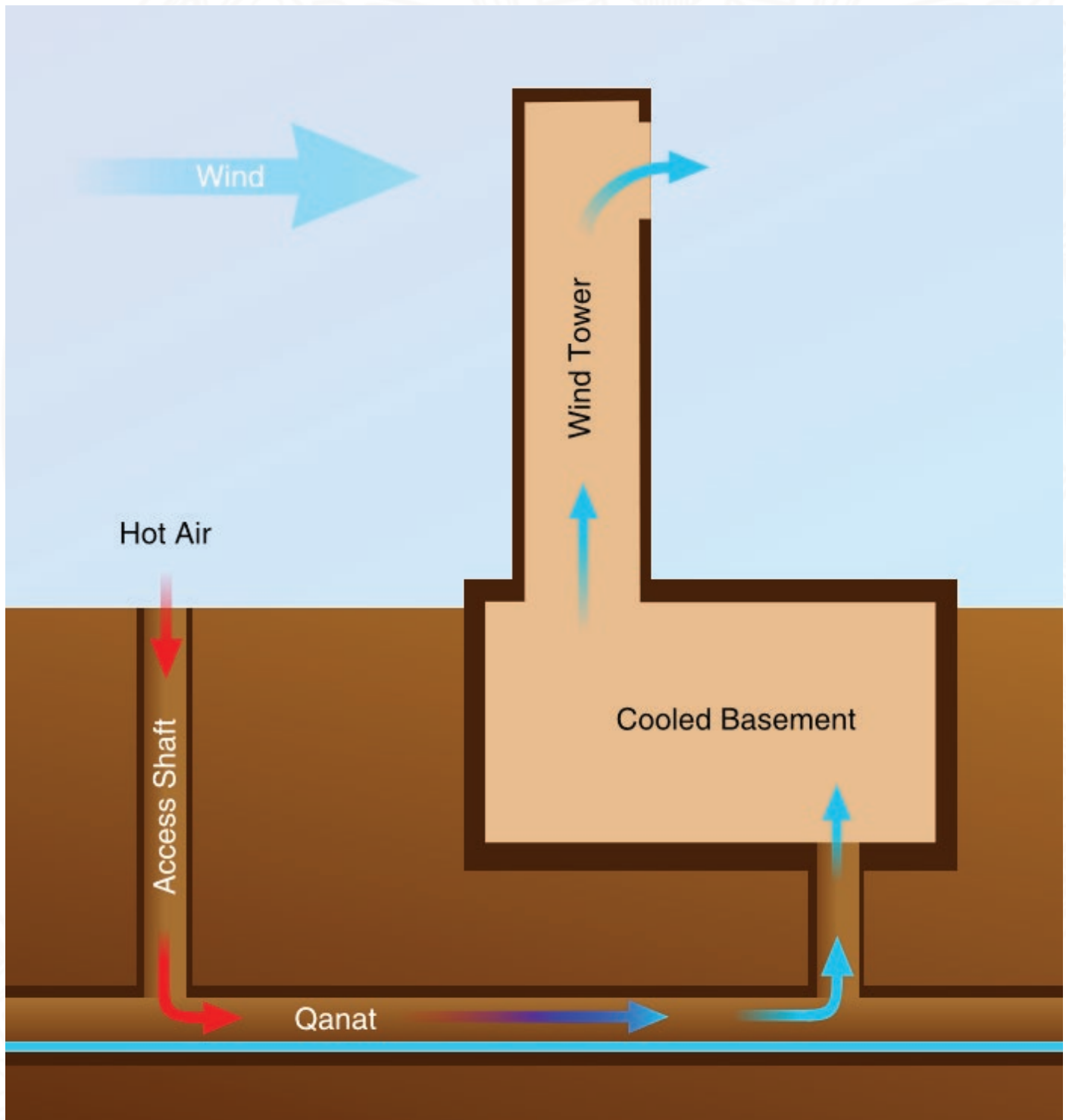
Vegetation of the desert

Vegetation that holds the soil together, keeping the desert at bay, is thus largely due to irrigation. What little natural growth there is, dependent upon occasional rainfall, occurs mainly round the Plateau rim where grazing animals quickly eat any vegetation.



The farmers are conscientious users of their water supply, planting saplings beside the irrigation channels and growing both Lucerne and fruit trees in those small mud-walled fields which extend as far as the water allows beyond the village, toward the desert.

The shade, coolness and greenery of orchards found in small towns and villages on the Plateau- have two vital contributions to make to the success of living with the desert. Firstly, the villages use it as shade from the hot sun. Secondly, they help to lay some of the dust which the wind hurls at the settlements standing in its path.

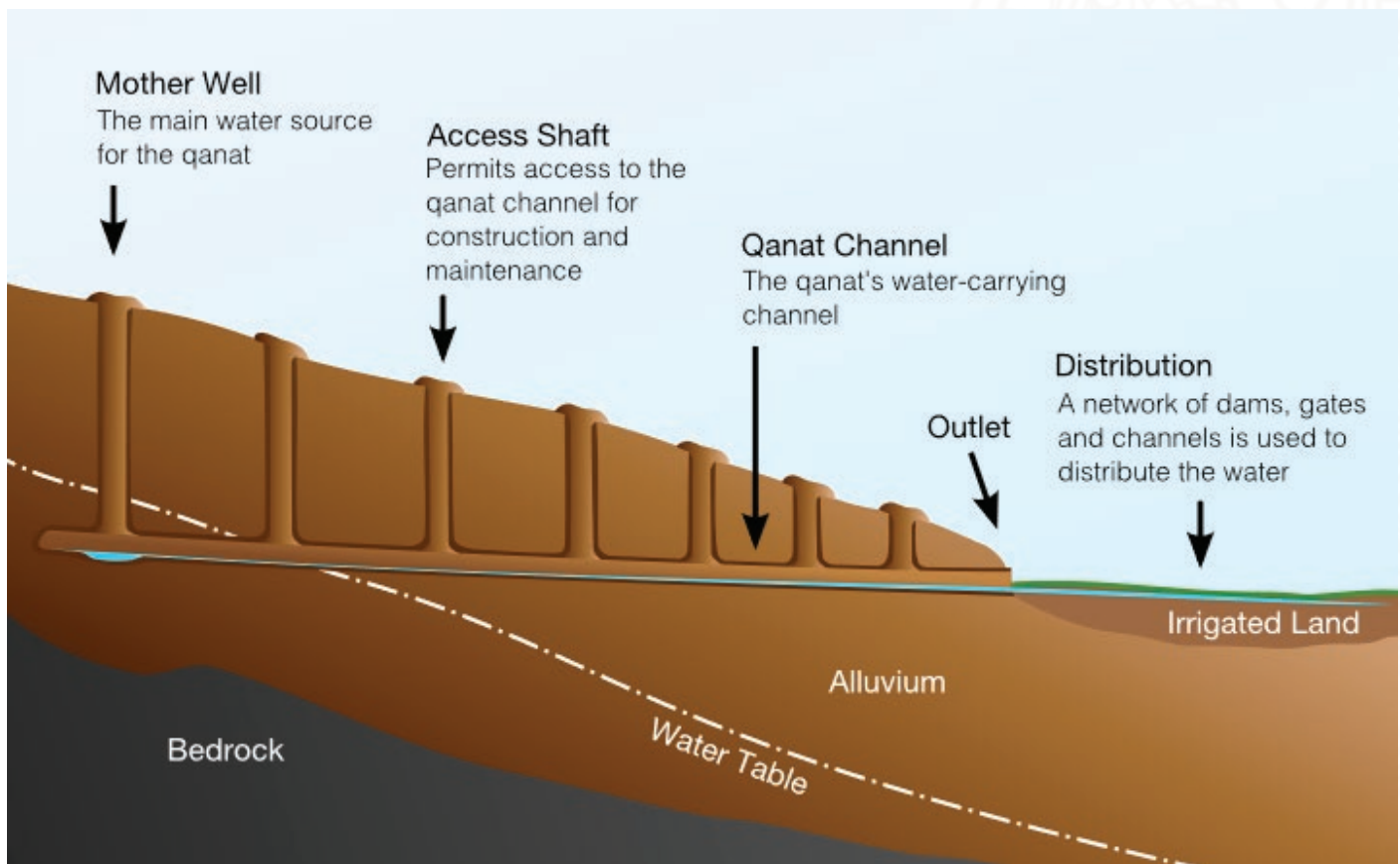


Qanats

A *qanat* is an underground water channel. It is a traditional method of supplying water used throughout Iran. The estimated number of qanats in Iran is more than 50 000.

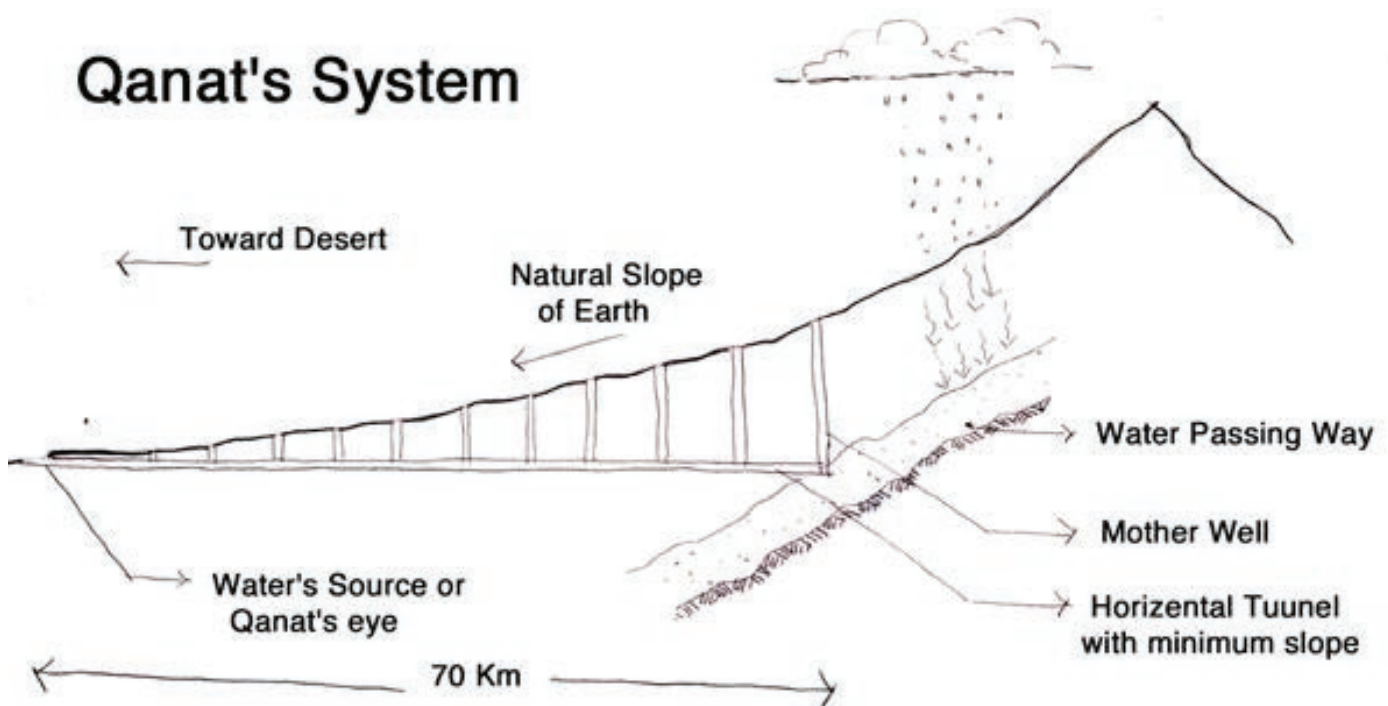
Qanat construction is expensive and dangerous, so complex laws govern their use and maintenance.

Traditionally, qanat builders come from the city of Yazd, and although modern irrigation projects and dams have been a government priority since the 1960s, Yazd qanat-builders are still in demand today



Method of constructing a Qanat:

1. Bore a well down to an underground water source-, which may be more than 100 metres down. The well must be at a higher level than the point at which the water is to be collected.
2. Dig a tunnel, just wide and tall enough to crawl along, in order to carry the water at a low gradient to that point.
3. Dig narrow wells down to the tunnel at regular intervals for ventilation and to dispose of the excavated rubble.
4. Enjoy using this traditional water source- first seen in the Central Plateau over two thousand years ago.



Climate Statistics

Tehran (1220m)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature	2.2	5.0	9.4	15.6	21.1	26.4	29.7	28.9	25.0	18.0	11.7	5.6	16.6°C
Precipitation	46	38	46	36	13	2	2	2	2	8	20	30	245mm

Activities:

1. Locate a map of Iran and highlight the features written about in section 2 of the article.
2. Account for the different types of deserts found on the Plateau:
 - a. Dasht.
 - b. Kavir.
 - c. Namak.
 - d. Lut.
3. Research and describe a caravanserai.
4. Using another blank map of Iran, divide the country, as would a medieval Arab geographer.
5. What is the “black wind”?
6. Using the climatic statistics information complete a climatic graph for Tehran.
7. Qanats are used in Iran’s desert for villagers’ survival.
 - a. What are they?
 - b. How do they work?
8. Describe the advantages of qanats for vegetation in the desert. Outline the explicit link between the two for the farms of the Iranian desert.



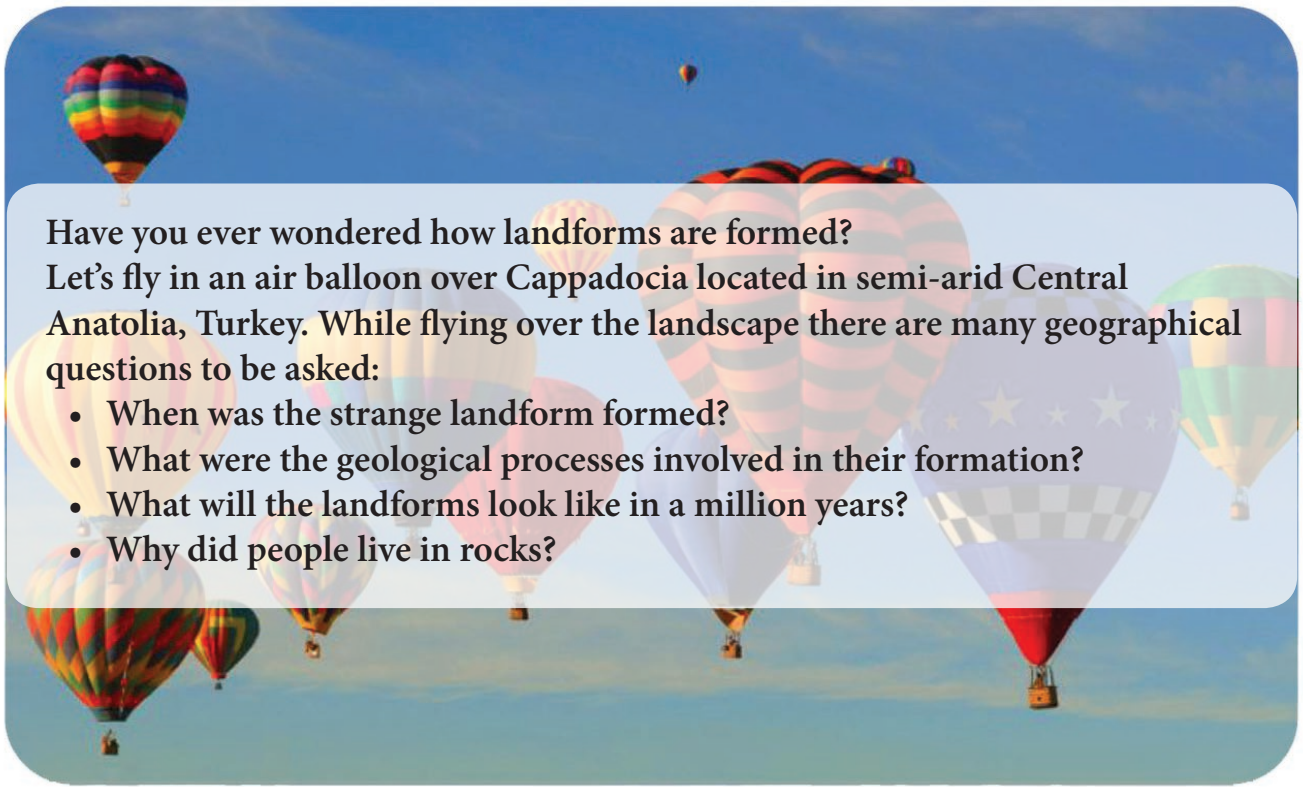


Cappadocia

Landscapes and Landforms

by Dr. Susan Bliss

Photographs: Cappadocia (S. and J. Bliss)



Have you ever wondered how landforms are formed?

Let's fly in an air balloon over Cappadocia located in semi-arid Central Anatolia, Turkey. While flying over the landscape there are many geographical questions to be asked:

- When was the strange landform formed?
- What were the geological processes involved in their formation?
- What will the landforms look like in a million years?
- Why did people live in rocks?

Cappadocia

Cappadocia is located in central Turkey. The present landforms were created with the eruption of three **volcanoes** about ten million years ago. The volcanic explosions spread a thick layer of hot ash over the region, which hardened into a soft, porous stone called tufa. Over millions of years **wind erosion** and **water erosion** wore away portions of the **tufa**, carving it into elaborate shapes, resembling thin pillars and minaret-like formations.

Hard stone eroded slowly and protected the underlying soft rock from erosion. This resulted in a column of soft tufa with a hard boulder perched on top. These are referred to as 'fairy chimneys' or hoodoos. As tufa is soft, troglodytes (cave dwellers) used primitive tools to cut homes, churches, monasteries and multi-level cave cities in the ground.

Göreme

Between 800BC and 1200BC Göreme was inhabited by the Hittites. As Göreme was *located in a precarious political position between rival empires such as the Greeks and Persians, local residents required a hiding place. They found safety by tunnelling into soft rock. Around the 4th century Christians fleeing Rome's persecution sought refuge in troglodyte villages and subterranean towns such as Kaymakli and Derinkuyu.*

From 725-842, simple decorations in many churches and after 842 many churches were decorated with brightly coloured figurative painting e.g. Tokalı (10th century), St. Barbara (11th century) and Elmalı (12th – 13th century). Some of these paintings exist today. Göreme National Park and the Rock Sites of Cappadocia were declared a World Heritage Site in 1985 for their natural beauty and cultural heritage:

- *natural*: landscape showing a variety of rock pillars, pinnacles, mushrooms and chimneys, some stretching 40 metres into the air
- *cultural*: beginning in the 4th century AD carving of tunnel complexes in soft rock formed an underground urbanised cultural landscape (e.g. churches with frescos).



<https://pixabay.com/en/fairy-chimneys-g%C3%B6reme-love-valley-64881/>

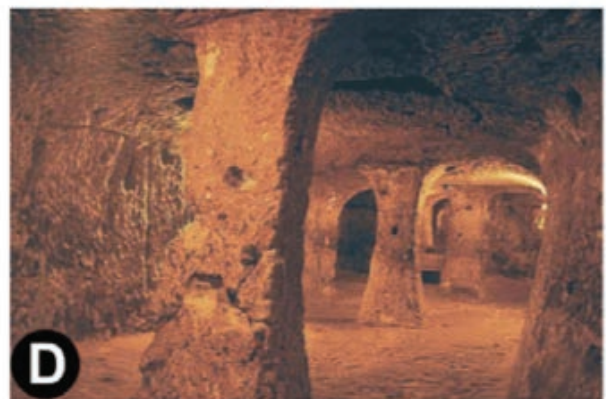
<https://s-media-cache-ak0.pinimg.com/736x/fa/3e/b2/fa3eb237ce370cc3ed1fbca644215705.jpg>

CIUDAD SUBTERRANEA DE DERINKUYU

- ① Entrada habitada al turismo
- ② Entradas no habitadas
- ③ Canal
- ④ Chimeneas de ventilación y pozos
- ⑤ Iglesia
- ⑥ Puertas de piedra

http://www.cappadocia1.com/wp-content/uploads/harita_8.jpg





<https://etd.lib.metu.edu.tr/upload/12605665/index.pdf>

Examples of rock-hewn settlements in Cappadocia

A and B: Gümüşler and Ürgüp (cliff type settlements)

C and D: Kaymaklı and Derinkuyu (underground settlements) **E and F:** Gelveri and Çanlıkilise (mixed type settlements)

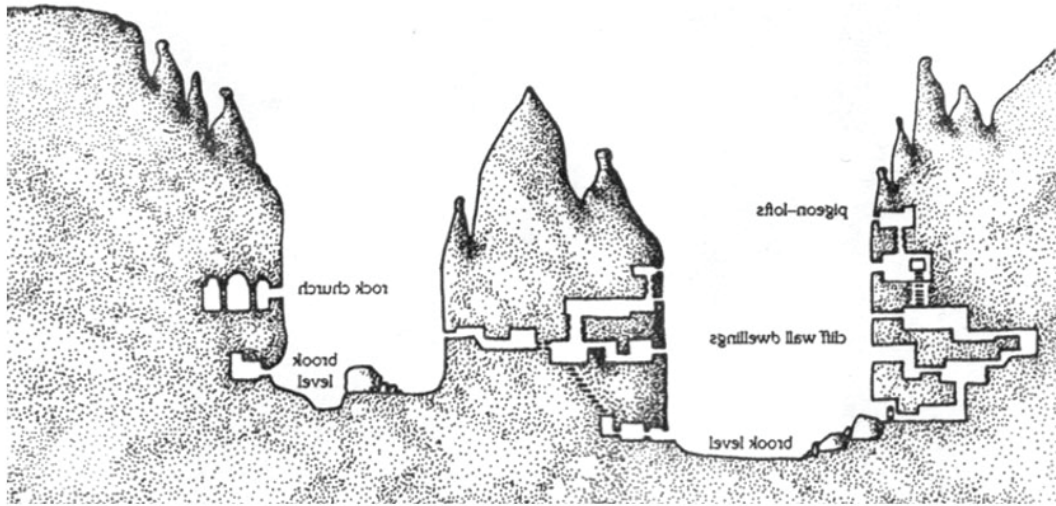


Figure 3.3 Schematic section of cliff settlements (Giovannini, 1971)

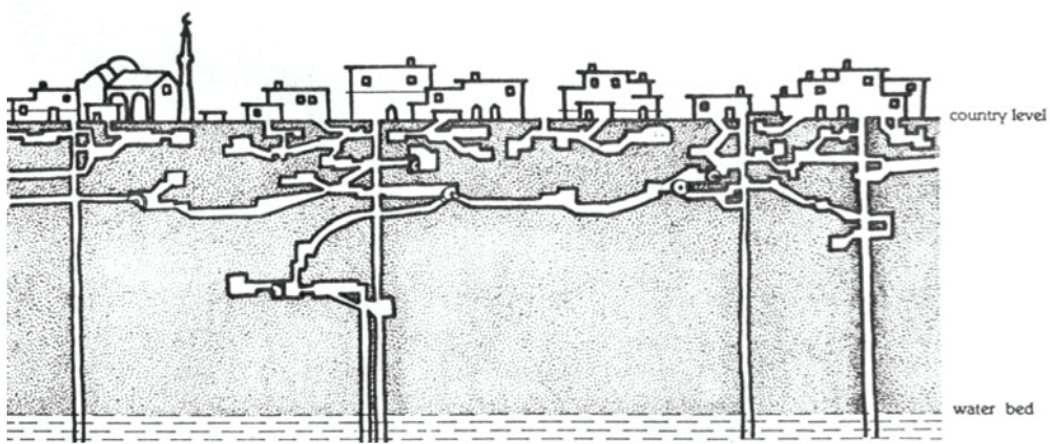


Figure 3.4 Schematic section of underground structures (Urban, 1973)

Diagram: <https://etd.lib.metu.edu.tr/upload/12605665/index.pdf>

Did you know?

The word 'Cappadocia'; dates back to Persian times, when the region was called katpatukya meaning 'Land of Beautiful Horses'

Activities

The landscape of Cappadocia is a result of its geology-the nature of the rocks and the processes of erosion which wore them down. Discuss.

Explain why Cappadocia is a World Heritage Site.

Refer to the internet and in groups investigate the following:

- Rock-cut churches of the Göreme Open-Air Museum and their frescos
- Zelve Open-Air Museum, with a warren of troglodyte dwellings and churches.
- Nevşehir the largest town.
- Underground cities of Derinkuyu and Kaymaklı.

Include photographs where possible.

ICT

Geology- advanced research for geology

<https://etd.lib.metu.edu.tr/upload/12605665/index.pdf>

Water in Turkey

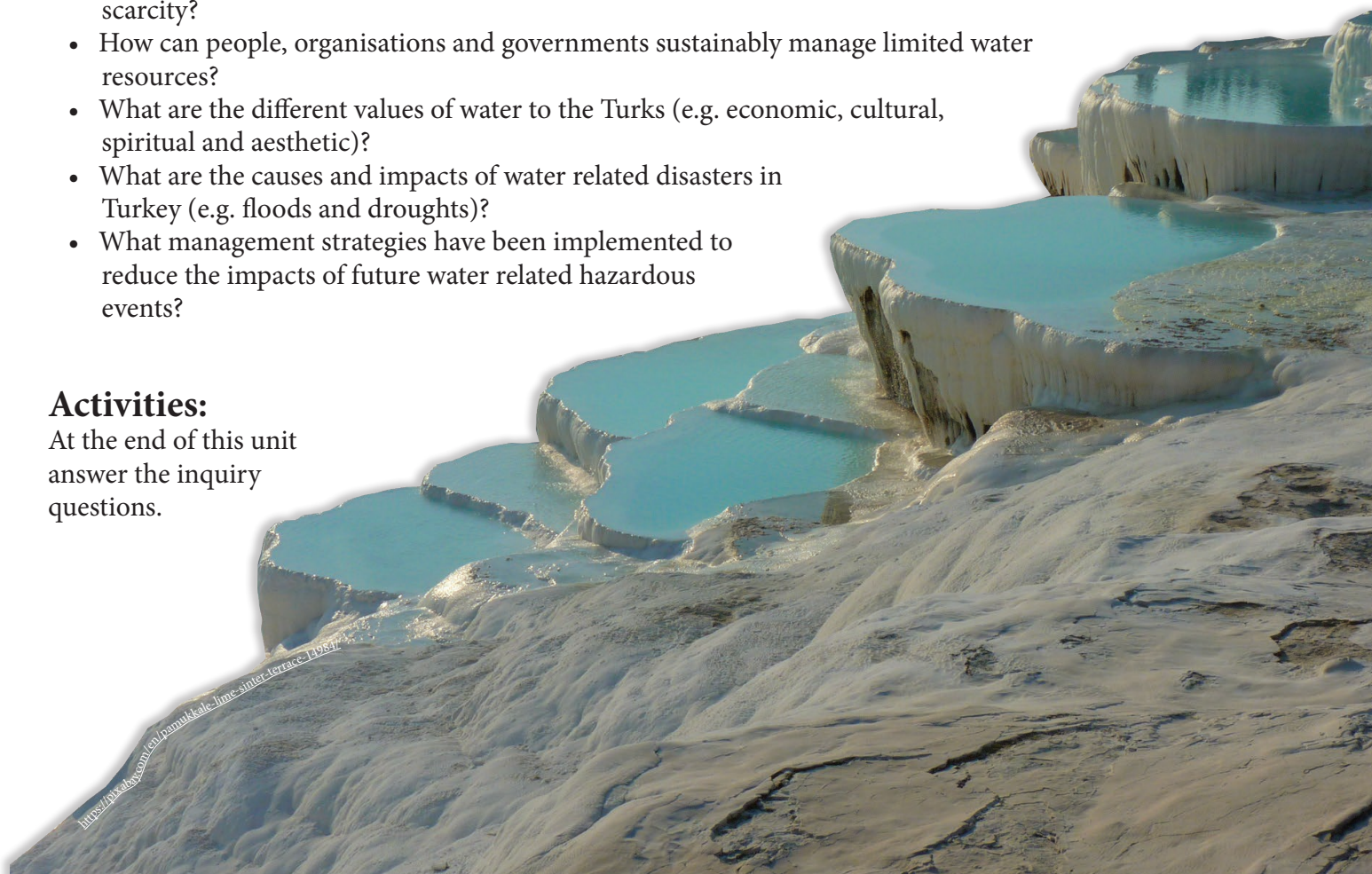
Photograph: Turkey, Istanbul, Basilica Cistern, ancient water reservoir (J. Bliss)

Inquiry questions:

- How does the water cycle operate in Turkey?
- What are the main water cycle flows in Turkey (PERTIC)?
- What are the main water cycle storages in Turkey (e.g. groundwater, lakes, seas and glaciers)?
- What is the spatial distribution of water resources across Turkey?
- What areas in Turkey experience water stress?
- How will climate change, and increased population and economic activity, impact on future water scarcity?
- How can people, organisations and governments sustainably manage limited water resources?
- What are the different values of water to the Turks (e.g. economic, cultural, spiritual and aesthetic)?
- What are the causes and impacts of water related disasters in Turkey (e.g. floods and droughts)?
- What management strategies have been implemented to reduce the impacts of future water related hazardous events?

Activities:

At the end of this unit answer the inquiry questions.



Water footprint

The water footprint is the quantity of water consumed by an individual, household, farm, industry, mine, community or country. Turkey's water footprint per person is 4,500 litres per day-less than Yemen (2,500), Angola (2,600), and USA and Australia (see table below). The water footprint also includes the volume of water required to produce a product (e.g. jeans requires about 11, 000 litres of water) and the food the Turk's eat (e.g. 1kg of chocolate uses 17,196 litres of water).

Turkey's growing water footprint and whether the country will have sufficient water resources to sustain escalating water demands, is a major problem.

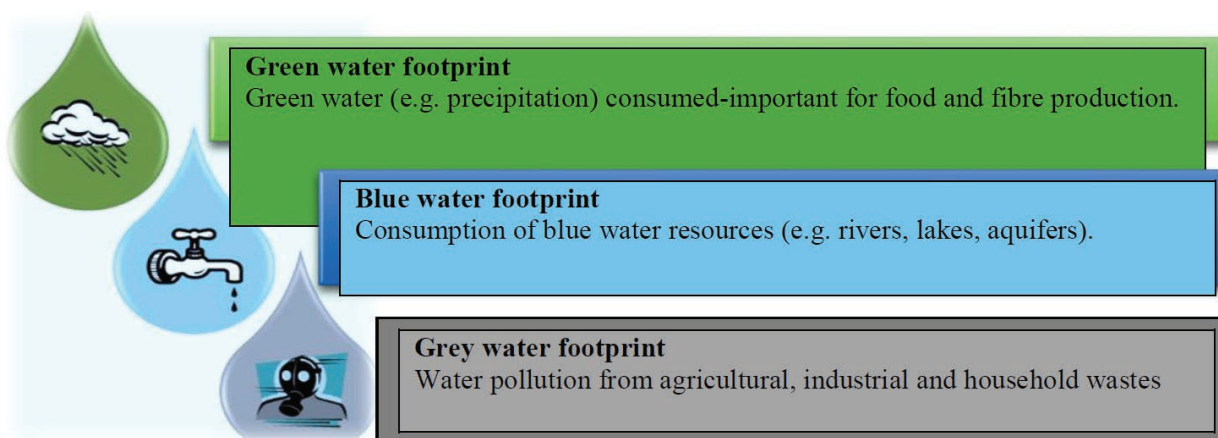
Water footprints

Adapted: <http://waterfootprint.org/en/resources/interactive-tools/national-water-footprint-explorer/>

Country		Turkey	Australia	United States
				
Water footprint per capita (litres per day)		4,500	6,300	7,800

Green, blue and grey water footprints

The water footprint has three main components-blue, green and grey. Global average water footprint for the production of chocolate is 98% green, 1% blue and 1% grey water.



Water consumption in Turkey 1990-2030

Growth in water consumption in Turkey.... (*) of 110 billion m³

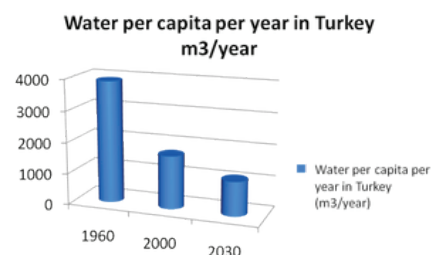
Source: <http://medhycos.mpl.ird.fr/doc/turkey.htm>

YEAR	TOTAL WATER WITHDRAWAL		SECTORS					
			Irrigation		Domestic		Industrial	
	million m ³	%(*)	million m ³	%	Million m ³	%	million m ³	%
1990	30 600	28	22 016	72	5 141	17	3 443	11
1999	38 900	35	29 200	75	5 700	10	4 000	11
2000	42 000	38	31 500	75	6 400	15	4 100	10
2030	110 000	100	71 500	65	25 300	23	13 200	12

Water consumption per capita 1960-2030

Source: <https://waterisliving.files.wordpress.com/2012/04/water.png?w=300&h=17>

Water per capita per year in Turkey (1430 m³) is a lot less than the world's mean (7600 m³). However, with increasing population and growing demand for water resources, by 2030 Turkey will have reached the upper threshold of water stress (1000 m³).

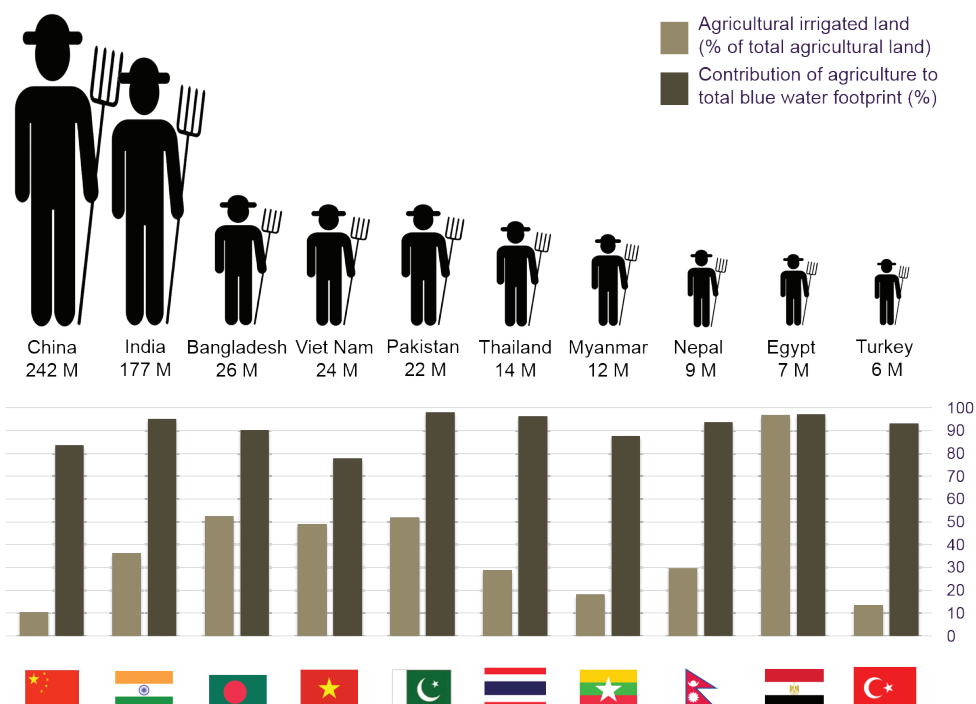


Thirsty agriculture

By 2030, 65% of Turkey's water supply will be used for irrigation. The remaining 23% will be used for domestic purposes and 12% used for industrial purposes.

As Turkey's population grows the demand for food increases. As a result agriculture is placing pressure on water resources to irrigate crops. Agricultural land in China and Turkey is mostly rain fed (blue water footprint). By contrast in Egypt, most available water is used to irrigate crops. However, 100% of the population experiences water scarcity for some months of the year.

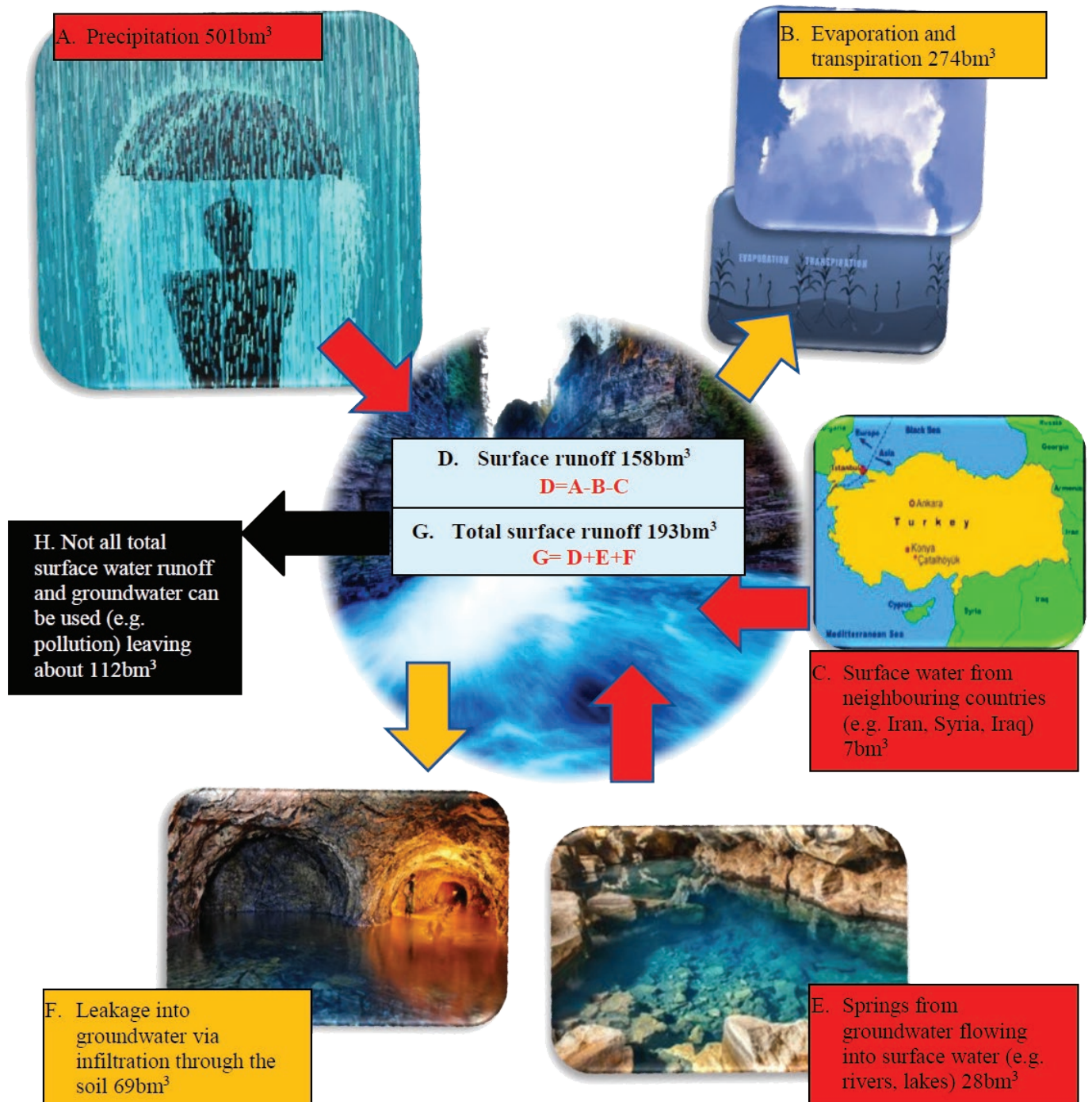
Top 10 countries with large agricultural employment and blue water scarcity



Sources: International Labour Organization (www.ilo.org); Mekonnen, M.M. and Hoekstra, A.Y. (2011) The green, blue and grey water footprint of crops and derived crop products, Hydrology and Earth System Sciences, 15(5): 1577-1600; FAO Statistics; Graphic of farmer by Meaghan Hendricks, License: Creative Commons

Water cycle flows in Turkey

Water cycle flows are precipitation, evaporation, runoff, transpirations, infiltration and condensation (PERTIC).



- A. Precipitation 501bm³
- B. Evaporation and transpiration 274bm³
- C. Leakage into groundwater 69bm³
- D. Surface runoff 158 bm³ $D=A-B-C$**
- E. Springs from groundwater flowing into surface water (e.g. rivers, lakes) 28bm³
- F. Surface water from neighbouring countries (e.g. Iran, Syria, Iraq) 7bm³
- G. Total surface runoff 193bm³ $G= D+E+F$**

Precipitation-water cycle flow in Turkey

Turkey experiences low precipitation, averaging 643mm/yr. It ranges from 250mm/yr in the south-east part of the country, to over 2200mm/yr in the north-east Black Sea coastal area. The country suffers from periodic droughts and floods.

- **High to medium precipitation:**
 - The *Aegean and Mediterranean* coasts receive cool, rainy winters and hot, dry summers. Annual precipitation varies from 580mm/yr-1,300mm/yr, depending on location.
 - The *Black Sea* coast receives the highest precipitation in Turkey. The eastern part receives over 2,200mm/yr and it is the only region in Turkey that receives rainfall throughout the year.
- **Low precipitation:**
 - The inland *Anatolian plateau* experiences hot summers and cold winters and receives little precipitation.

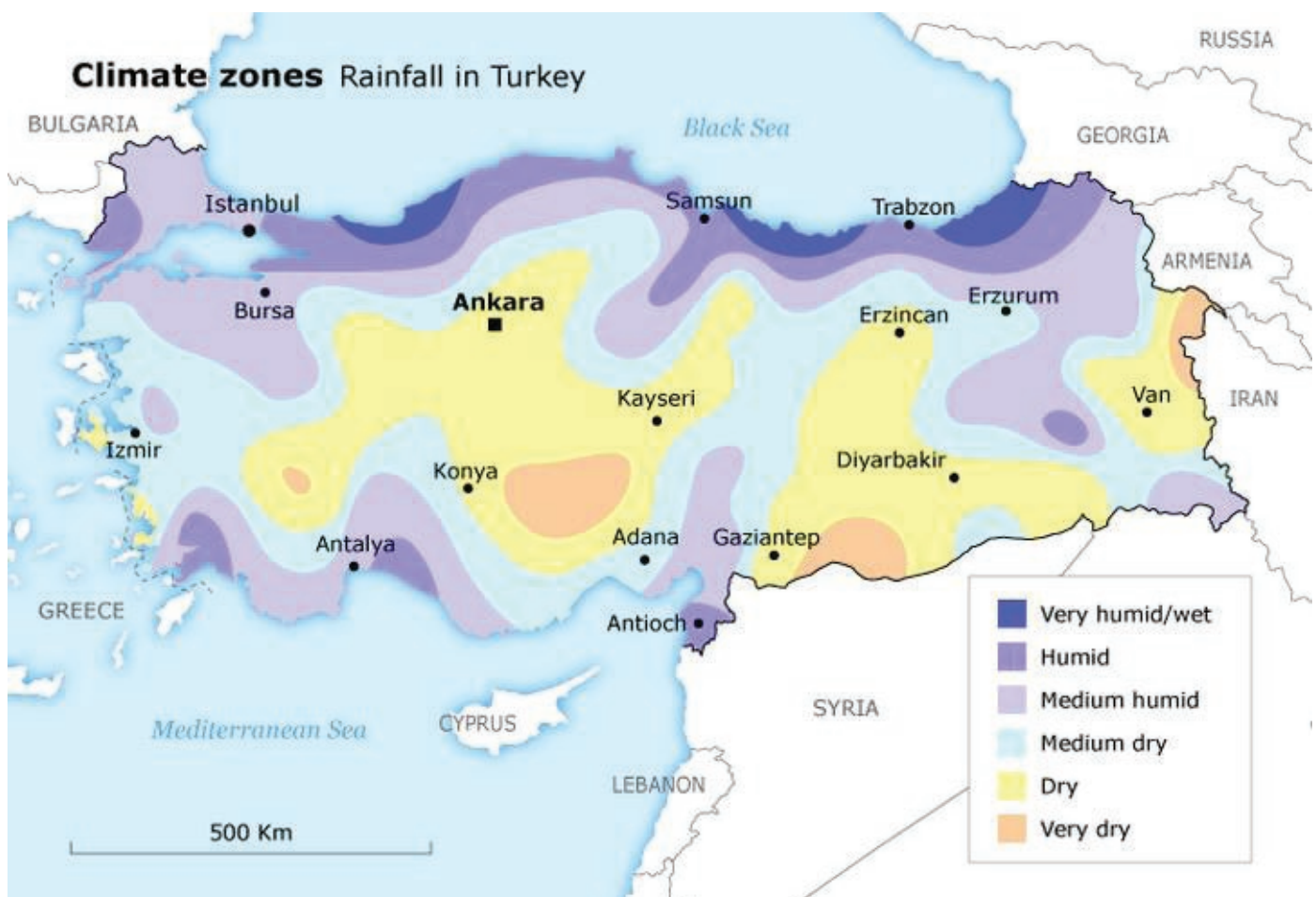
Climate zones across Turkey

Turkey's climate (e.g. precipitation and temperature) varies across the country:

- *coastal areas* around the Mediterranean Sea generally experience a mild climate. However the Black Sea coastal area is colder than the Mediterranean area.
- *inland areas* have a continental climate, with cold and snowy winters and hot and dry summers.

Climate zones and rainfall in Turkey

Map: https://s14turkey.files.wordpress.com/2014/02/turkey_climate_map_730px_fd74aa098e.jpg



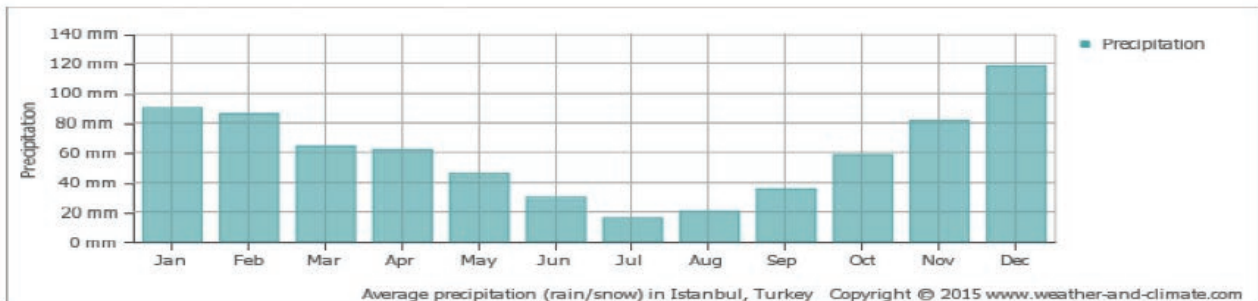
Precipitation graphs in Turkey

Source: <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine.istanbul.Turkey>

***Note the vertical scale differs between the places**

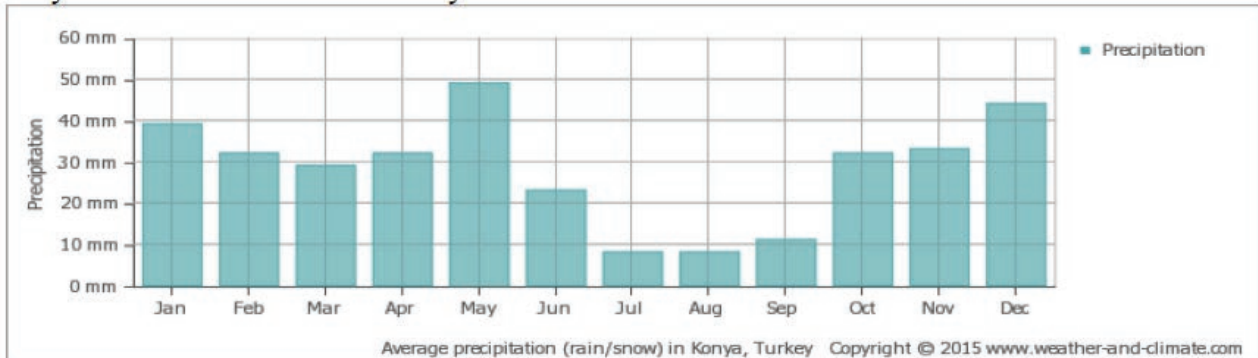
Istanbul

Most rain falls in December during winter. Dry conditions occur in July and August the warmest months. This a Mediterranean climate.

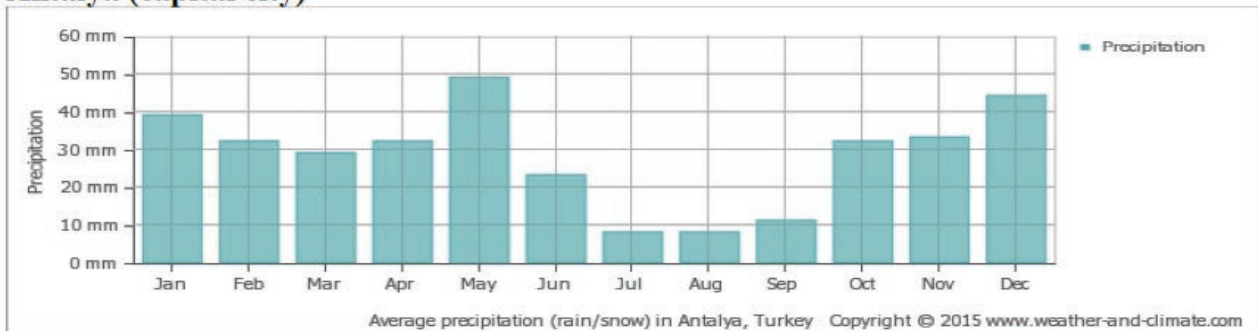


Konya

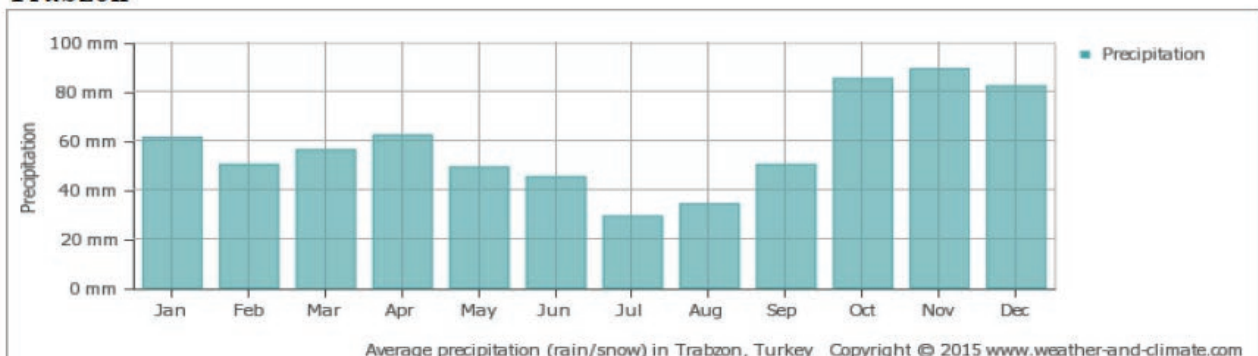
May is the wettest month and July the driest month.



Antalya (capital city)



Trabzon



Activity: Calculate the total precipitation for the year for the four locations in Turkey

Water storages in Turkey

Main bodies of water includes:

Mediterranean Sea, Aegean Sea, Black Sea, Kizilirmak River, Kura River, Tigris River, Euphrates River, Lake Van, Lake Tuz and Lake Beysehir.

Ample but unusable freshwater resources are located at the Black Sea, and the heavily populated and industrial areas around the Marmara and Aegean Seas.



Bosphorus Strait, Presidential yacht (J. Bliss)

Main water storages in Turkey

Rivers

- Euphrates
- Tigris
- Kizilirmak
- Yesilirmak
- Büyük (Great) Menderes

Lakes

- 120 natural lakes
- Largest and deepest lake is Lake Van
- Second largest lake is Lake Tuz

Dams

- 555 large dam reservoirs
- Largest dam is Ataturk (817km²)

Rivers in Turkey

Map: <http://www.dalaman-rafting.com/images/maps/rivers-map-turkey.jpg>



Groundwater in Turkey

A hamam is a traditional steam bath house used for cleansing and relaxing. The baths using water from hot springs (groundwater), are found across the country. Often hamams are located near mosques for those believers who desire deeper cleansing before prayers.

Pamukkale

Pamukkale's ancient baths reach a temperature of 38°C. Cleopatra is said to have swam in Pamukkale's thermal pools. They are popular with tourists today, though now are open to the environment and to mixed gender.

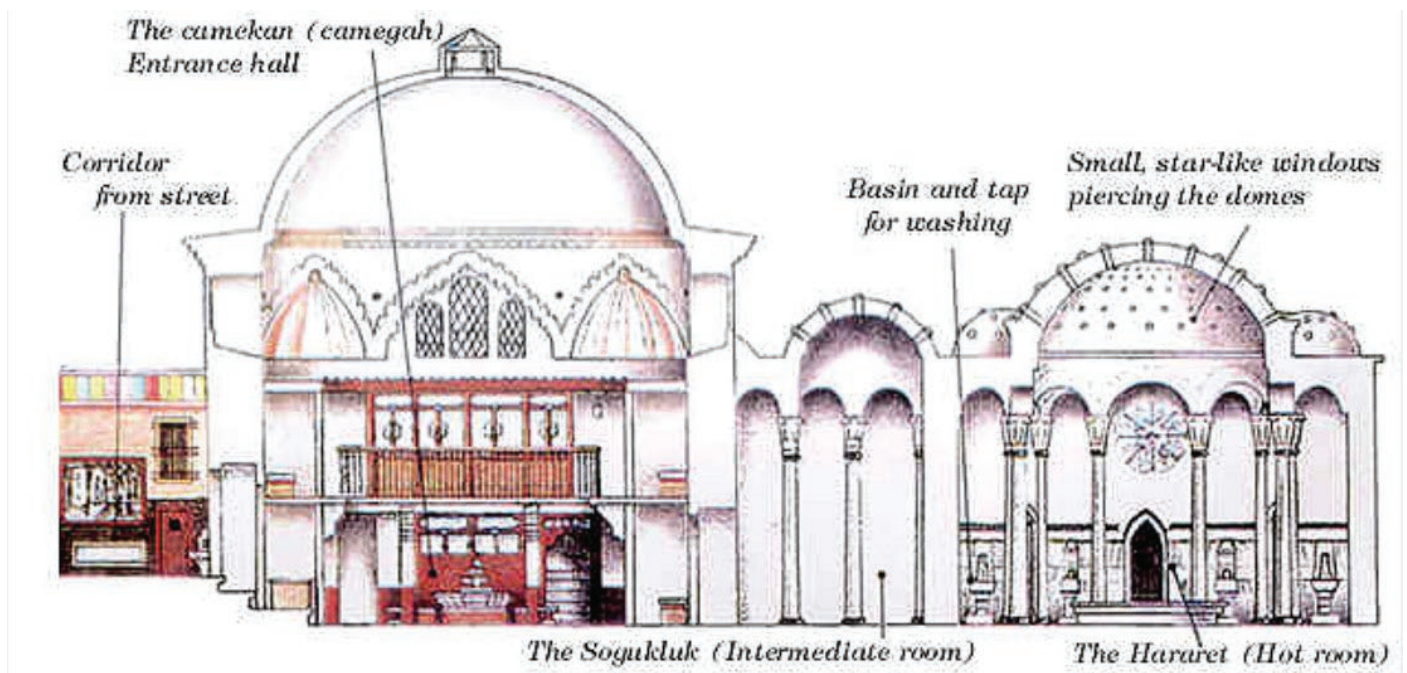


Photo: <http://thewanderlife.com/wp-content/uploads/2010/08/pamukkale1.jpg>

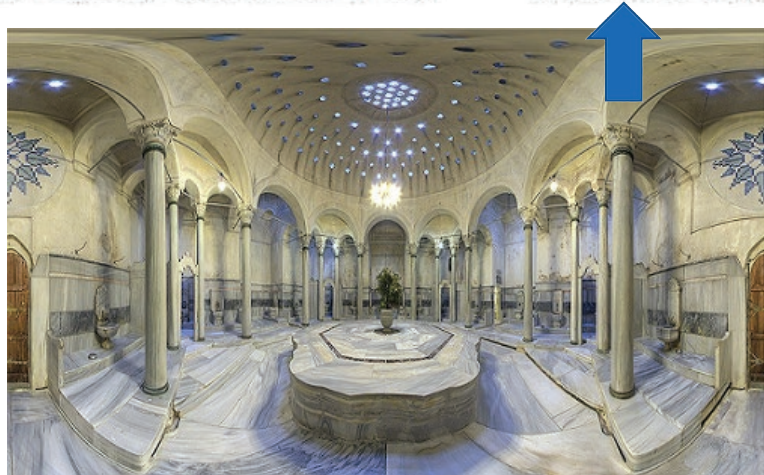
Cagaloglu Turkish bath in Istanbul

Constructed in 1741 is still operational today.

Image: <http://s2.photobucket.com/user/stormicy/media/a3e15503.jpg.html>; <http://rarefindstravel.com/wp-content/uploads/2013/02/cagaloglu-bath.png>



Section two is the hot area where the central, heated stone platform is located. It is surrounded by small basins, benches and private bathing cubicles.



Groundwater use and misuse

Groundwater is used for a variety of purposes in Turkey such as irrigating farms, domestic supplies, industrial processes and a source of geothermal power.

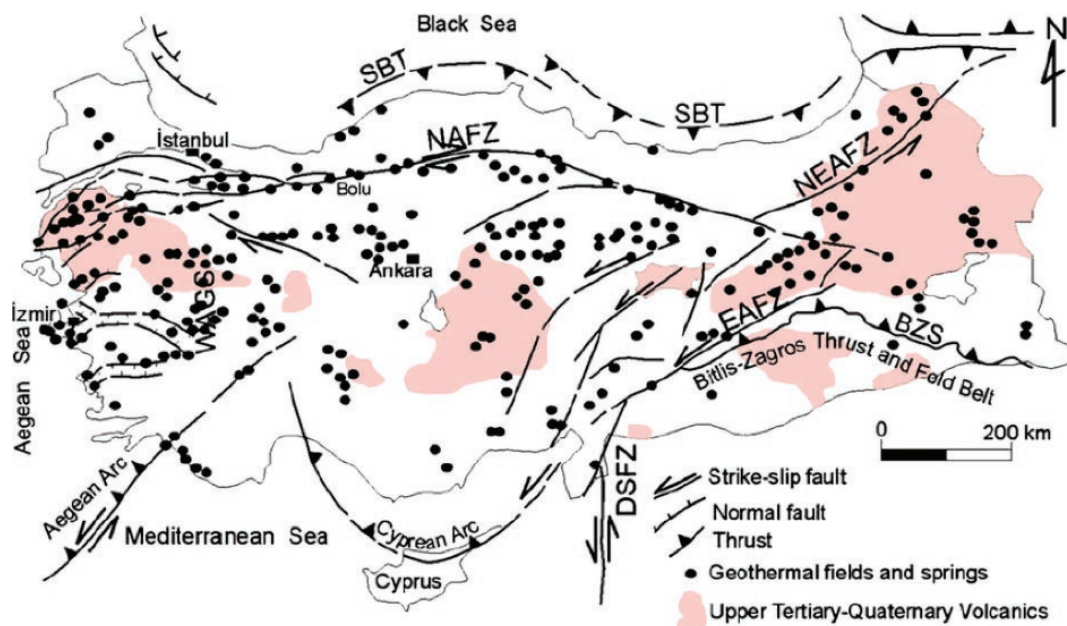
Turkey's groundwater is vulnerable to contamination from a variety of forces:

- *natural* - geological formations, seawater intrusion and geothermal fluids
- *human* - agricultural (infiltration of pesticides and fertilisers), industrial and mining waste and septic tanks. Concentration of arsenic in groundwater are found in Izmir and Van. Abandoned mercury mines in the western regions of Turkey, especially in Çanakkale, İzmir and Balıkesir, causes serious groundwater quality problems.

In Turkey groundwater cannot be exploited without the consent of the government.

Hot springs and fault plains across Turkey

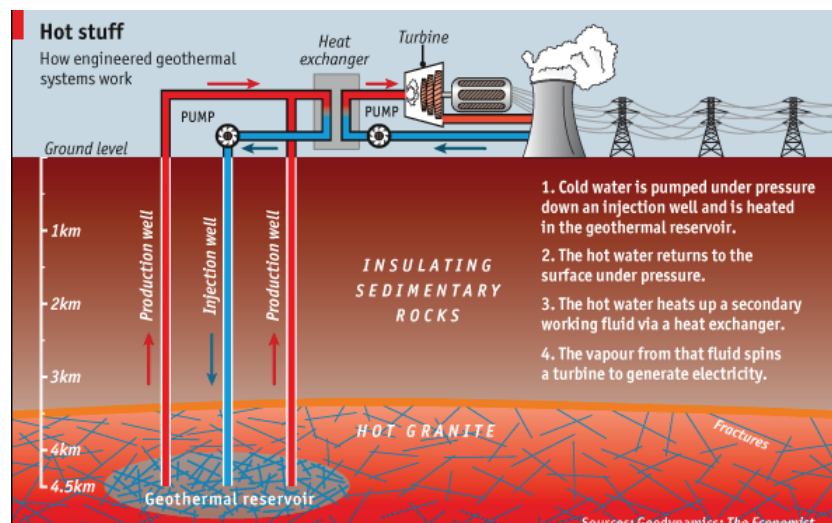
Map: <http://www.cleanriverstrust.co.uk/wp-content/uploads/2016/02/springs.png>



Geothermal energy in Turkey

- began in the 1970s
- currently two power plants operate
- used for heating residences, greenhouses, spas, bathing and swimming pools
- twenty cities in Turkey are being explored for their high geothermal energy potential

Source: <http://www.evwind.es/wp-content/uploads/2012/08/Geothermal-Energy-2-595x372.png>



Water Crisis Ahead?

Turkey is experiencing:

- large growing population
- economic growth, industrialisation, urbanisation
- increased water pollution
- intensified severity of extreme water- related events (droughts and floods)
- climate change

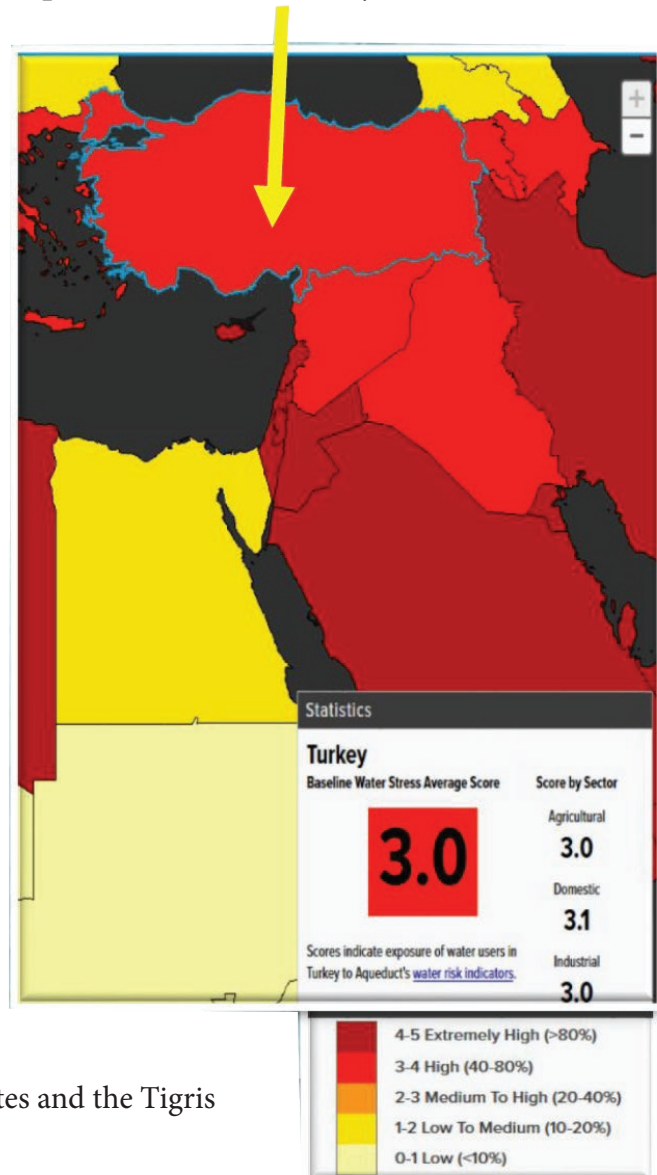
Climate change is anticipated to cause a decline in available water resources as it will trigger:

- a drop in runoff between -52% and -61% (note minus numbers)
 - a reduction in surface water in river basins by 20% (2030), 35% (2050) and 50% (2100).
- Using a high-resolution regional climate model (PRECIS), Turkey could experience an increase in water stress areas.

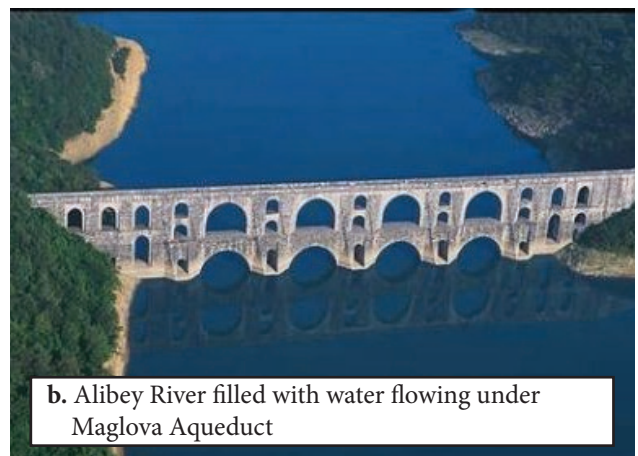
The Euphrates –Tigris Basin contains snow-fed rivers critical for the provision of hydroelectric power (HEP), irrigation, and industrial, mining and domestic activities. Anticipated changes in precipitation, snow cover and river discharge in the Euphrates –Tigris basin will impact adversely on Turkey's water resources. This dire situation requires the development of sustainable water storage and distribution projects.

One solution is the Southeast Anatolia Project, that is a integrated sustainable development project based on harnessing the water resources of the Euphrates and the Tigris rivers.

Map: Water Stress in Turkey, 2013



a. 2014 dry Alibey River under Maglova Aqueduct



b. Alibey River filled with water flowing under Maglova Aqueduct

The two storeyed Maglova Aqueduct, Istanbul was built over the Alibey River. It formed part of the Kırkçeşme water system, which brought water to Savaklar just outside Istanbul's old city walls. From here it supplied water to 158 locations that included seven palaces, 94 public drinking fountains, 15 watering troughs, 19 wells, and 13 public baths.

http://www.wri.org/sites/default/files/water_stress_by_country_0.png

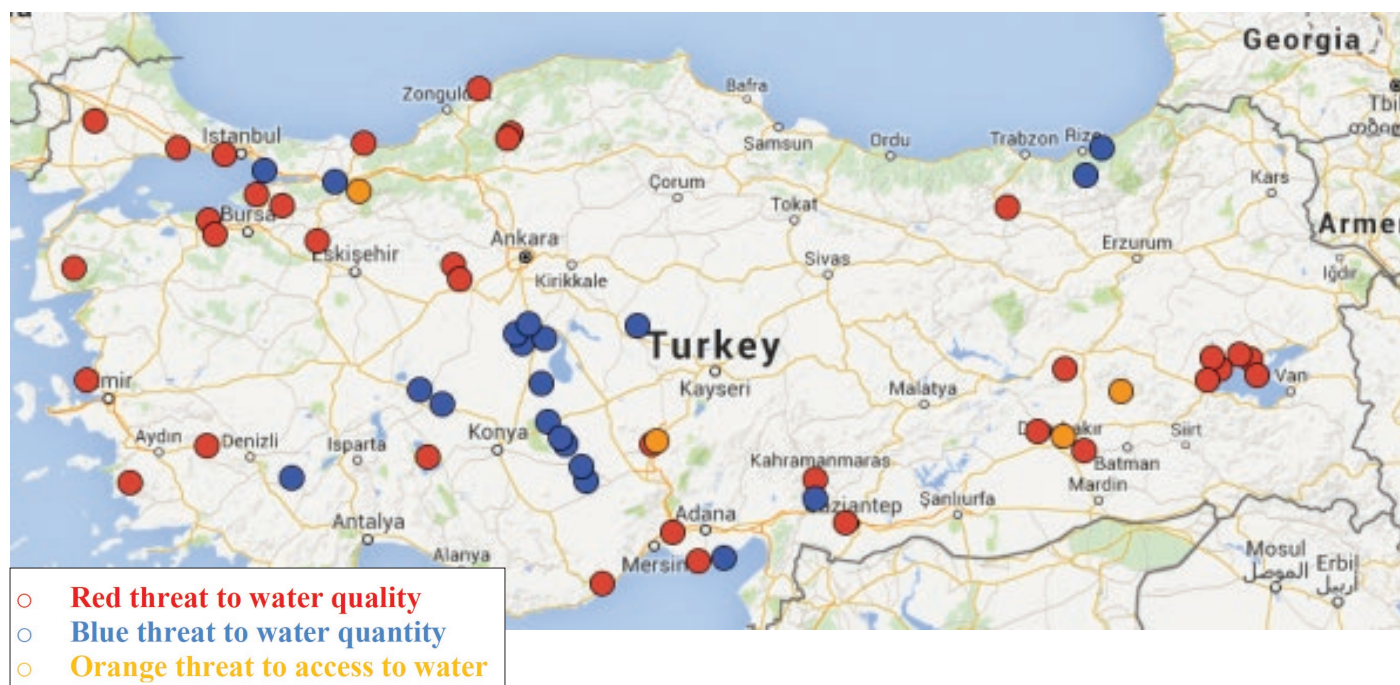
<http://i.cdn.turner.com/cnn/2010/WORLD/europe/11/29/climate.four.degrees.warning/t1larg.drought.turkey.gi.jpg>

<https://s-media-cache-ak0.pinimg.com/736x/6e/70/2c/6e702c15759841eae27102a20772bc0b.jpg>

Threats to water resources in Turkey: quality, quantity and access

In 2016, 35 threats to water resources were recorded including: river and lake pollution, decline in biodiversity, drying up of rivers and lakes, and depletion of groundwater

Source: <http://www.env-net.org/wp-content/uploads/2016/03/Water-Threats-595x263.png>



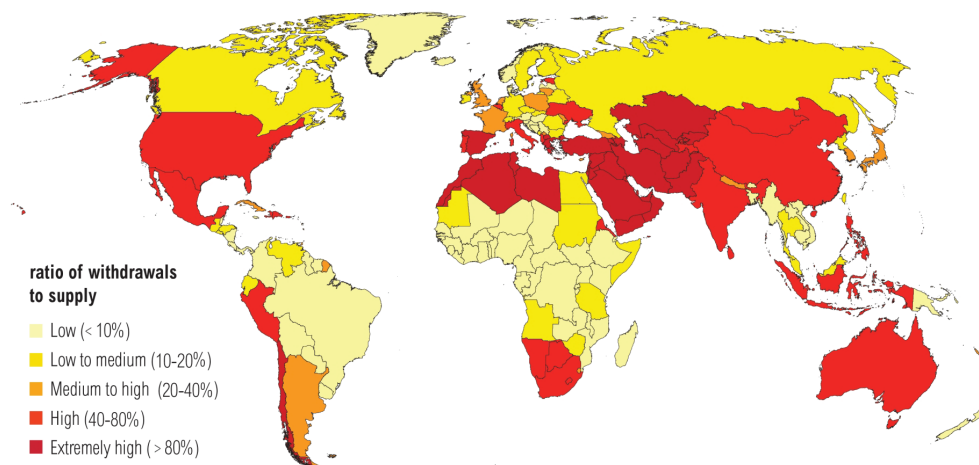
Water stress

The Intergovernmental Panel on Climate Change (IPCC) predicts a 12% decrease in annual precipitation in southern Europe and the Mediterranean Basin. As Turkey's annual water withdrawals are expected to exceed 20% of the annual renewable water supply, the country is at risk of suffering water stress in the next decade.

Water stress by country 2040

Source: http://www.wri.org/sites/default/files/uploads/water_stress_world_map_large.jpg

Water Stress by Country: 2040



NOTE: Projections are based on a business-as-usual scenario using SSP2 and RCP8.5.

For more: ow.ly/RIWop

 WORLD RESOURCES INSTITUTE

Climate change and impacts on water resources in Turkey

Cartoon: <https://s-media-cache-ak0.pinimg.com/736x/1c/e6/56/1ce6560452a1b73c7ab8b4034c2f7906.jpg>



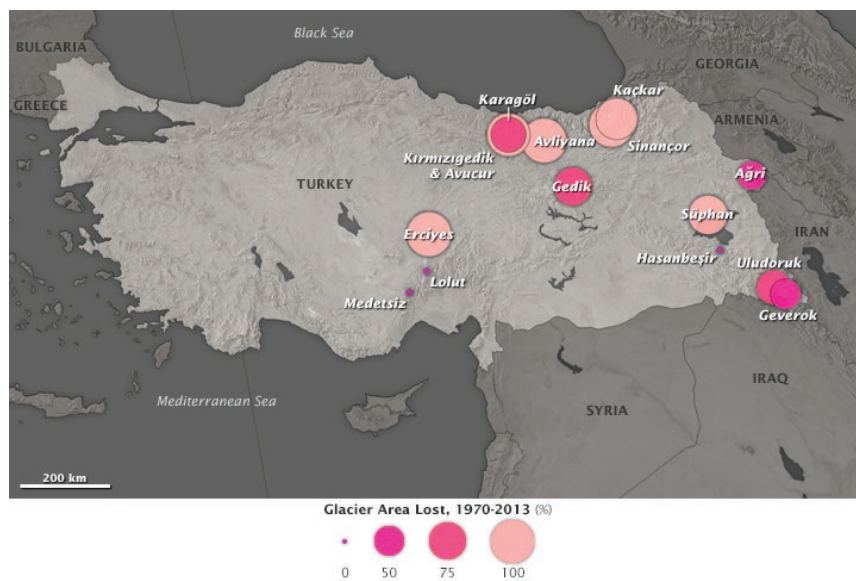
Primary water concerns in Turkey	<ul style="list-style-type: none"> • Water quantity • Water quality • Water supply and sanitation • Extreme weather events (e.g. floods and droughts) • Ecosystems
Precipitation changes	<ul style="list-style-type: none"> • Reduced winter precipitation in western provinces, loss of surface water, more frequent arid seasons- leading to degradation of soil, erosion in coastal regions and floods • Decline along the Aegean and Mediterranean coasts • Severe reductions along SW coast • Increase along the Black Sea coast • Changes to stream flows in Turkey's river basins • Shift from snowfall to rainfall by 2100 due to increasing temperatures • Reduction of up to 200mm (snow equivalent), in high plains of eastern Anatolia • Sea level rise with possibility of saltwater intrusion in inland groundwater • Eutrophication and salinisation of shallow lakes and wetlands is an environmental problem as well as a problem for drinking and irrigating crops • Increase in frequency, intensity and duration of extreme weather events such as floods especially in Western Black Sea region • Increase in water temperature affects ecological processes, leading to extinction of species and loss of biodiversity
Policies and plans	<ul style="list-style-type: none"> • National Climate Change Adaptation Strategy and Action Plan • Prevention of illicit use of groundwater resources • Treatment of waste water to be used in agriculture and industry • Pricing policy to ensure more efficient use of water in cities • Promotion of insurance to address risks from natural disasters • Legislation to protect ecosystems



Retreating glaciers in Turkey (water cycle storage)

<http://glacierhub.org/2015/07/28/looking-at-turkish-glaciers-through-satellites/>

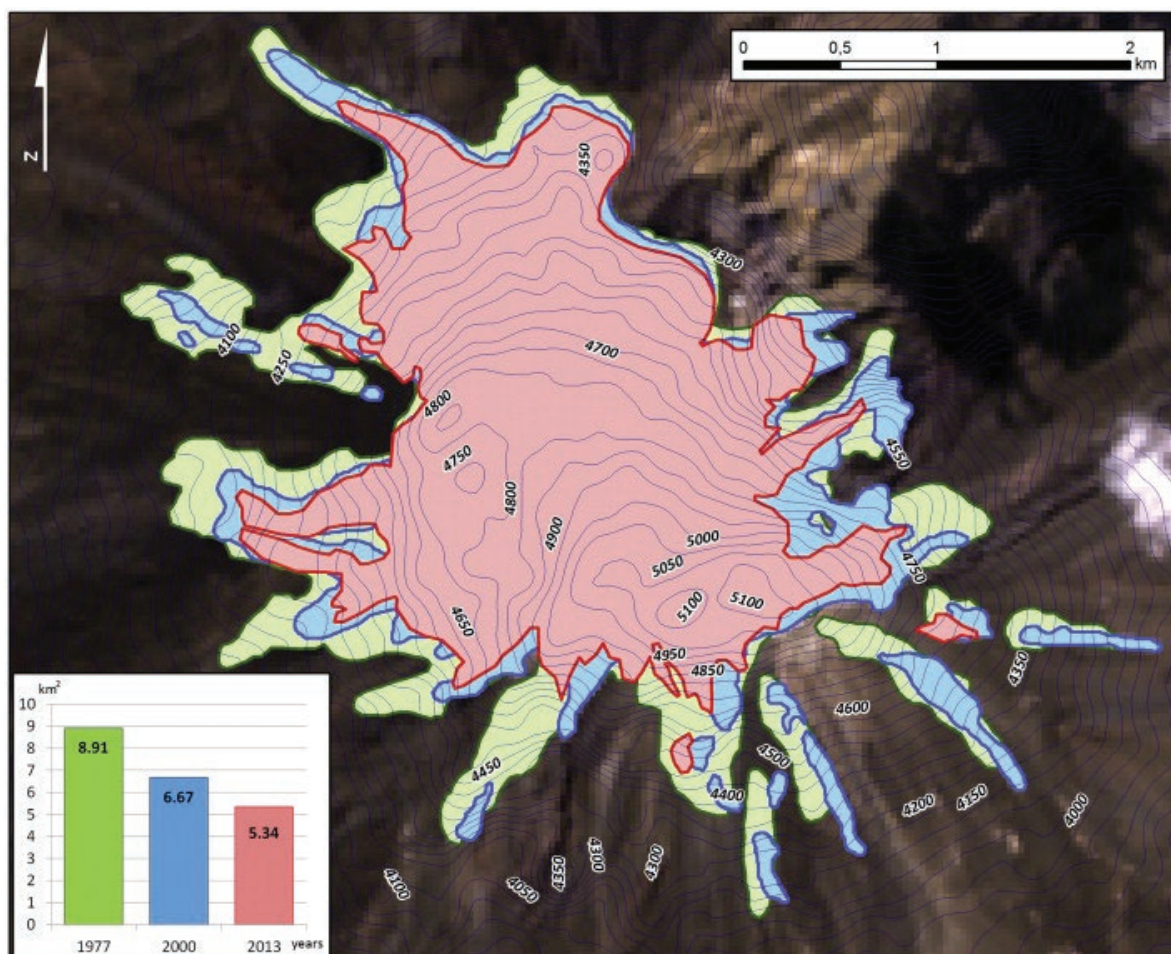
Turkey is a mountainous country with an average elevation of 1,132masl. Half of Turkey is covered by mountains and hills. Since the 1970s more than half of the ice cover in Turkey has vanished. The glacial area fell from 25km² in the 1970s, to 10.85km² in 2012-2013. Five of the glaciers have completely vanished. Now, glaciers only exist on three volcanoes, in Southeastern and Middle Taurus Mountains, and in the Eastern Black Sea Mountains.



Retreating glaciers

Adapted: http://glacierhub.org/wp-content/uploads/2015/07/turkey_gis_1970-2013.jpg

Mt. Ağrı (also called Mt. Ararat) is the highest (5,137masl) mountain in Turkey. It also contains the largest glacier. From 1977-2013, most glacial retreat took place on the southern, western and eastern glacier aspects. Most glacial retreat is attributed to climate change and its impact on rising summer night time temperatures and minimum temperatures'



Topographic map: glacier change for three dates (1977, 2000, and 2013) over 36 years for Mt Ağrı.

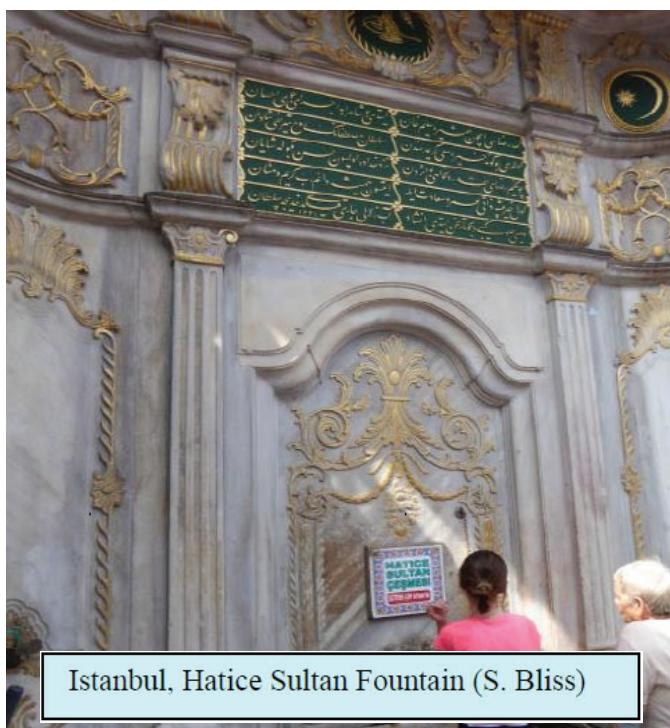
Photo credit: Doğan Doğu Yavaşlı, Compton J. Tucker, and Katherine A. Melocik.

VALUES

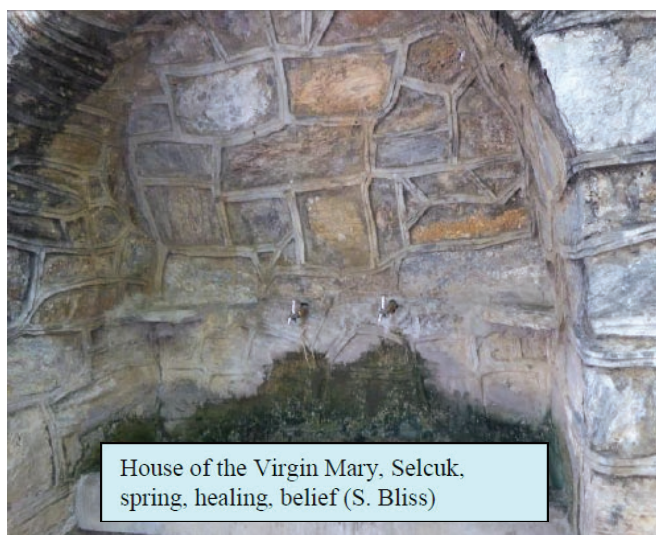
Values of water in Turkey

Economic	Cultural	Spiritual	Aesthetic
<ul style="list-style-type: none"> • Agriculture • Industry • Mining • Energy • Transport • Tourism (e.g. World Heritage Sites) 	<ul style="list-style-type: none"> • Tea and coffee an important part of Turkish culture. • Recreation • Pamukkale (hamam) 	<ul style="list-style-type: none"> • Holy wells and springs • Ancient Turks considered Earth-Waters (Yer-Su) sacred. • Sacred Well-Hagiaσμα, Istanbul 	<ul style="list-style-type: none"> • Black Sea • Mediterranean Sea • Bosphorus Strait, Istanbul • Istanbul, Basilica Cistern • Dead Sea

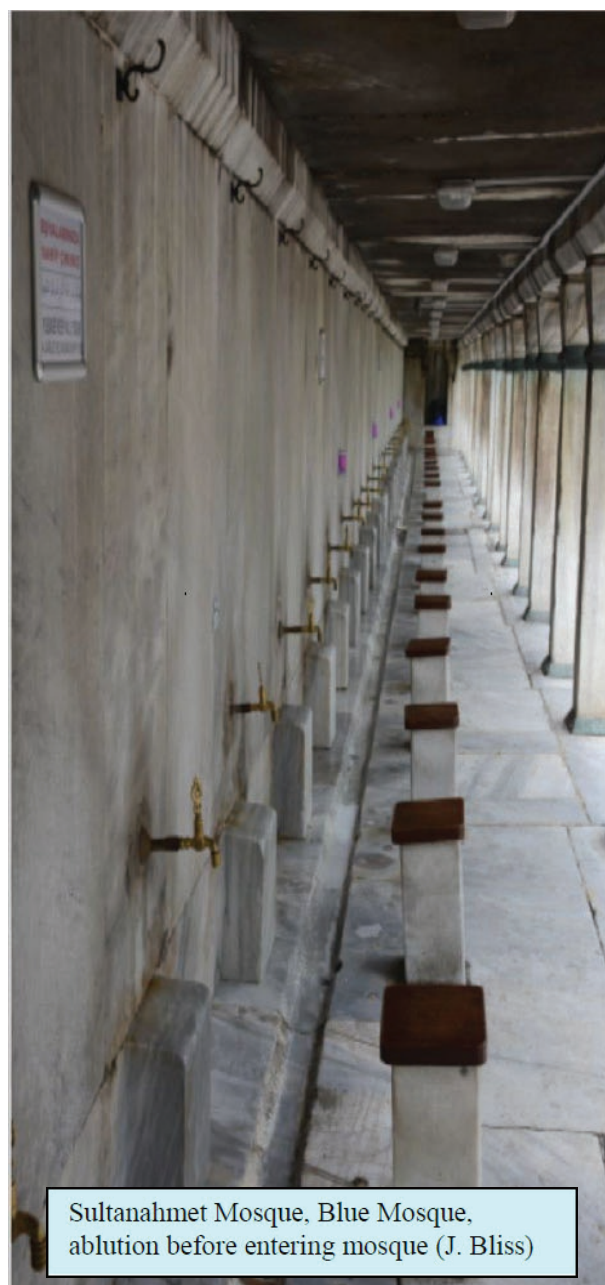
Spiritual and cultural values



Istanbul, Hatice Sultan Fountain (S. Bliss)

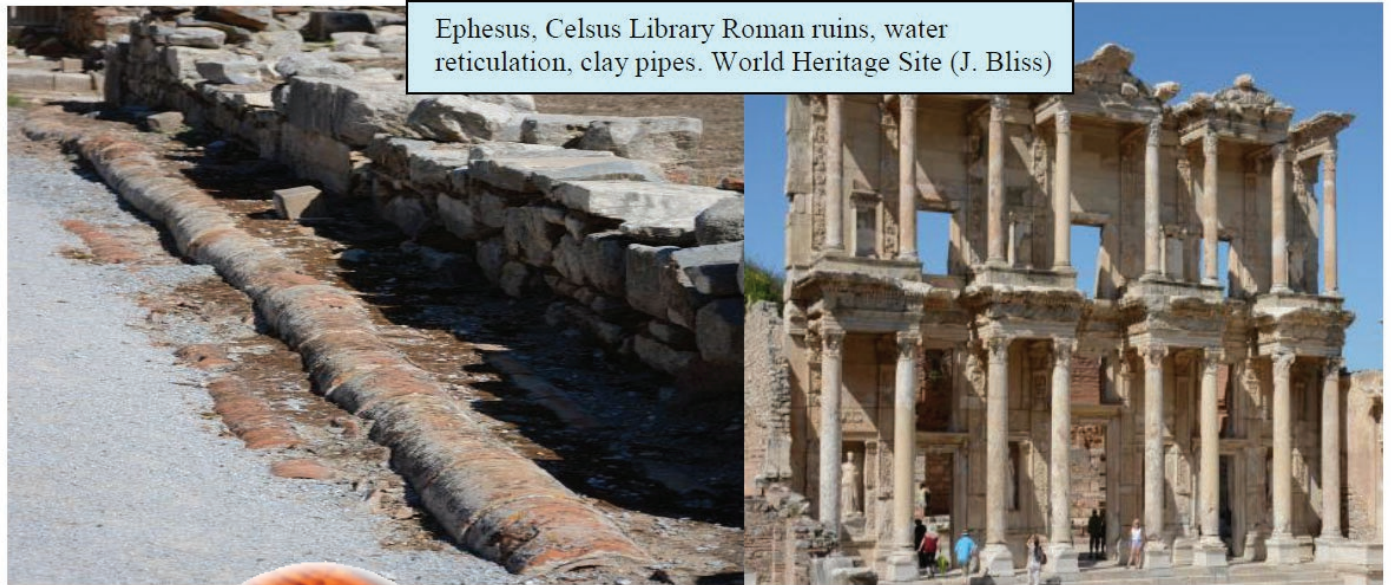


House of the Virgin Mary, Selcuk, spring, healing, belief (S. Bliss)

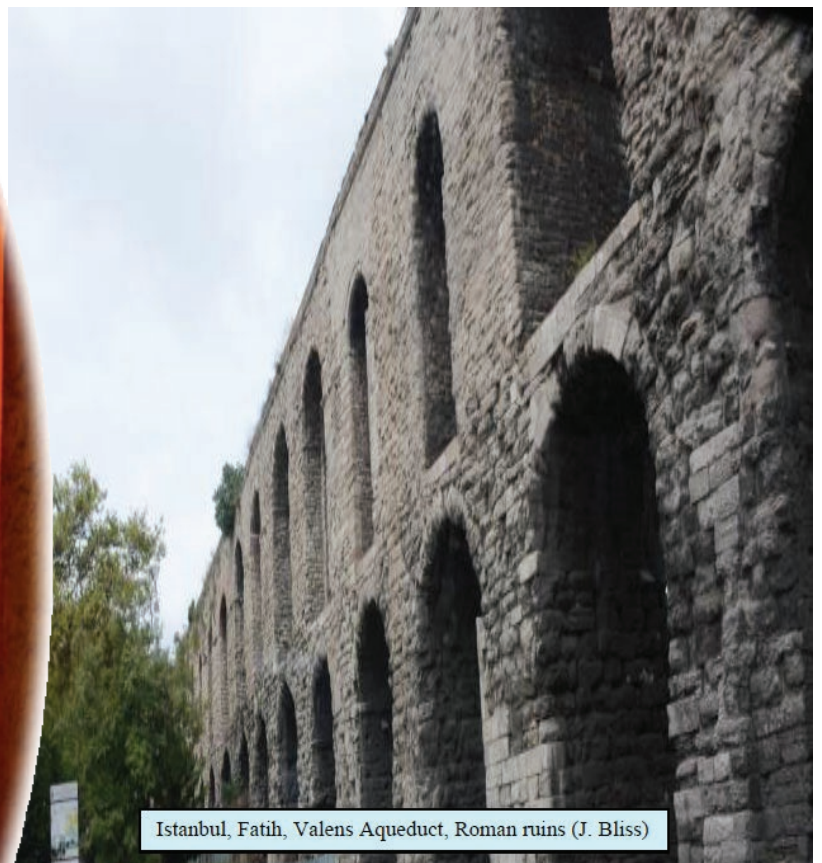


Sultanahmet Mosque, Blue Mosque, ablution before entering mosque (J. Bliss)

Aesthetic and cultural values



Istanbul, Basilica Cistern, Yerebatan Sarnici, water reservoir (J. Bliss)

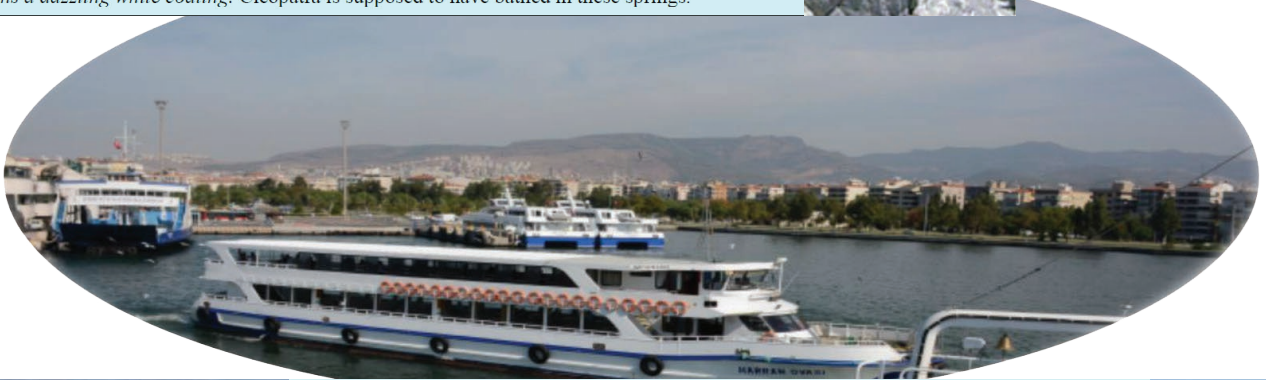


Istanbul, Fatih, Valens Aqueduct, Roman ruins (J. Bliss)

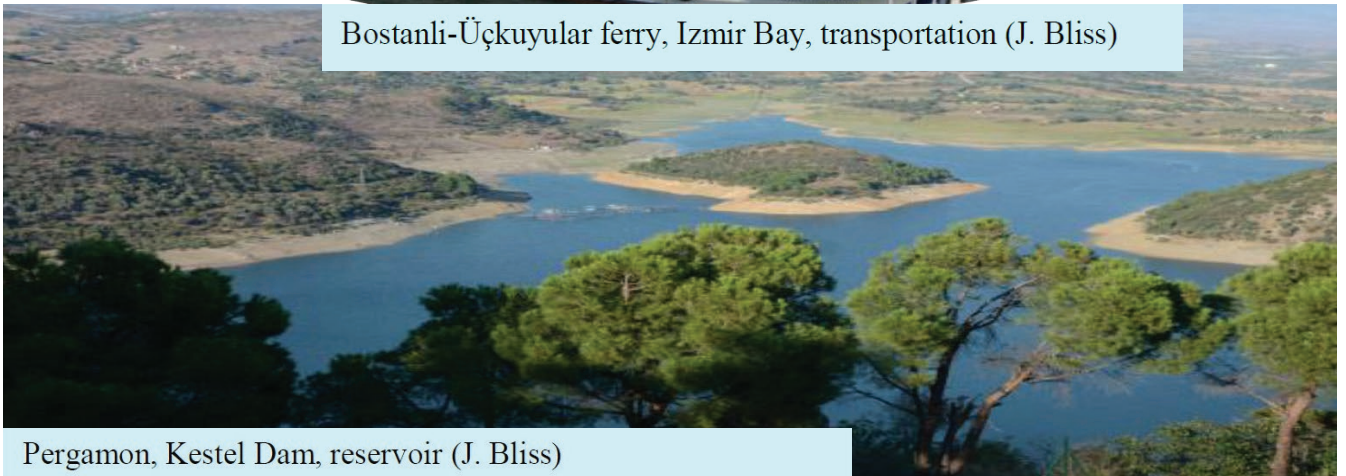
Economic Values



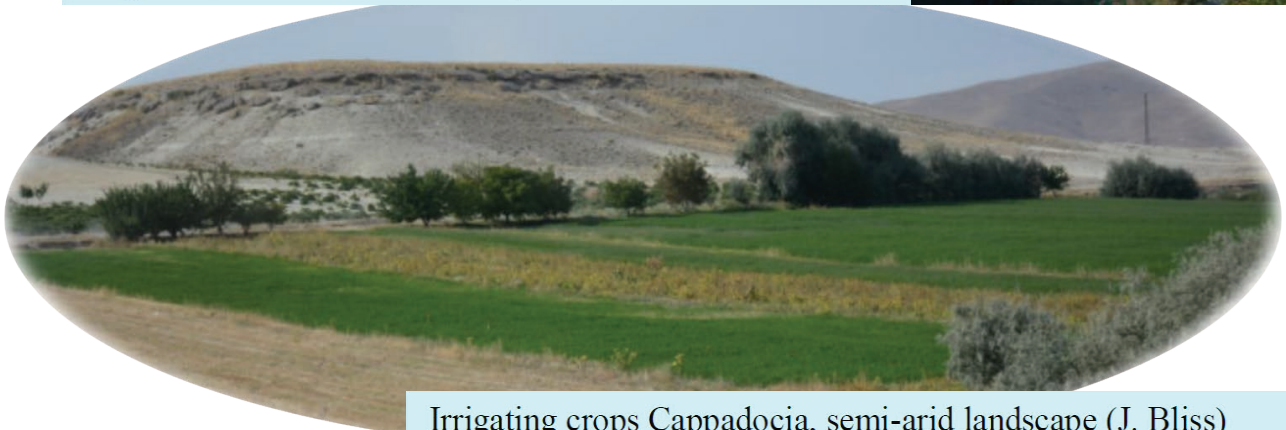
Pamukkale, Turkey<http://archive.feedblitz.com/861701/~4637020>Pamukkale, Turkey
Listed as a World Heritage site in 1998, Pamukkale's 'mineralised waters have generated a series of petrified waterfalls and pools with step-like terraces. Fresh deposits of calcium carbonate give these formations a dazzling white coating. Cleopatra is supposed to have bathed in these springs.



Bostanli-Üçkuyular ferry, Izmir Bay, transportation (J. Bliss)

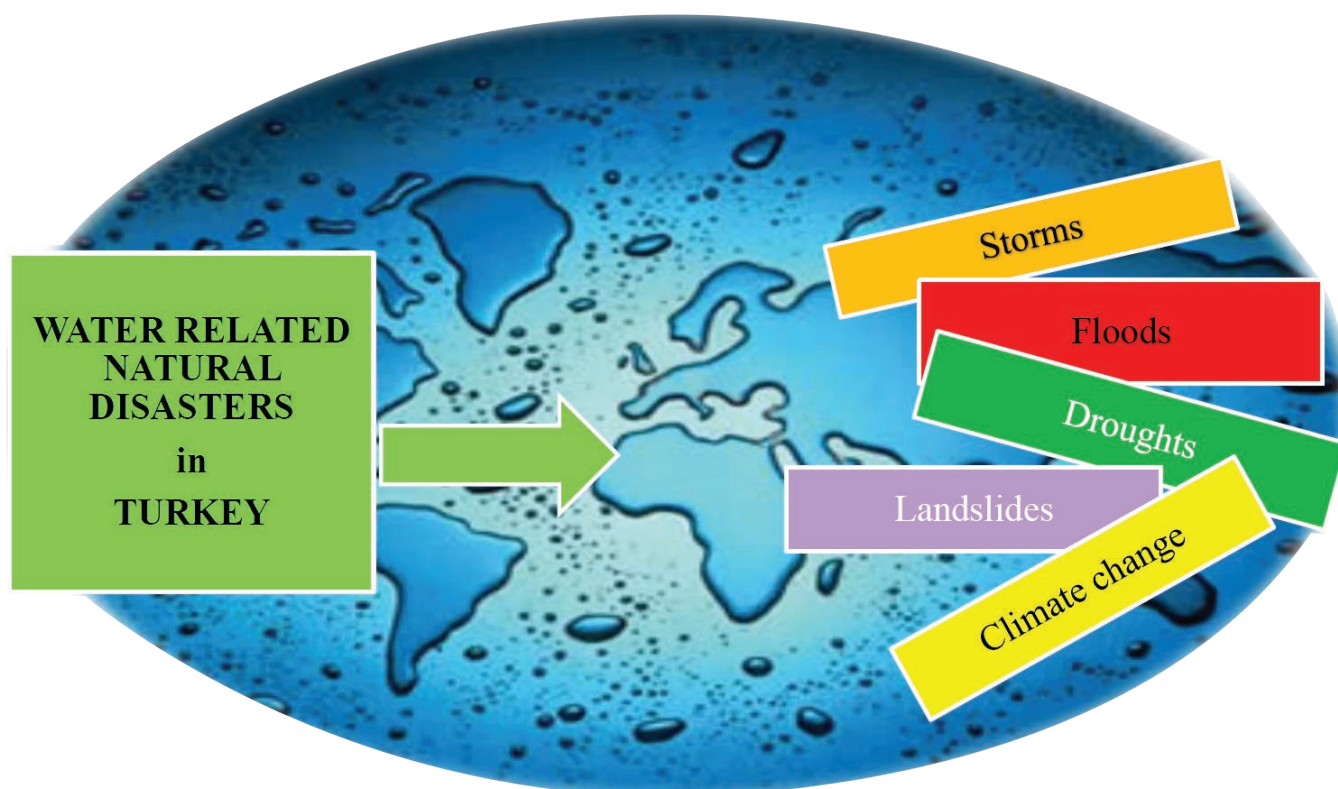


Pergamon, Kestel Dam, reservoir (J. Bliss)



Irrigating crops Cappadocia, semi-arid landscape (J. Bliss)

Water disasters in Turkey



As storms are inevitable it is essential Turkey's population becomes storm disaster prepared and resilient.

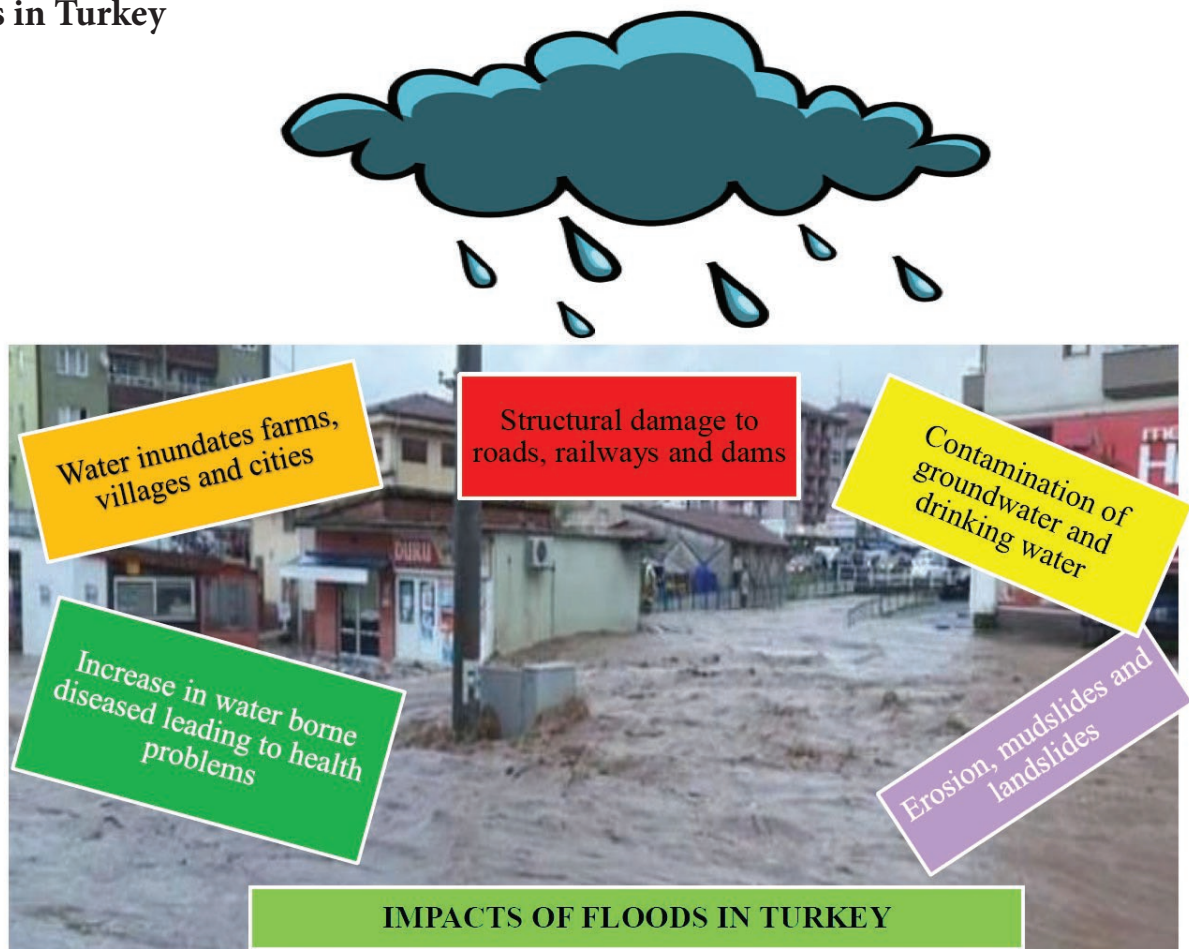
Storms and flash floods

<http://etinspires.com/wp-materials/uploads/2014/10/storms.jpg>

Spring storm April 18, 2012	Winter storm January 25, 2010	Winter storm, December 10, 2001
<ul style="list-style-type: none"> • In Istanbul buildings collapsed as wind speed reached 100kph • Sea transport stopped due to high seas and Turkish Airlines cancelled 43 flights due to high winds. 	<ul style="list-style-type: none"> • Snowstorm caused power, gas and water outages in Istanbul. • In Turkey's western region near the Greek and Bulgarian borders, villages were isolated when major roads were blocked by heavy snow 	<ul style="list-style-type: none"> • The storm caused flooding, high winds, and blizzard conditions. Two ships sank in the Black Sea and 300 villages in north-west Turkey were cut off by snow. • The region had four times the average monthly rainfall, which inundated farm land



Floods in Turkey



Strong flood inundates streets of Kdz Ereğli, northern Turkey October 7 2015

Image: http://thewatchers.adorraeli.com/data/uploads/turkey_flood6.jpg

2009 Turkish Flash floods

September 9, 2009 flash floods hit Istanbul. The heaviest rains in eight decades caused flash floods with over 31 people killed. Flooding also occurred in the western cities of Canakkale, Balikesir, Aydin, Izmir, Antalya and Bursa.

Istanbul is vulnerable to flooding because of the 'double-edged sword' of inadequate urban planning and rapid urbanisation. In Istanbul, water tried to find a way to move over and under the ground but couldn't because the ground is covered with concrete and buildings as a result of urbanisation. The Turkish military used helicopters and tanks to evacuate people. The Red Crescent dispatched tents, blankets, food and personnel to the area.

Floods and mudslides across northeastern Turkey, August 2015

Image: <http://thewatchers.adorraeli.com/2015/08/25/floods-and-mudslides-across-the-northeastern-turkey-7-dead-17-injured/>



Floods in Turkey May 10, 2016

Disasters will become more frequent and dangerous because of climate change, but also because governments in Turkey are continuing practices that increase risks. The main reason behind the deadly floods and landslides that hit Turkey's Black Sea region is inappropriate settlements. Although climate change is increasing the frequency and intensity of disasters, governments continue to engage in practices that increase the risks.

<http://www.hurriyetdailynews.com/climate-change-a-scapegoat-disasters-in-turkey-are-man-made.aspx?pageID=238&nID=87730&NewsCatID=340>

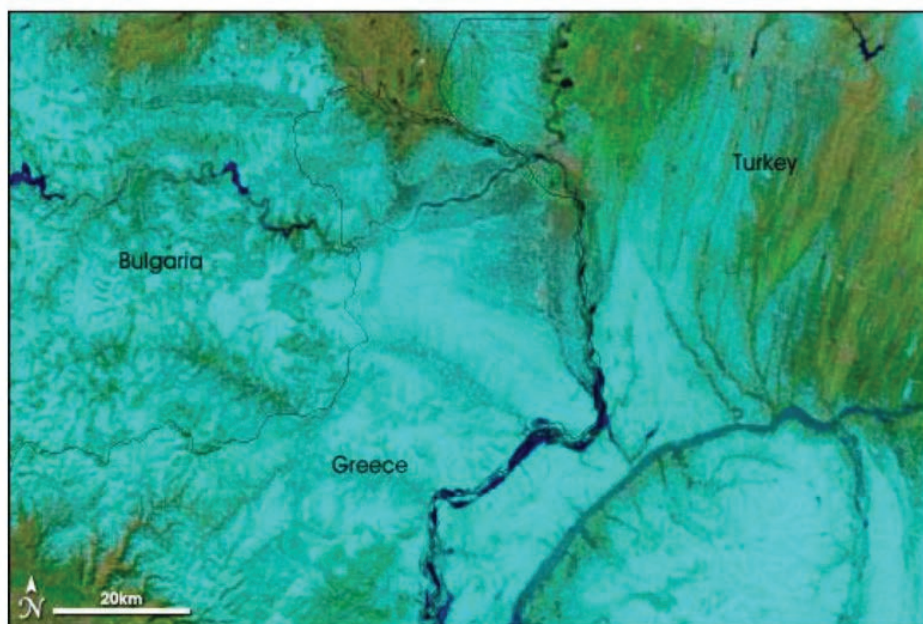
Satellite images of Evros River 2006

Satellite: <http://earthobservatory.nasa.gov/IOTD/view.php?id=6397>

Rain and melting snow combined to push the Evros (Meriç) River over its banks in March 2006. The river lined by fertile agricultural land, was inundated in the floods. Though springtime flooding is common along the river, the floods in 2006 had been the worst in 15 years.



March 20, 2006



March 3, 2006

Droughts in Turkey

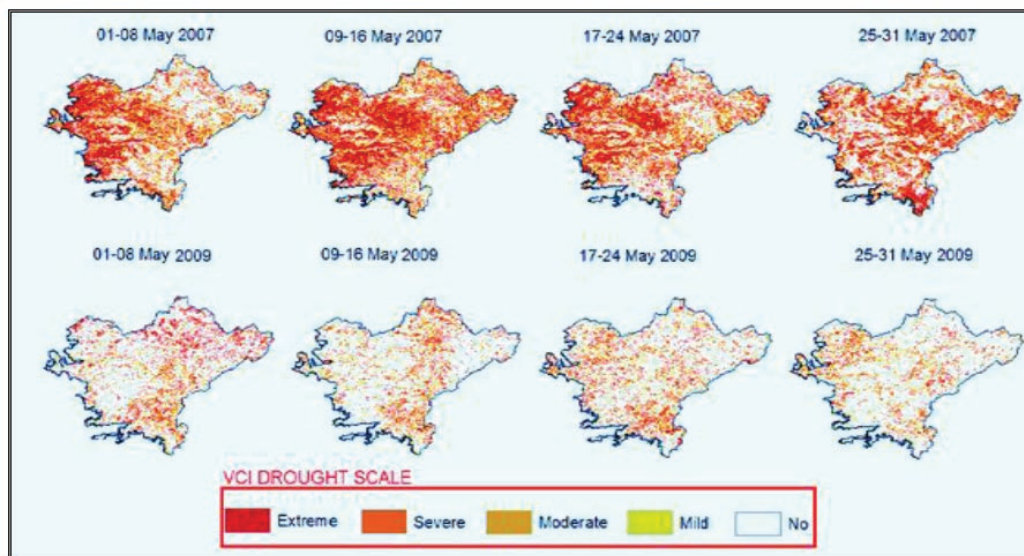
'Drought is a natural event that occurs when the amount of precipitation is significantly less than normal, that negatively affects land resources and production systems. A drought can turn into an agricultural drought when irrigation water and soil moisture are insufficient for agriculture. The increased severity of meteorological droughts in Turkey are caused by changes in global climate patterns. Turkey can expect drought as a normal part of daily life with expected climate change.'

Source: <http://ipc.sabanciuniv.edu/en/wp-content/uploads/2014/03/DROUGHT-IN-TURKEY-Levent-Kurnaz.pdf>



Drought maps in Aegean area of Turkey May 2007 and 2009

Maps: https://www.researchgate.net/figure/224250470_fig1_Figure-3-VCI-drought-maps-of-Aegean-geographical-region-of-Turkey-in-2007-and-2009



Drought 2016

NASA says recent drought in Turkey and eastern Mediterranean worst in 900 years

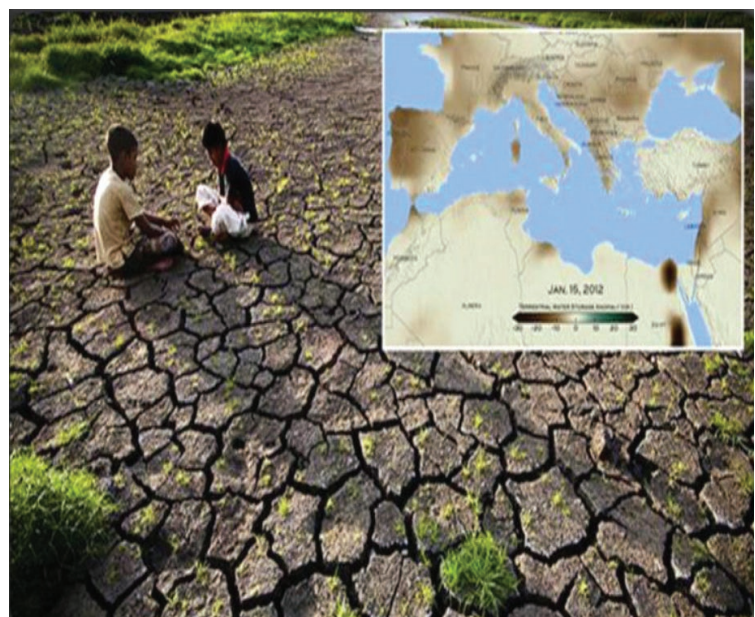
Source; http://www.hurriyetdailynews.com/images/news/201603/n_95934_1.jpg

'In 2016 Turkey was struggling with its worst drought in a decade.

Climate change is only part of the reason; poor water management is also to blame.'

'Turkey's Greenpeace activist Pinar Aksogan recalls the summer of 2007 when Istanbul struggled with water cuts at least twice a week. Back then, water levels in Istanbul's dams were at 55% - nearly double 2016 levels.' Turkey needs to introduce water- saving measures in homes and factories. "We scarcely make use of our roofs," "We could use them to collect rainfall or produce energy with solar panels."

<http://www.dw.com/en/turkey-battles-water-shortage/a-17458001>



Disaster Reduction

The United Nations Office for Disaster Risk Reduction (DRR) aims to reduce damage to people, properties and livelihoods in Turkey. There are four main disaster management strategies - *preventing*, *preparing*, *responding* and *recovering*. The DRR focuses on preventing and preparing before the disaster, rather than responding and recovering after the disaster. Improvements in preparing for disasters includes education, early warning systems and evacuation procedures.

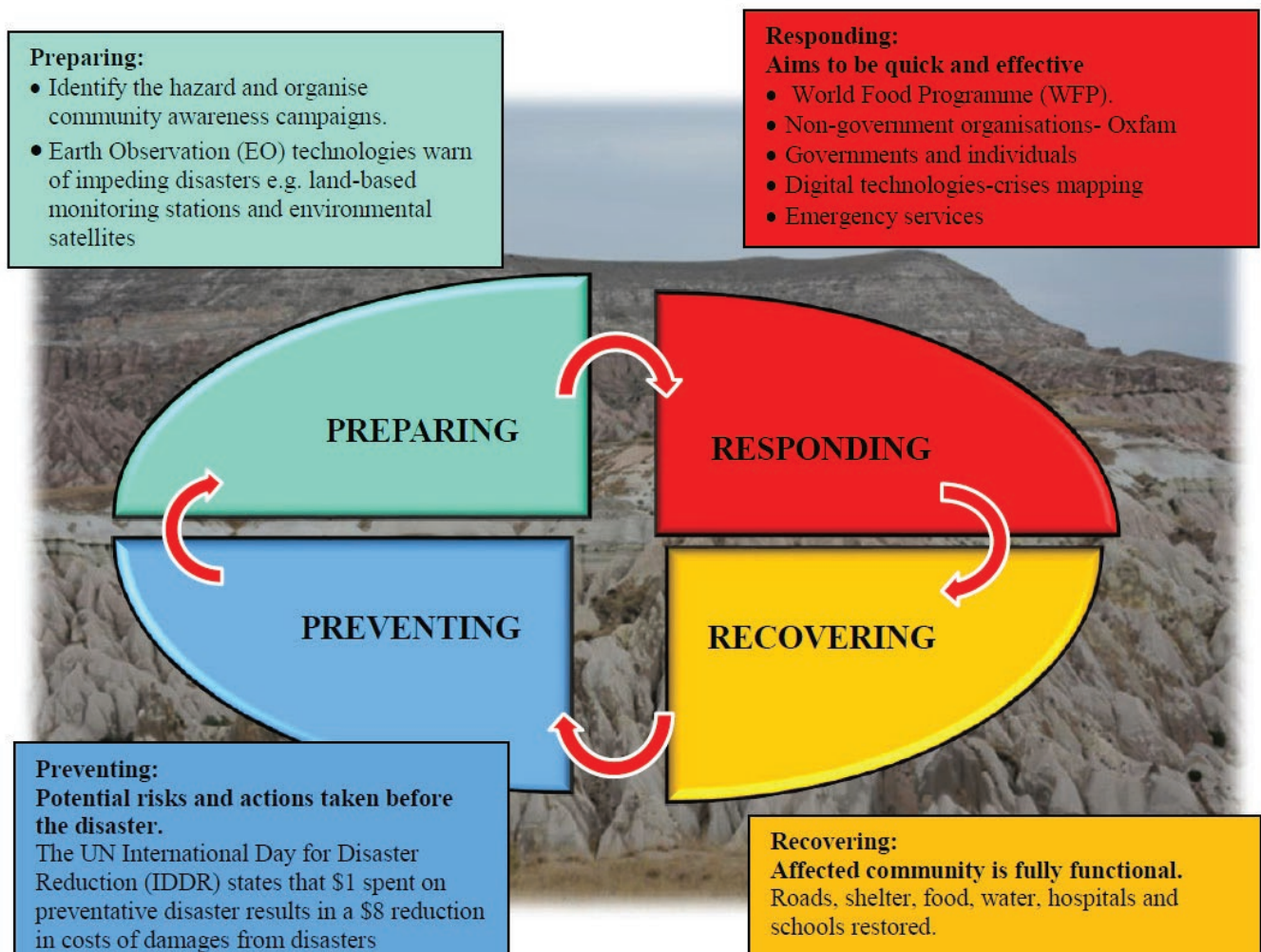
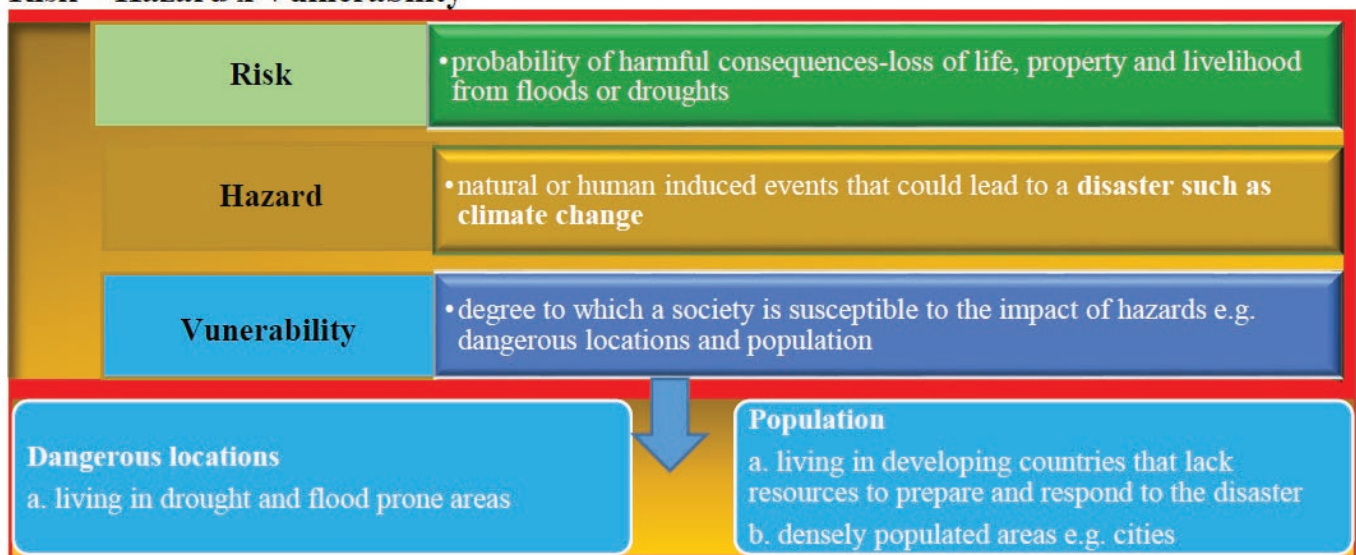


Photo: Semi-arid Cappadocia, Turkey (J. Bliss)

Risk = Hazard x Vulnerability



Dead or Red!



Ölüdeniz or Dead Sea in Turkey

<https://upload.wikimedia.org/wikipedia/commons/a/af/Ölüdeniz.jpg>

Ölüdeniz means 'Dead Sea'. It was named because of its calm waters even during storms.



Lake Tuz in Turkey turned red

2015 <https://timedotcom.files.wordpress.com/2015/07/lake-aksaray-5.jpg?quality=75&strip=color&w=838>

Tuz Gölü also known as the salt lake turned red as a result of algae bloom.

Photograph: Fishing on Galata Bridge across the Golden Horn, in Istanbul (J. Bliss)



ICT

- Interactive water stress map <http://www.wri.org/applications/maps/aqueduct-country-river-basin-rankings/#x=38.12&y=27.32&l=5&v=home&d=bws&f=0&o=139>
- Ranking world's most water-stressed country in 2040 <http://www.wri.org/blog/2015/08/ranking-world%E2%80%99s-most-water-stressed-countries-2040>
- Yeşilçay Drinking Water Plant https://en.wikipedia.org/wiki/Ye%C5%9Fil%C3%A7ay_Drinking_Water_Plant
- Greater Istanbul Water Supply Project <http://www.suyapi.com.tr/en/18698/Greater-Istanbul-Water-Supply-Project-Melen-System>
- Freshwater country profile http://www.un.org/esa/agenda21/natlinfo/countr/turkey/Turkey_freshwater.pdf
- National water footprint explorer <http://waterfootprint.org/en/resources/interactive-tools/national-water-footprint-explorer/>
- Interactive graphs http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/living_planet_report_graphics/water_footprint_interactive/

YouTube

Geopolitics and water scarcity <https://www.youtube.com/watch?v=FXSdxkV1XRA>



CAUSES, IMPACTS and Management of DECLINING Groundwater

by Dr. Susan Bliss

Photograph: <https://s-media-cache-ak0.pinimg.com/564x/47/db/91/47db913bb3c92b6e4514c0c5fa4ea1dc.jpg>

Water located below Earth's surface can hide from the naked eye, but not from satellites and 3D underground GIS! This water is referred to as **groundwater**. It acts like a giant sponge in the Earth's crust where water is stored in porous rocks and soil. Groundwater moves slowly through rocks like sandstone and between cracks in rocks such as limestone, connecting rivers and lakes. Sometimes groundwater discharges naturally onto the Earth's surface, bubbling into springs and contributing to wetlands.

Groundwater represents about 98% of fresh water on Earth and currently makes up around 33% of total water consumed for domestic, industrial, agricultural, mining and energy functions. Even though most groundwater is clean it can become contaminated from pesticides and fertilisers from agriculture, toxic chemicals from industry, leachates from garbage landfills and leaky underground oil pipes. As it is located deep in the ground, groundwater is difficult and expensive to clean up.

As this hidden resource is challenging to conceptualise it has been undervalued, and as a result frequently unsustainably managed, especially when abstraction of groundwater exceeds renewal. This trend threatens future water and food security.

Did you know?

*'The **Indo-Gangetic Basin** provides more than 750 million people in Pakistan, India, Nepal, and Bangladesh with water—but 60% of its groundwater is contaminated....In a study published in Nature Geoscience, researchers found 23% of the water too salty, and 37% with toxic concentrations of arsenic. Arsenic is naturally (and safely) present in many water sources, but it can climb to dangerous levels with the use of fertilisers and mining. High salinity can arise from inefficient farmland irrigation and poor drainage. The Indo-Gangetic Basin provides nearly a quarter of all groundwater extracted worldwide.'*

Science Magazine, <https://www.sciencemag.org/news/sifter/60-south-asia-s-groundwater-undrinkable>

Part A

Groundwater

Figure 1: Process: formation of groundwater

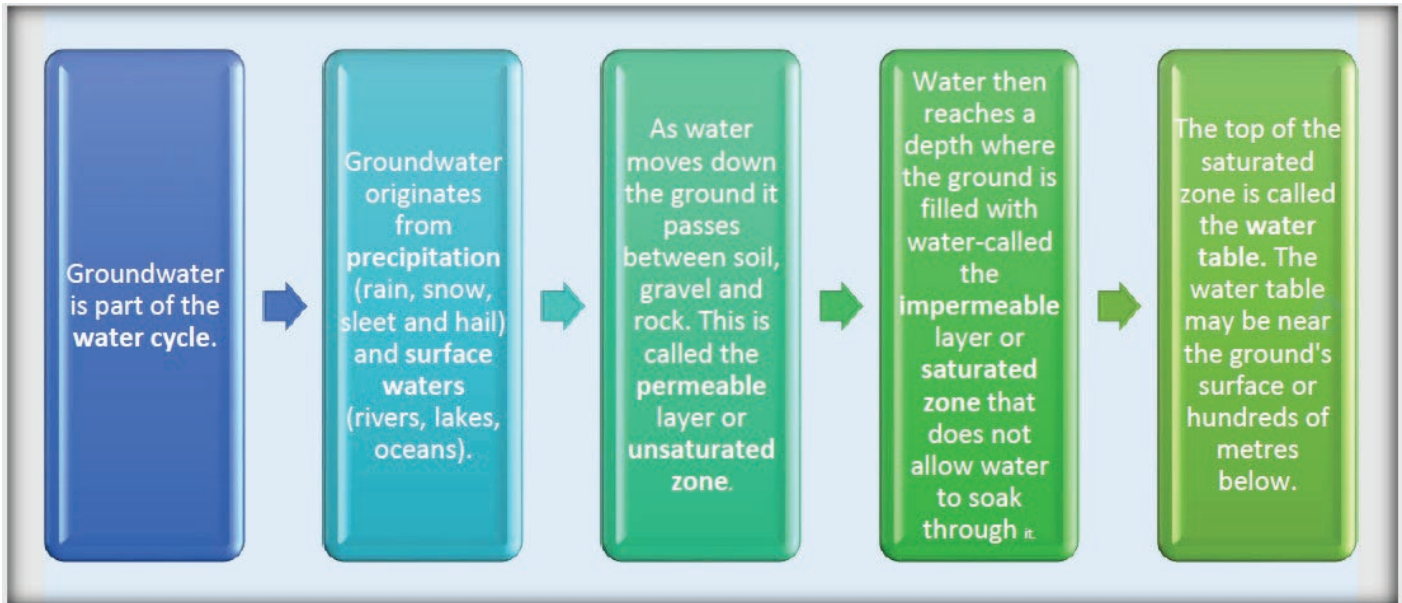


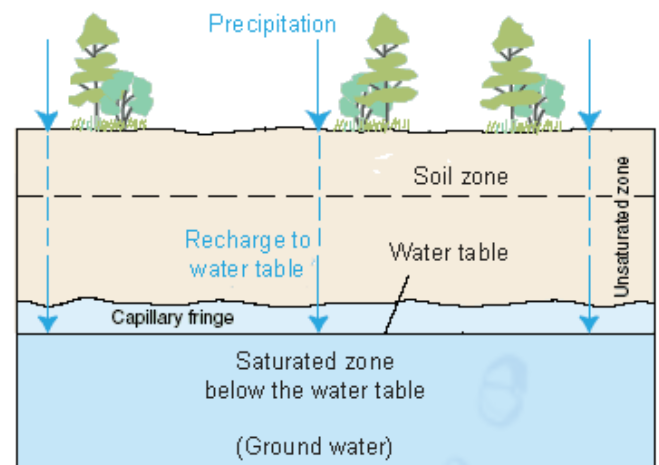
Figure 2: Diagram illustrating saturated and unsaturated zones and the water table

<http://water.usgs.gov/edu/graphics/wcgwstoragezones.gif>

Aquifers

The water bearing permeable rock is called an **aquifer** from which **groundwater** is extracted. There are two types of aquifers:

- **Replenished/recharged:** aquifers are replenished with new water. They are classified as a **renewable resource** as they can be replenished in the short term (e.g. by precipitation and rivers).
- **Non-replenished:** aquifers were formed thousands or even millions of years ago when the climate was wetter. These aquifers contain **fossil groundwater** and are classified as a non-renewable resource because they cannot be replenished in the short term.



Did you know?

Yemen has both rechargeable and fossil aquifers, but growth in population and poor water management has meant that it is consuming water quicker than it is replenished. Wells in Sana'a, the largest city, are forced to extend 100 metres below the ground to reach the disappearing water table. It is predicted the country will run out of water by 2025.

Figure 3: Edible Earth Parfaits

<https://blogs.cornell.edu/cibt/files/2015/05/Edible-Earth-Parfaits-Groundwater-Foundation.pdf>



Activities

Knowledge and understanding

- What is groundwater?
- Distinguish between: renewable and non-renewable aquifers, and permeable with impermeable surfaces.

Inquiry and skills

Refer to Figures 1:

- Explain how groundwater is formed.
- What zones does the water table divide in the ground?

Refer to Figure 2

- Construct your own edible aquifer
- Food colouring represents contamination. What is the effect of pink food colouring on groundwater quality?
- Using a drinking straw drill a well into the centre of your aquifer. What occurs when you suck on the straw? How could you recharge your aquifer/drink?

Fieldwork: Take students outside onto the school grounds and ask them to discuss what occurred last time it rained. Where did the water go? On roofs? On soil? Take a cup of water and pour on soil and on a paved surface and discuss why one soaks into the ground and the other forms a puddle. Then pour a cup of water on sand and gravel or clay, and explain why water poured on sand disappears first.

Extension: Groundwater is one of our most valuable resources. However, as rocks have different porosity and permeability characteristics (e.g. sandstone, granite), water does not move around the same way. Explain this statement.

ICT

- Deep subjects-wells and groundwater <https://www.epa.gov/sites/production/files/2015-08/documents/mgwc-ww-well.pdf>
- Groundwater animation <http://undergroundwaterproject.blogspot.com.au/>
- Groundwater cycle <http://undergroundwaterproject.blogspot.com.au/>

YouTube

- What is groundwater? https://www.youtube.com/watch?v=oNWAerr_xEE

Part B

Use of Groundwater

Groundwater is used for activities such as drinking, cleaning, mining, industry, agriculture and energy production. Globally, groundwater provides 17% of water used in irrigation and 50% of drinkable water supplies. About 60% of water used in agriculture in **India** and 70% in Hebei provinces, **China**, comes from groundwater. In the Asia-Pacific region, groundwater provides drinking water to 32% of the population.

Figure 4: Groundwater used for irrigation. Compare India and China with Australia

http://www.iges.or.jp/en/natural-resource/groundwater/PDF/activity20110601/KATAOKA_Yatsuka.pdf

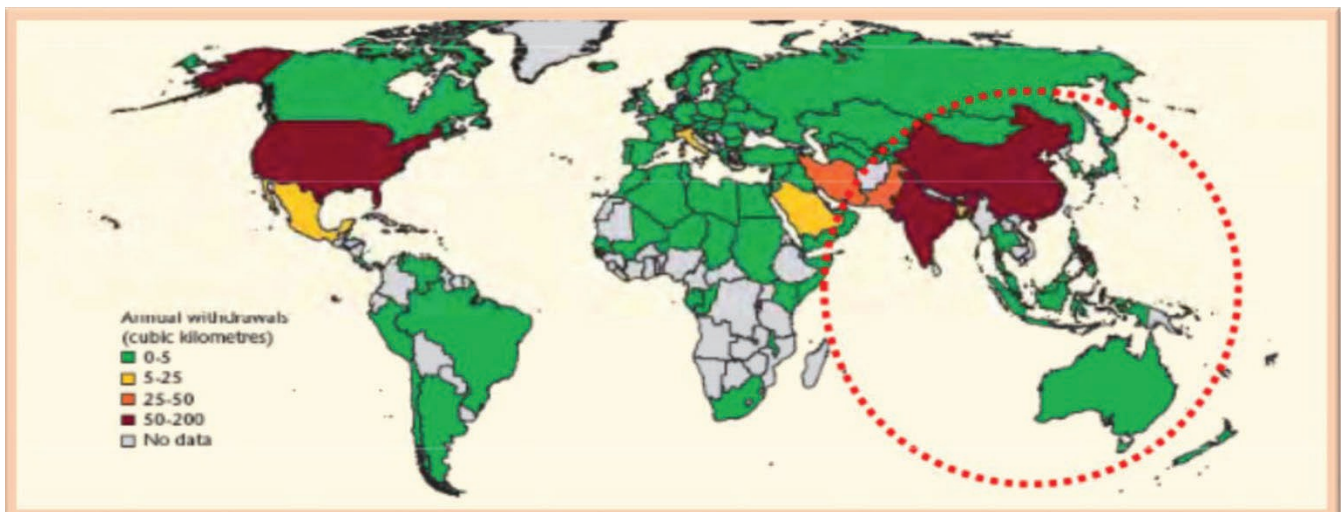
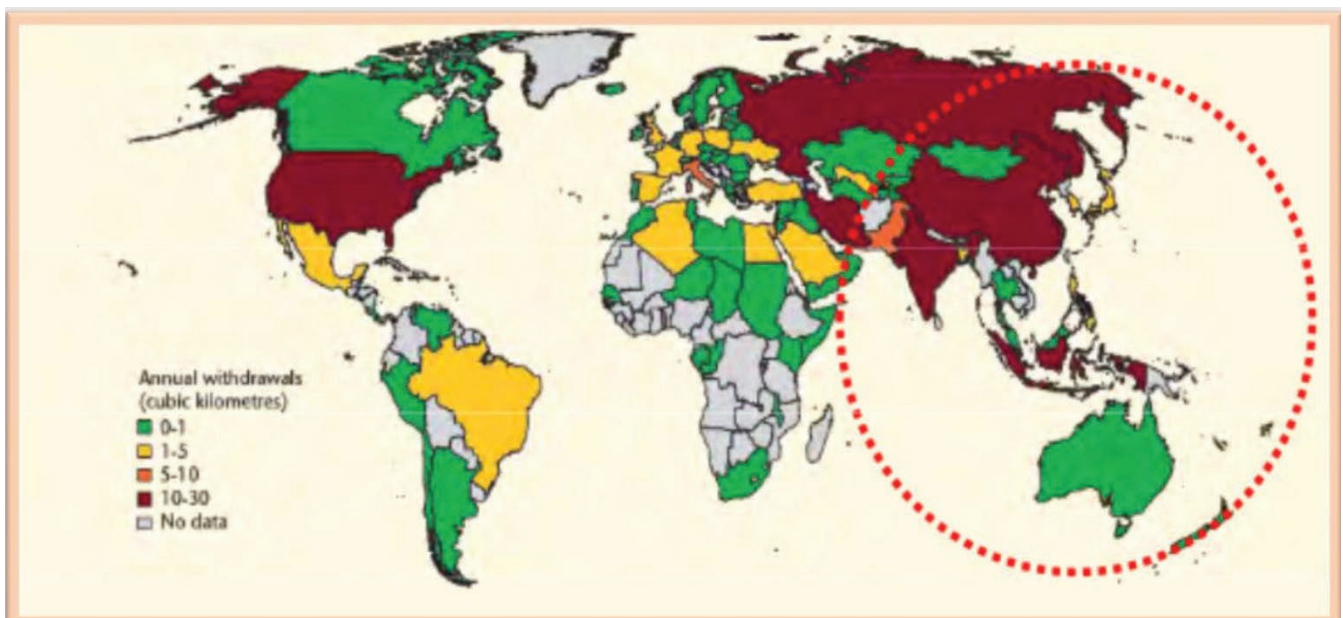


Figure 5: Groundwater used for drinking water. Compare India and China with two African countries.

http://www.iges.or.jp/en/natural-resource/groundwater/PDF/activity20110601/KATAOKA_Yatsuka.pdf



Part C

Over Extraction of Groundwater

Not only does groundwater play a vital role in sustaining rivers particularly during droughts but it supplies water to billions of people. Today 25% of the world's population live in regions where groundwater is being used faster (**extraction rates**) than it is being replenished (**recharge rates**). As groundwater is a finite resource this global problem requires sustainable groundwater abstraction, and the eradication of groundwater pollution.

Despite its importance aquifer levels are falling in the grain producing areas of **India** and **China**. In Indonesia's capital city, **Jakarta**, part of the land collapsed 4 metres due to the over pumping of groundwater. Additionally, coastal cities and farms are discovering more salts in their wells, as groundwater becomes depleted and sea level rises.

Figure 6: Impacts of over extraction of groundwater.

Present diagram as a narrative.

Source of photograph <http://img.scoop.it/b-B8G2Tzy-0PQ77HlojUHzl72eJkfbmt4t8yenImKBXEejxNn4ZJNZ2ss5Ku7Cxt>

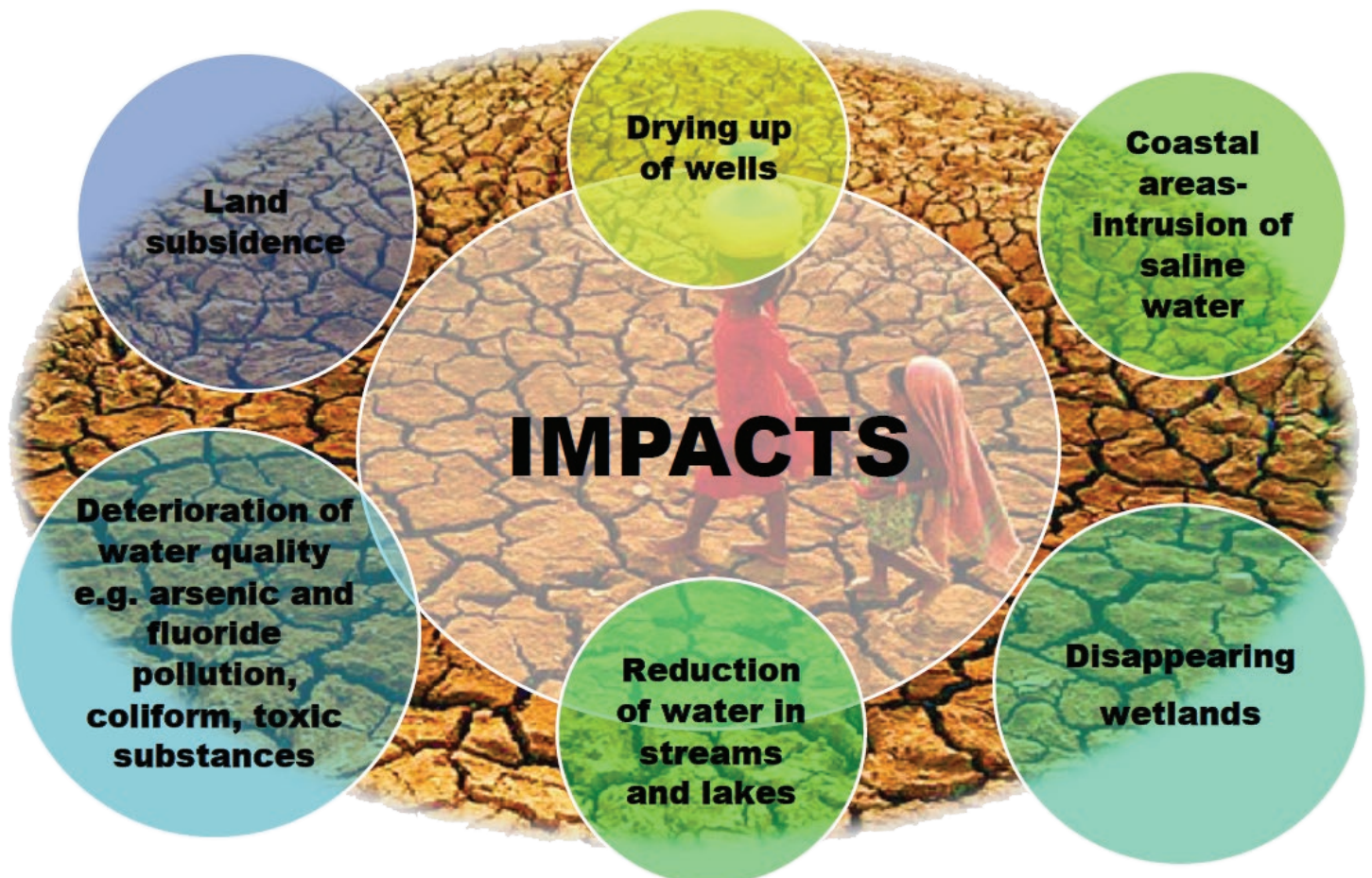


Figure 7: Extraction and use of groundwater.

Explain how runoff finds its way to a mine and farm. Research the functions of a water treatment plant.

http://www.nwc.gov.au/data/assets/pdf_file/0020/21827/Groundwater_essentials.pdf,page27

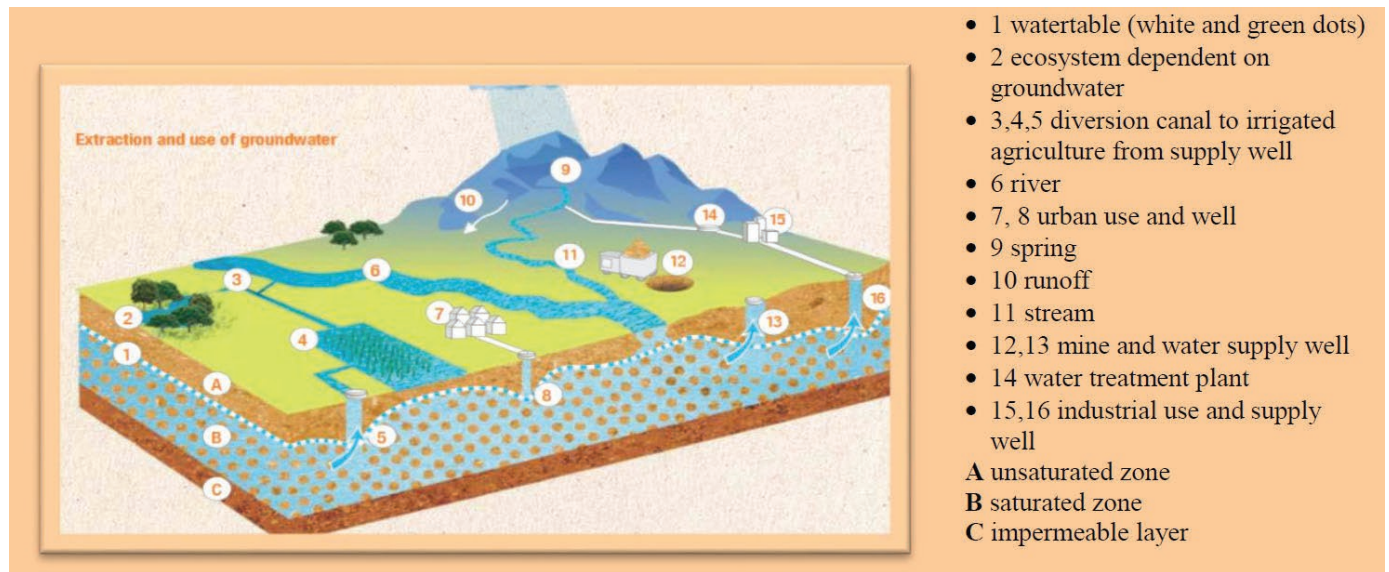


Figure 8: Impacts of over extraction of groundwater on a coastal city

Explain what can occur when groundwater demand exceeds groundwater supply.

undergroundwaterproject.blogspot.com.au

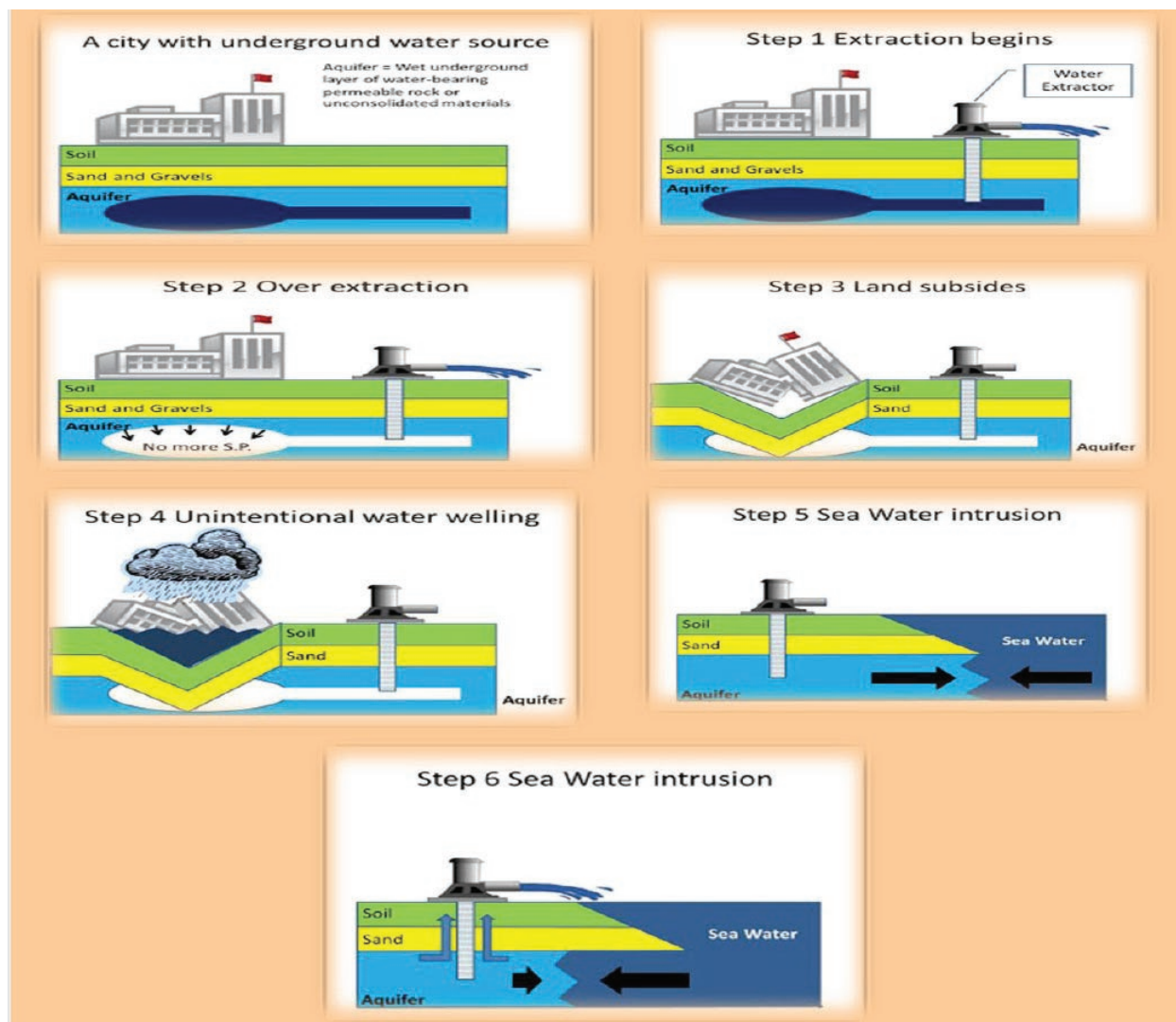


Figure 9: Land subsidence in Bangkok 1978-2000.

Compare two locations on the map. What were the causes? How can this disaster be reduced?

<http://www.ejge.com/2013/Ppr2013.163alr.pdf>

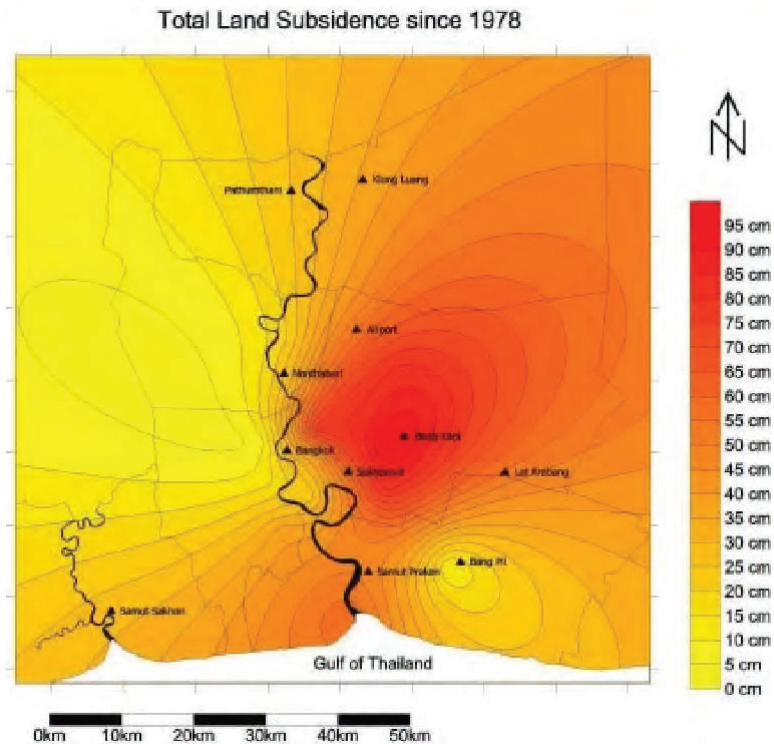
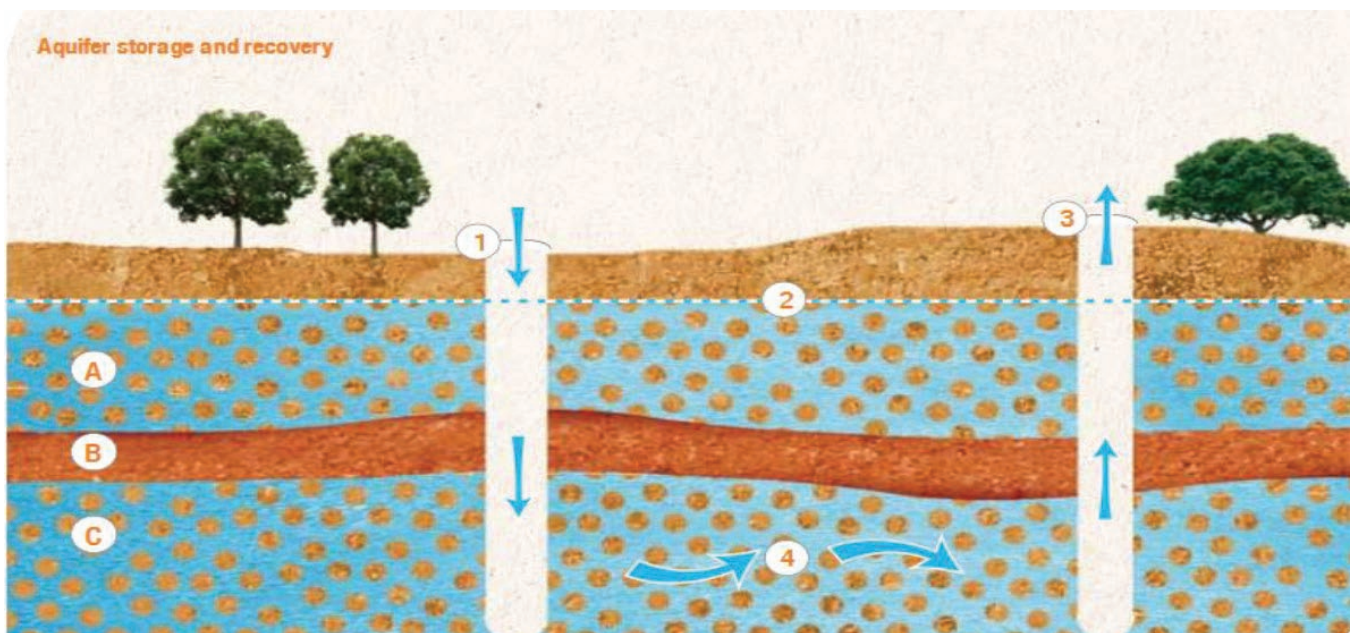


Figure 10: Management-aquifer storage and recovery

Aquifer storage and recovery is the injection of water into an aquifer. Explain the process. Why is this process important?

http://www.nwc.gov.au/data/assets/pdf_file/0020/21827/Groundwater_essentials.pdf





Part D

Groundwater Crisis in Asia

Source: <http://islam.ru/en/sites/default/files/img/story/2012/08/underground-water.jpg>

Humans cannot see it, hear it or smell it, but a disaster is gathering underground at a variety of **scales**-global, regional, national and local. With a growing global population, the unsustainable overuse of groundwater requires urgent action.

Oversized global groundwater footprint

- An aquifer's footprint is the size it needs to be, to sustainably support the current rate of use.
- The current size of the global groundwater footprint is about 3.5 times the actual area of aquifers.
- This is a sign of overuse.

Approximately 1.7 billion people live in areas where groundwater resources and groundwater ecosystems are under threat.

Asia has problems

Groundwater provides Asia with over 30% of its freshwater. However, at the present rate of use, South, East and West Asia are at risk from groundwater depletion. The **Upper Ganges** and **North China plain** are two hotspots where population growth and density, is causing a strain on aquifers.

A few countries dominate the **global groundwater footprint** such as **China, India, USA and Saudi Arabia**. *'The groundwater footprint for the **Upper Ganges (India)** aquifer is more than 50 times the size of its aquifer, so the rate of extraction is unsustainable'*. (Nature, 2012). Before the monsoon rains the Indian government annually measures water levels in 13,000 wells. In 2016 it noted that the levels in most wells were lower than previous years, due to overuse.

NASA satellite data noted that 21 out of the world's 37 largest aquifers were being depleted faster than they were being recharged. In **West Asia**, the Arabian Aquifer (Saudi Arabia) is extremely stressed, with little hope of recharging. Unfortunately, only 6% of global groundwater has been recharged in the last 50 years.

Figure 11: Decline in groundwater – overuse and misuse

OVERUSE	MISUSE
<ul style="list-style-type: none"> • Withdrawal of groundwater is greater than renewal • Saudi Arabia and Syria have over pumped their groundwater with many wells now dry. If the trend continues countries will be forced to import food. • China's coal mining and coal burning power plants is contributing to the North China Aquifer System's high levels of depletion. • India's Ganges-Brahmaputra Basin overuse of groundwater is mainly due to wasteful agricultural-water practices 	<ul style="list-style-type: none"> • Leaching of industrial toxic waste and agricultural pesticides through the soil and into aquifers. • China has become reliant on groundwater for economic development as many rivers are polluted (e.g. Cancer Rivers). • Sewage disposal in ground flows to water bodies

Figure 12: Groundwater extraction at a variety of scales

In groups design an e-collage of groundwater use and misuse in three Asian countries.

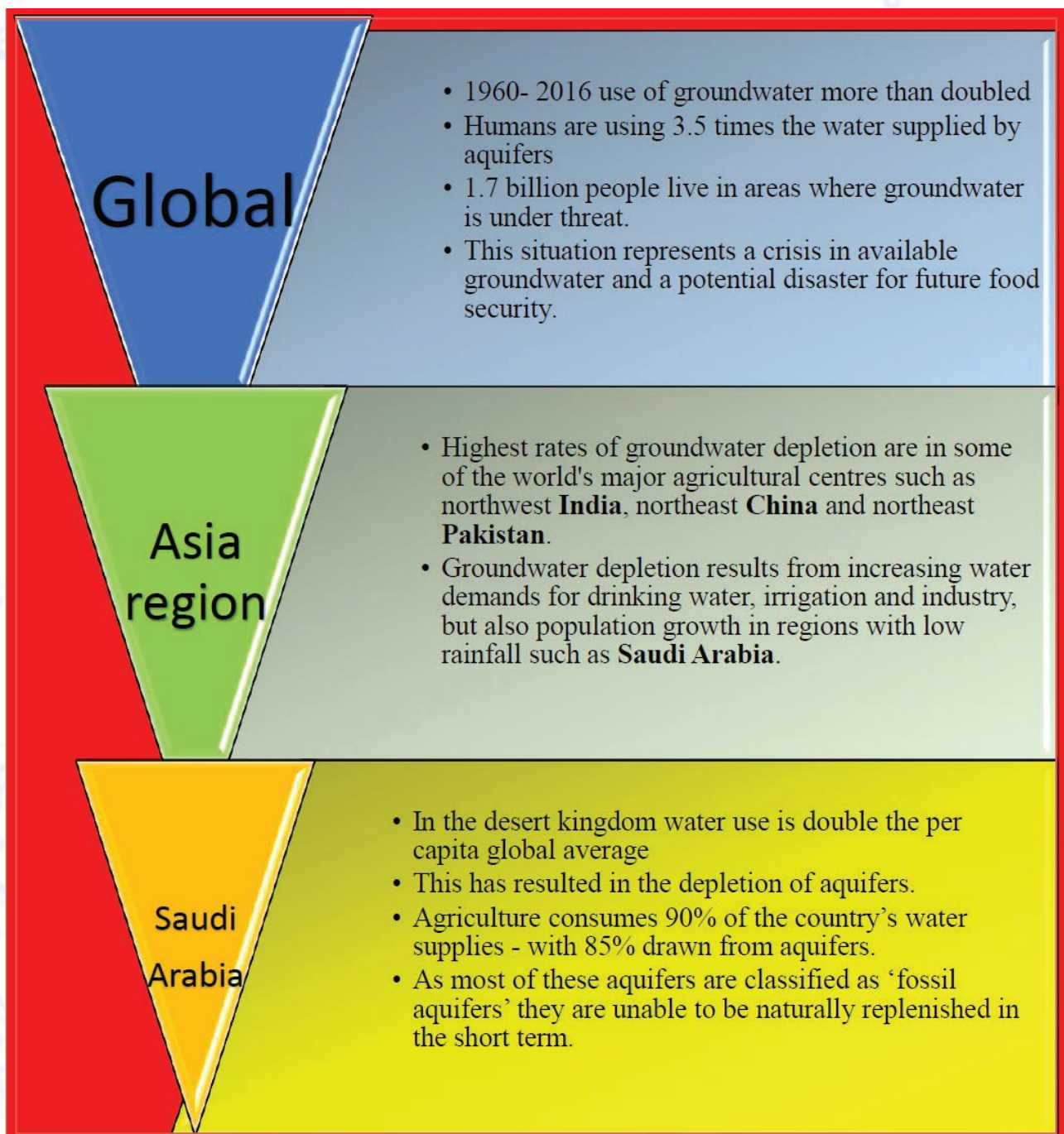


Figure 13: Groundwater footprint (extension level)

What does 54.2x mean for the Upper Ganges?

Compare India (Upper Ganges), China (North China Plain), Iran (Persia), North Arabia.

Key:

- Grey: The groundwater footprints (in grey) of six aquifers
- Red, orange or yellow- the bigger the relative footprint size, the more severe the depletion.

[http://newswatch.nationalgeographic.com/2012/08/13/our-oversized-groundwater-footprint/;](http://newswatch.nationalgeographic.com/2012/08/13/our-oversized-groundwater-footprint/)

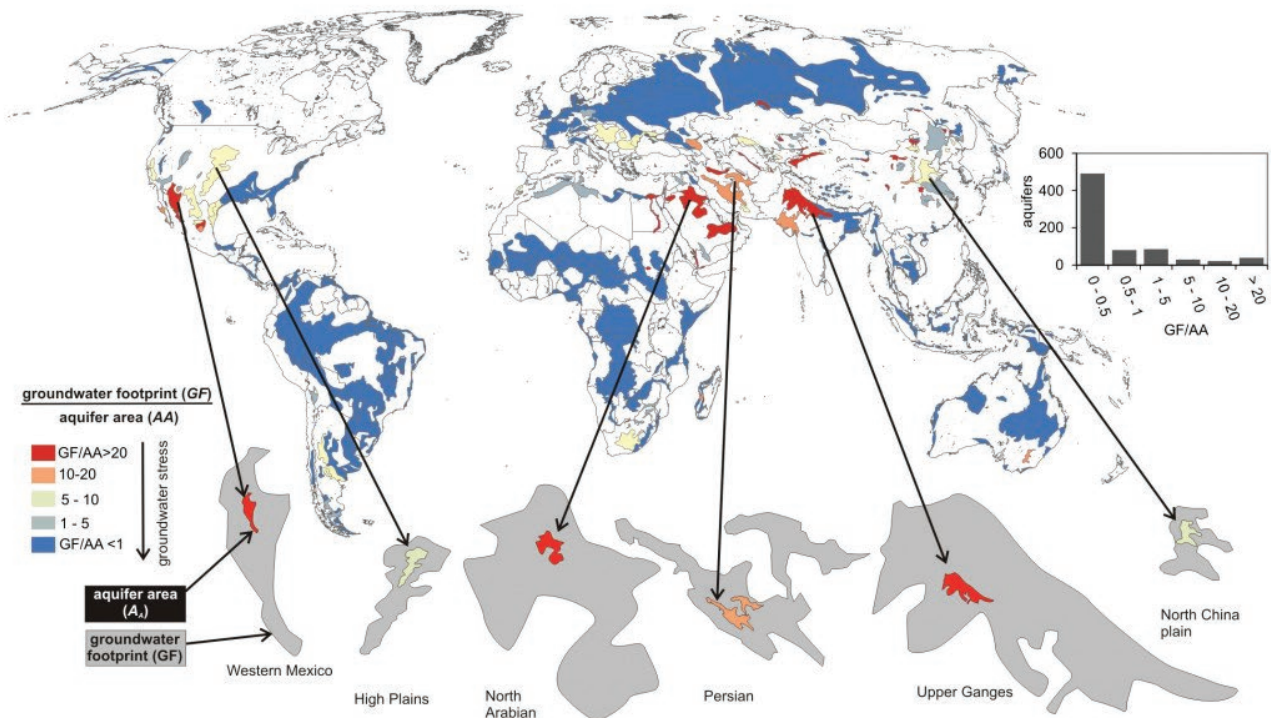


Figure 14: NASA reveals 21 of the world's 37 largest aquifers have passed the 'sustainable tipping point'

List the Asian countries and the names of their aquifers/basins/systems that are in the dangerous red and orange zones.

<https://www.newsecuritybeat.org/wp-content/uploads/2015/06/NASA-groundwater-map1.jpg>

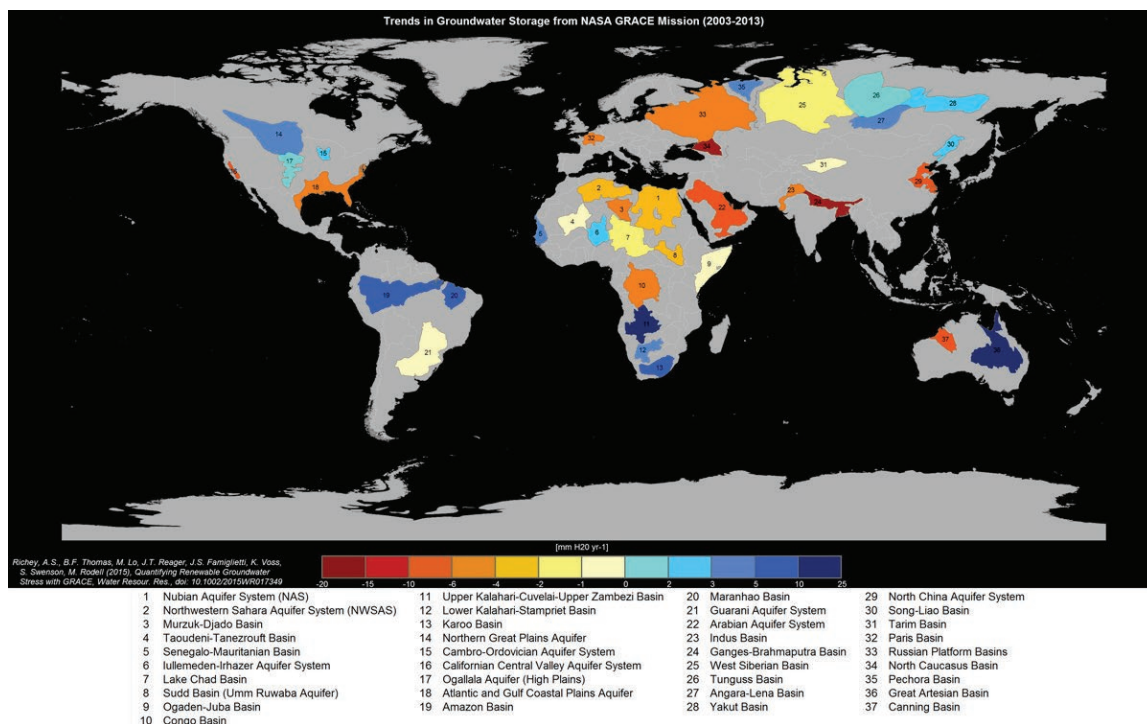


Figure 15: Groundwater withdrawal.

<http://www.iwmi.cgiar.org/assessment/Water%20for%20Food%20Water%20for%20Life/Chapters/Chapter%2010%20Groundwater.pdf>

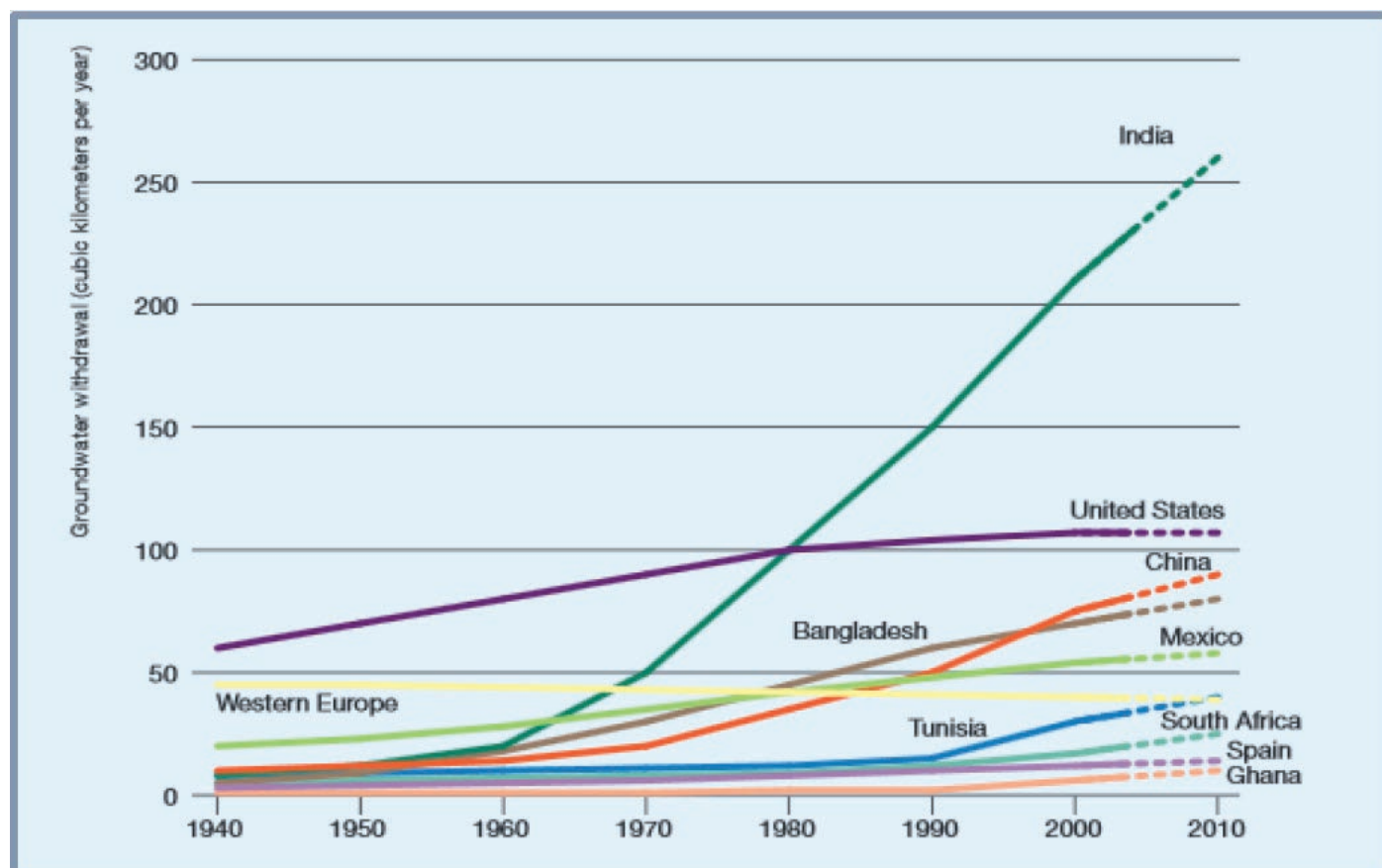
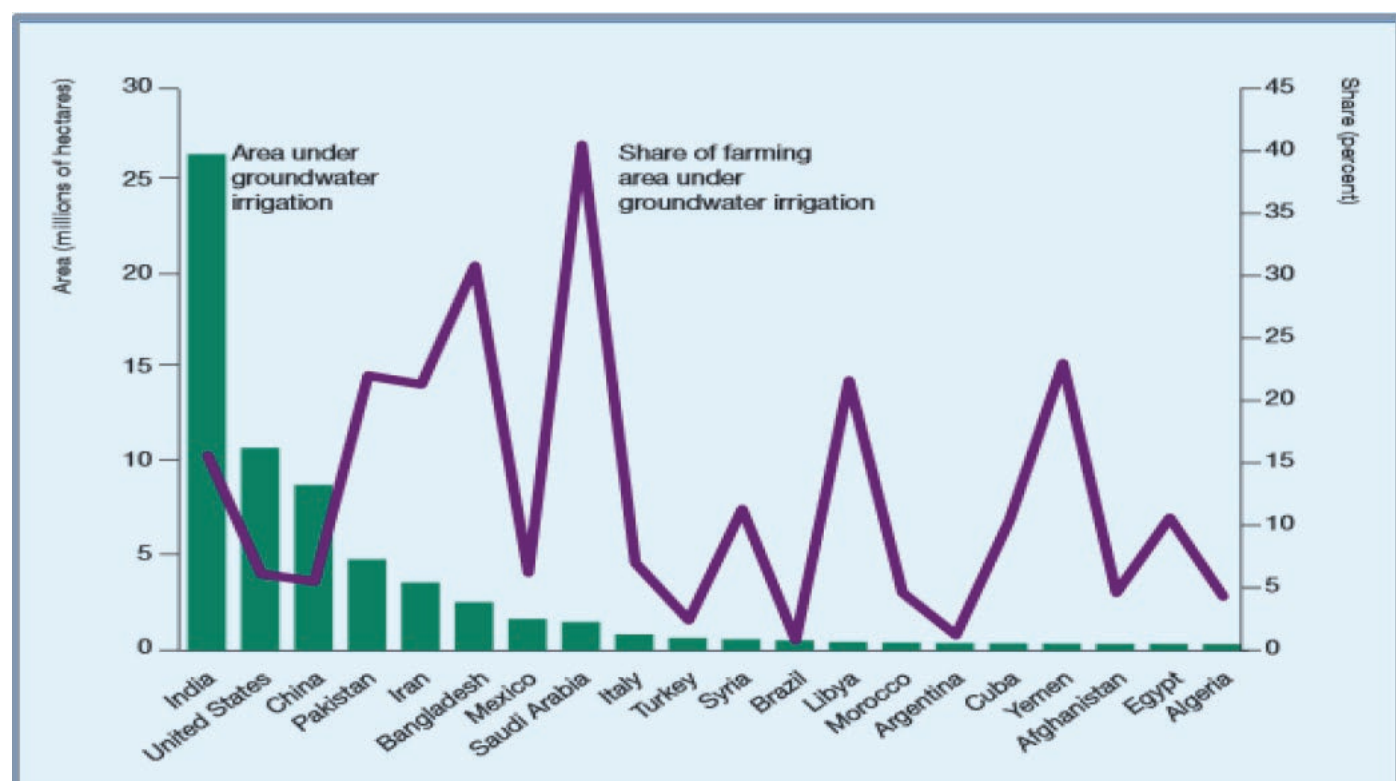


Figure 16: Twenty top groundwater irrigating countries.

<http://www.iwmi.cgiar.org/assessment/Water%20for%20Food%20Water%20for%20Life/Chapters/Chapter%2010%20Groundwater.pdf>



Agriculture-overexploitation

Groundwater has become the mainstay of irrigated agriculture in many parts of Asia. The rise of the Green Revolution led to an increase in tube well technologies and a decline in groundwater levels. Excessive extraction of groundwater for agricultural purposes such as thirsty rice, is a key factor to vanishing groundwater.

Haryana, India: The original Green Revolution produced High Yielding Varieties (HYV) of crops such as rice, wheat and corn. These HYVs produced 10 times the yield of traditional rice and improved food security. However, on the downside it overexploited groundwater and required the use of agrochemicals that polluted water sources. Haryana is the largest producer of wheat and rice in India. It has more than 80% of its land under cultivation, which is taking a heavy toll on groundwater resources. Average water consumption is higher than ground water recharge. The new Second Green Revolution driven by agribusinesses like Monsanto aims to reduce water use.

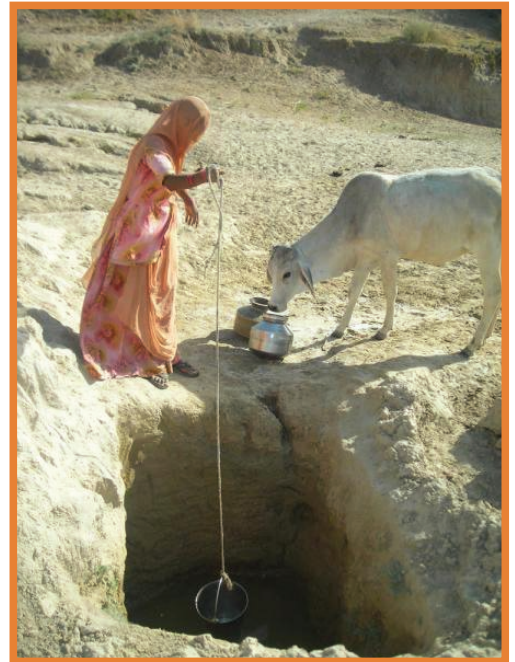


Photo: depleted groundwater in Haryana

http://www.dnaindia.com/locality/sites/default/files/styles/news_slider/public/newsimage/water%20crisis.jpg?itok=vafP21ZV

Unsustainable management

The regions with the greatest rates of groundwater depletion are also the world's major agricultural regions. These include **north-east Pakistan, north-west India, north-eastern China**, California's Central Valley and the Midwest of the United States. These regions use groundwater to irrigate crops that supply their growing populations. For example water tables are falling in the **North China Plain** that produces more than 50% of China's wheat and a third of its corn. As water for industry and cities is worth about 70 times more than for agriculture, poor farmers generally lose in the competition for scarce water.

The development of powerful electric and diesel pumps since the 1950s contributed to the over pumping of groundwater. Today, **Indian** water well drillers are using oil drilling technology so they can go as deep as 1,000 metres to reach water.

Activities

Knowledge and understanding

- What is the global groundwater footprint?
- Large parts of the world are experiencing a crisis in the supply of groundwater. Explain this statement with reference to one country.

Inquiry and skills

Refer to Figure 15:

- Calculate the difference in groundwater withdrawal in India from 1940-2010. Explain the trend.
- Explain the reasons for different rates of growth.

Refer to Figure 16:

- How many hectares in India, China, Pakistan and Bangladesh use groundwater irrigation?
- Research the reasons for the large increase in share farming an area under groundwater irrigation in Saudi Arabia.

Using a variety of secondary sources explain why groundwater depletion is considered unsustainable in India and China. Evaluate your sources for reliability, and present your findings as an oral report. Research one Indian project that is recharging aquifers as an oral report.



Part E

Groundwater Crises and Management in India

Photograph: Indians draw groundwater from a well

Source: <http://theopinionmag.com/wp-content/uploads/2012/12/groundwater2.jpg>

NASA's Gravity Recovery and Climate Experiment (GRACE) satellites confirmed that groundwater is disappearing fast from the world and India is among the worst hit.

India in trouble

India's average annual precipitation is abundant by global standards, however most precipitation falls in brief deluges during the **monsoon** rains. However, there are large disparities in the quantity of precipitation received across India—from the arid Thar Desert in the northwest to the subtropical region in the southwest. Cherrapunji located in the east hills holds the world's record for most precipitation in a year, however during the dry monsoon season residents trek long distances to obtain drinkable water. (For further details, refer to the Köppen climate classification at https://en.wikipedia.org/wiki/Climate_of_India#/media/File:India_map_of_K%C3%B6ppen_climate_classification.svg)

The combination of variable climates with frequent droughts, and increasing demand for water by the 1.2 billion people, led to accelerated demand for groundwater rather than surface water from rivers and lakes. As a result there has been a rapid decline in the country's groundwater resources.

Fragile water security

India is the largest user of groundwater resources in the world. The country consumes more than 25% of world's groundwater. More than 60% of irrigated agriculture and 85% of drinking water supplies are dependent on groundwater. The World Bank reports that if the current trends continue, in 20 years about 60% of all India's aquifers will be depleted or near depletion. Moreover, aquifers are depleting in the most populated areas and climate change will place further strain on groundwater resources. This trend has serious repercussions for water and food security, sustainability of agriculture and economic growth.

Groundwater acts a critical buffer against the monsoon dry season in agricultural areas. However, the overuse of groundwater is not only a rural issue. In **Indian cities**, the urbanites also rely on groundwater due to unreliable and inadequate municipal water supplies.

Approximately only 20 cities receive an average supply of water for only 4.3 hours per day. Only two cities in India (**Thiruvananthapuram** and **Kota**) receive continuous water supplies.

Did you know?

India

21 million wells have lowered their water tables

North Gujarat

water tables are falling by 6 metres per year

Tamil Nadu

95% of wells are dry, reducing the irrigated area by 50% over the last decade

Figure 17: Groundwater reserves hit critical level as extraction rockets

Groundwater is being extracted in Delhi, Haryana, Punjab and Rajasthan at a rate faster than it's replenished, according to the latest report of the Central Ground Water Board (CGWB).

In groups explain why Indian is experiencing a groundwater crises.

<http://www.dailymail.co.uk/indiahome/indianews/article-2774163/Groundwater-reserves-hit-critical-level-extraction-rockets.html>

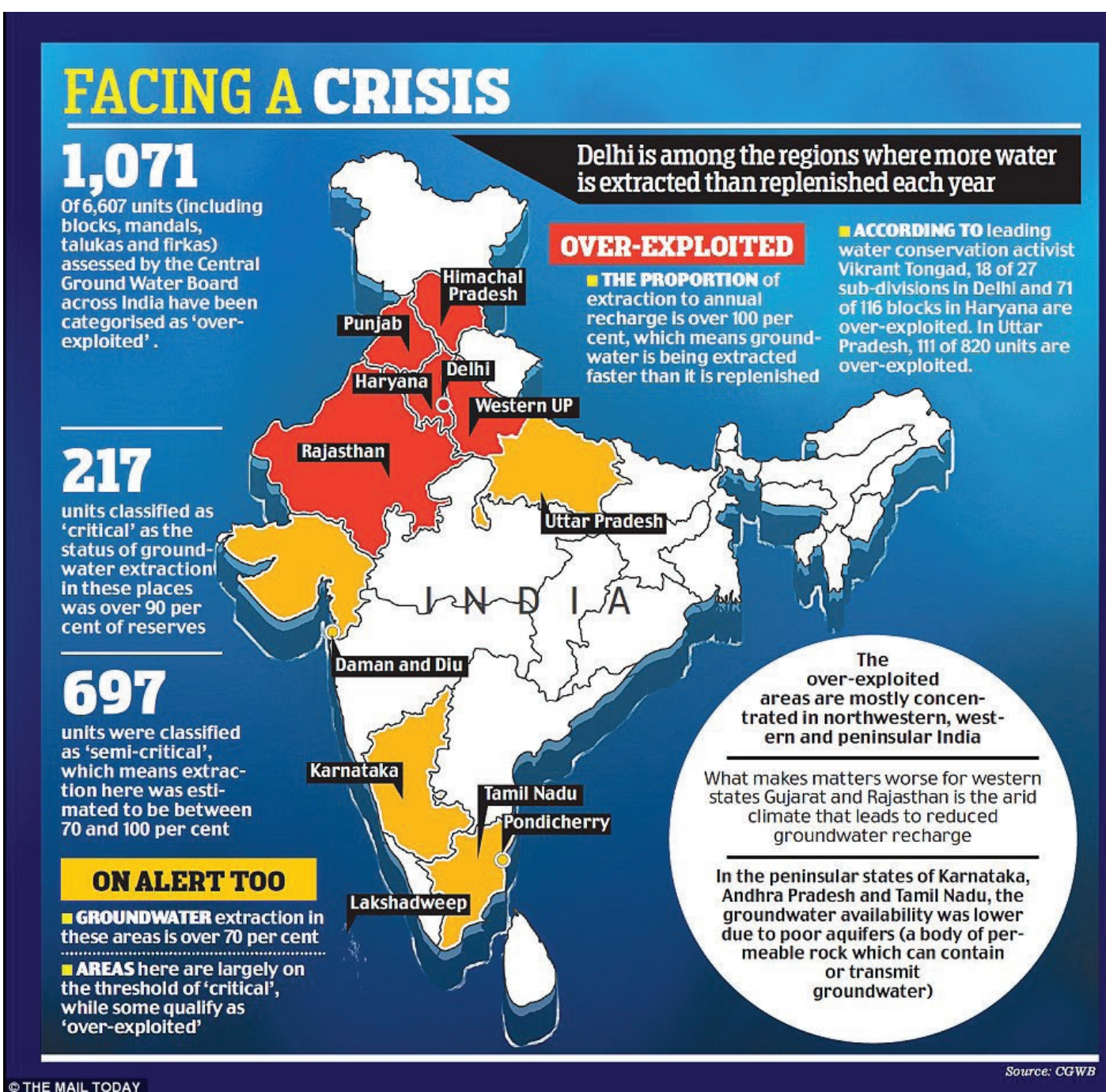
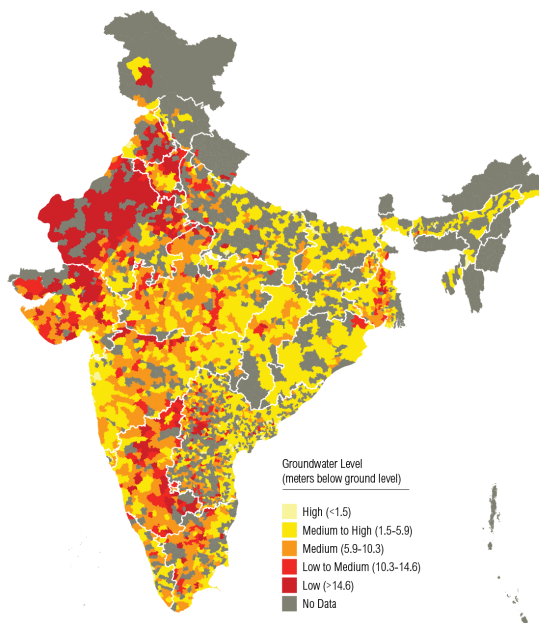


Figure 18: Groundwater wells are decreasing
Compare decreasing water wells in NE with NW India

'Of the 4,000 wells captured in the IWT 2.0 showing statistically significant trends, 54 percent dropped over the past seven years, with 16 percent declining by more than 1 metre per year. The Indian government subsidizes the farmers' electric pumps and places no limits on the volumes of groundwater they extract, creating a widespread pattern of excessive water use and strained electrical grids.'
'North western India again stands out as highly vulnerable. Of the 550 wells studied in the region, 58 percent have declining groundwater levels.'

54%
of India's
Ground-
water
Wells Are
Decreasing



www.indiawatertool.in

 WORLD RESOURCES INSTITUTE

http://www.wri.org/sites/default/files/uploads/India_Water_tool_blog_graphics-02.png

Figure 19: 3D map showing groundwater depletion

Research why India has a greater groundwater depletion problem compared to Brazil and Indonesia.

http://www.nature.com/ngeo/journal/v5/n12/fig_tab/ngeo1617_F2.html



Satellites see underground

Gravity Recovery and Climate Experiment (GRACE) satellite missions can sense changes in water stored above or below Earth's surface. GRACE noted that:

'Northern Indian states of Rajasthan, Punjab and Haryana have groundwater depletion: staggering population growth, rapid economic development and water-hungry farms, which account for about 95% of groundwater use in the region'.

Researchers *'found that groundwater levels have been declining by an average of one metre every three years'* from 2002-2008. (http://www.nasa.gov/topics/earth/features/india_water.html)

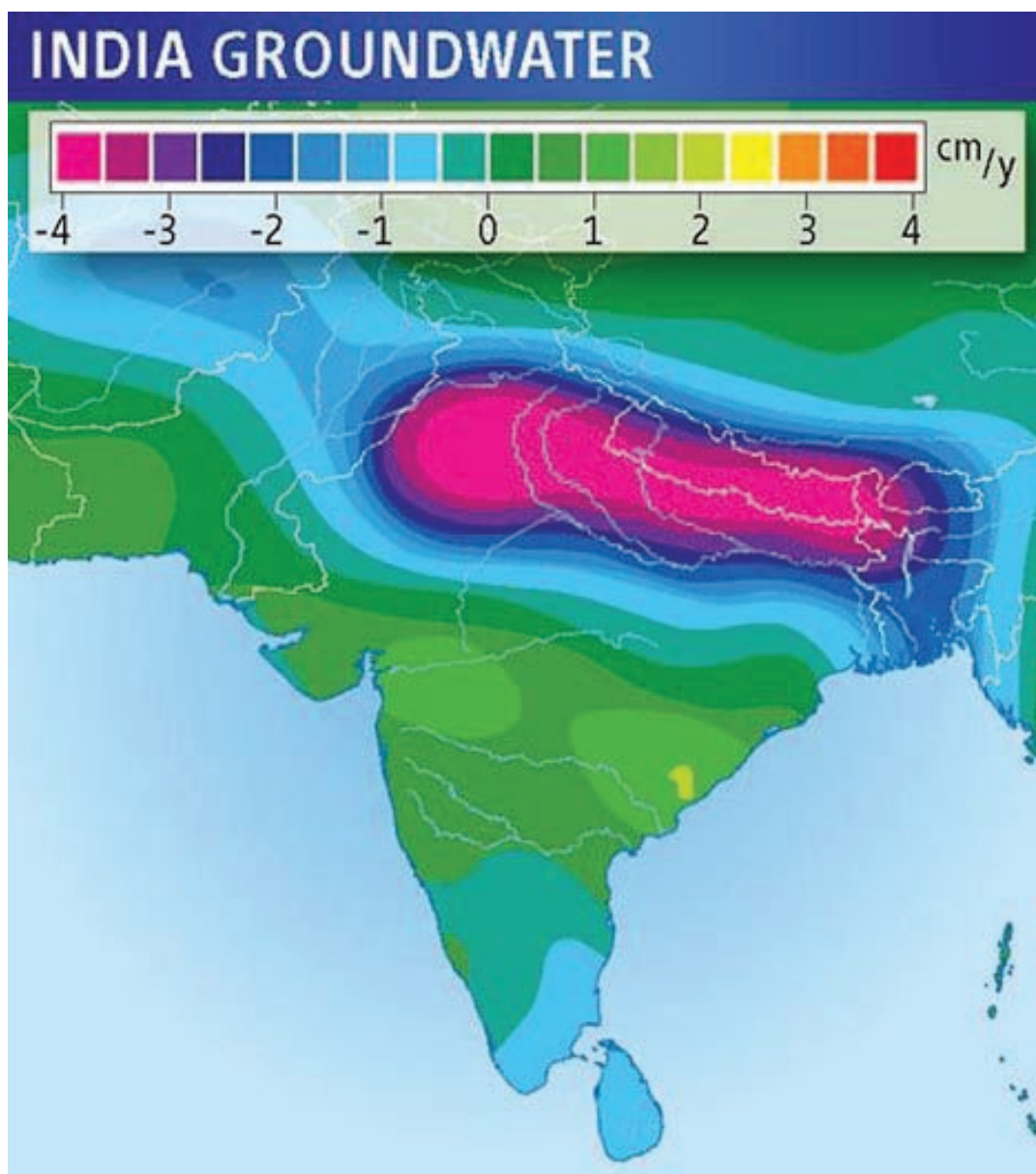
Figure 20: Satellite image of groundwater depletion in Upper Ganges aquifer of northern India

The satellite image shows a 2000 km long region in northern India is depleting groundwater from the Upper Ganges Aquifer at a rate of 24cm per year.

Key to satellite imagery:

- Pink/purple is highest rate of declining groundwater
- blue and green lower rate levels
- yellow lowest rate

http://news.sciencemag.org/sites/default/files/styles/thumb_article_1/public/article_images/200981011.jpg?itok=zh05D74h



Towards sustainable management

Unsustainable groundwater extraction in India has led to:

- less water for humans use
- less water for the functioning of ecosystems that depend on groundwater for survival
- falling water tables
- extreme water shortages especially during droughts



<http://news.mit.edu/sites/mit.edu.newsoffice/files/images/2014/MIT-Desalination-India-01.jpg>

NASA data suggested that groundwater use was exceeding natural replenishment and unless sustainable water use strategies are implemented India is looking towards a future water crises.

Figure 21. Action plans at macro and micro scales

MACRO SCALE	MICRO SCALE
<ul style="list-style-type: none"> • Implementing the National Water Policy which aims to manage water resources in the context of the environment, sustainability, equity, soil justice, conservation and the role of women. • Establishing sustainable groundwater yields so less water is withdrawn than replenished across Indian states (e.g. assessment of hydrologic conditions such as reliability of groundwater renewability and vulnerability to aquifer pollution, as well as population demands) • Monitoring water allocation and water extraction between users 	<ul style="list-style-type: none"> • Community management of groundwater where the user is responsible for implementing management measures. 'A World Bank report showcases a model adopted in the drought-prone areas of the Indian state of Andhra Pradesh. At the cost of \$2,200 per village per year, communities have shown the first large-scale example of self-regulation of groundwater. Farmers have doubled their income, while bringing their groundwater use close to sustainable levels.' http://www.worldbank.org/en/news/feature/2012/03/06/india-groundwater-critical-diminishing • Barefoot hydrogeologists or local experts who understand the local geology and groundwater, and travel around India educating people on how to sustainable use their groundwater.

Figure 22: Implementation of sustainable policies

WATER SAVING STRATEGIES	GROUNDWATER STRATEGIES
<ul style="list-style-type: none"> • Promoting efficient forms of irrigation e.g. drip irrigation • Growing crops that use less water • Reducing water loss through evaporation and leaks • Recycling waste water • Subsidising people for water efficiency practices 	<ul style="list-style-type: none"> • Extraction controls to major groundwater uses • Provision of alternative water sources • Promotion of water saving efforts-industry, agriculture and mining • Implementation of Sustainable Water Management Policies

Figure 23: Solutions to groundwater depletion

<http://www.geo.hunter.cuny.edu/tbw/ncc/Notes/chapter12.humans.env/groundwater.depletion.prevention.control.jpg>

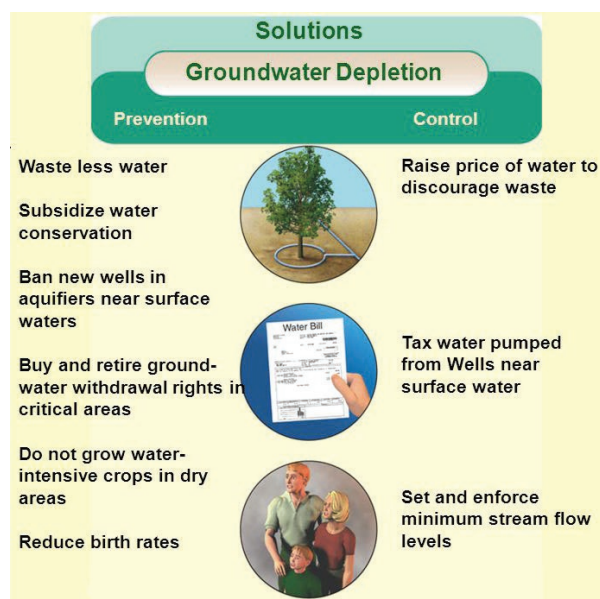


Figure 24: Management of groundwater

<http://www.prsindia.org/administrator/uploads/general/1455682937~~Overview%20of%20Ground%20Water%20in%20India.pdf>

Table 4: Major central level water institutions responsible for ground water management

Institution	Role
Central Water Commission	Initiating and coordinating schemes for the conservation and utilisation of water resources in the country in collaboration with state governments; and monitoring water quality
Central Ground Water Board	Developing and disseminating technology related to sustainable use of ground water; monitoring and implementing policies for the sustainable management of ground water resources; estimating ground water resources
Central Ground Water Authority	Constituted under Section 3(3) of the Environment (Protection) Act, 1986 to regulate and control development and management of ground water resources; can resort to penal actions and issue necessary regulatory directives
Central Pollution Control Board	Implementation of the Water (Prevention and Control of Pollution) Act, 1974 which seeks to restore water quality

Sources: Ministry of Water Resources; Lok Sabha Question 2157, March 10, 2015; PRS.

Activities

Knowledge and understanding

- What is meant by water security?
- Explain why a monsoon climate in India is an unreliable source of water.
- Describe the trends in the overuse of groundwater in India.
- Why is groundwater used in Indian cities?

Inquiry and skills

- **Refer to Figure 20:** Explain the advantages of using satellite imagery in relation to groundwater depletion in India
- **Refer to Figures 21, 22, 23, 24:** In groups draw an annotated diagram illustrating sustainable solutions to groundwater depletion in India

With many aquifers around the world being rapidly depleted, restricting withdrawal of groundwater (pumping limits) and replenishment of aquifers, aims to halt depletion. Explain whether this strategy is only one solution. Research the use of groundwater in India by Coca Cola.

- e.g. 'Farmers fight Coca Cola as India's groundwater dries up' <http://www.bloomberg.com/news/articles/2014-10-08/farmers-fight-coca-cola-as-india-s-groundwater-dries-up>.
- Explain the cartoon

YouTube

- India's groundwater crises <https://www.youtube.com/watch?v=DEcGp-70CzU>



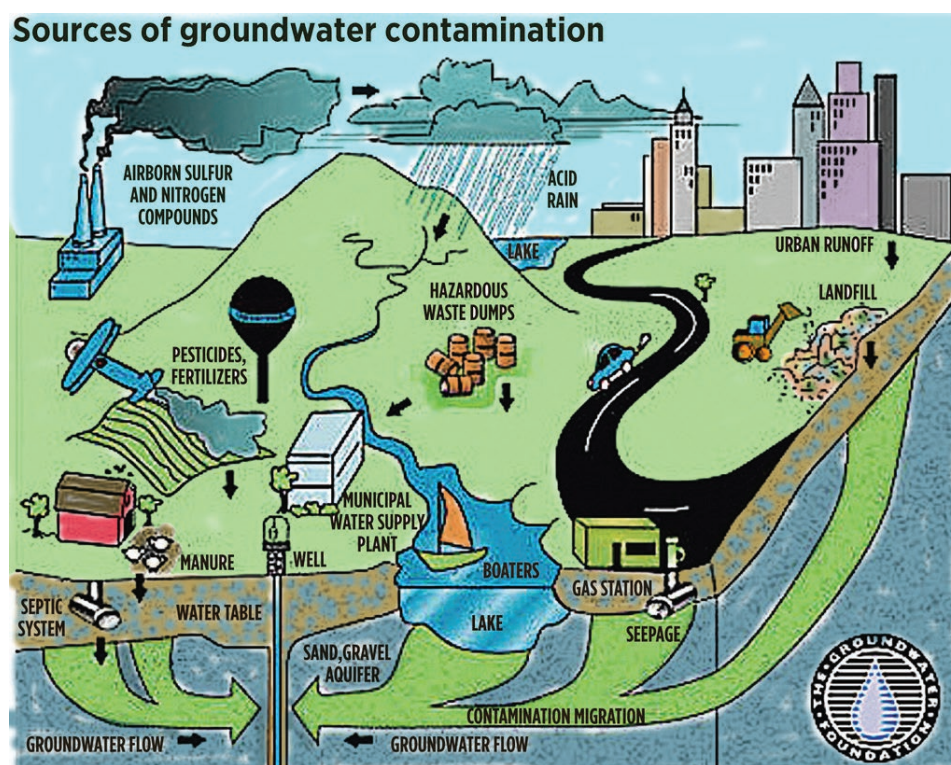
Photograph: Rajesh Kumar Singh/AP
<https://www.theguardian.com/world/2016/aug/30/more-than-half-of-south-asias-groundwater-too-contaminated-to-use-study>

Pollutants contaminate groundwater, posing a risk to human health and the environment. For example seepage of ecoli from septic tanks, toxic landfills from disposal of garbage, pesticides and fertilisers used in agriculture and toxic chemicals such as lead and cadmium from industry.

Figure 25: Sources of groundwater contamination

List the pollutants that enter groundwater

Source: http://www.mlive.com/news/kalamazoo/index.ssf/2010/04/spring_rains_offer_reminder_to.html



Source: The Groundwater Foundation, Illustration by C. Mansfield

GAZETTE

Arsenic in groundwater

Over the last few decades high concentrations of arsenic in drinking water has emerged as a major public health concern in parts of the world. Approximately 140 million people are affected in 70 countries. In India and Bangladesh 20% of the 8 million constructed wells contain high levels of arsenic. In most cases the source has been both natural (e.g. rocks) and human induced (e.g. disposal from industry).

In West Bengal, Jharkhand, Bihar, Uttar Pradesh located on the flood plain of the Ganges River; and Assam and Manipur situated on the flood plain of the Brahmaputra and Imphal

Rivers reported arsenic contamination in groundwater above the permissible limit of 10 µg/L. In West Bengal, 3 million people living in 1,300 villages are affected by arsenic contaminated groundwater, and a large portion of Ganga-Meghna-Brahmaputra plain with a population of over 500 million are at risk from groundwater arsenic contamination.

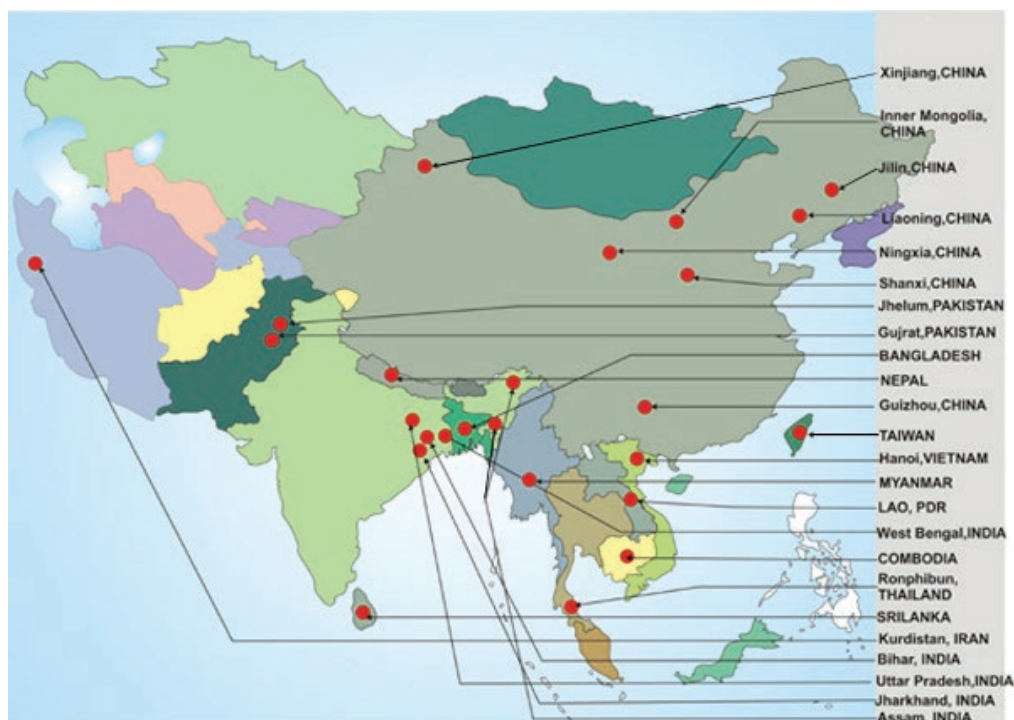


Arsenic in the groundwater is slow poisoning as crops grown using arsenic contaminated groundwater affects people who consume this food. It **bio-accumulates** up the food chain. Arsenic contamination leads to lower life expectancy and lower infant mortality rates (IMR). The provision of arsenic free water is essential to the wellbeing of Indians. To remove arsenic the Sono arsenic filter has been used in Pakistan and in other countries Subterranean Arsenic Removal Technology (SAR). In West Bengal a low cost chemical free method of arsenic removal known as TIPPOT was introduced as well as a low cost filtration methods in other Indian states.

Photo; arsenic poisoning http://tunza.eco-generation.org/file/arsenic_poisoning.jpg

Figure 26 : Arsenic contamination of groundwater in Asia

<http://www.soesju.org/arsenic/ganga.htm>



YouTube

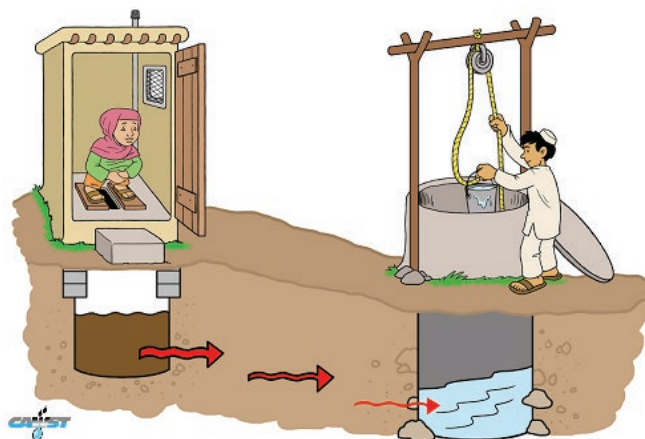
- Water Aid: poisoned population arsenic contamination in the Ganges Delta <https://www.youtube.com/watch?v=d5YXvm-iXrY>
- Silent killer <https://www.youtube.com/watch?v=-KZzVhENoS4>

Ecoli in groundwater

In 71 cities across India sewage was found to contaminate groundwater and percolate into wells. Effluent from septic systems and domestic and wild animal faecal matter are a known source of coliform bacteria. In Bangalore 52% of bore well water contained ecoli bacteria.

Cartoon https://upload.wikimedia.org/wikipedia/commons/c/c6/Groundwater_Contamination_SW_Asia_Sm.png

Describe how faecal pathogens from pit latrines can be found in wells.



Saltwater intrusion

Groundwater contaminated with **saltwater** is referred to as **seawater intrusion**. There are two ways salt can enter groundwater:

- **Naturally** when coastal aquifers are connected to the sea or salty lakes.
- **Human-induced changes** when more water is withdrawn than is renewed, resulting in the space filling up with seawater from a nearby sea or salty lake.

Seawater intrusion occurs in coastal Kolleru Lake in Andhra Pradesh in India where salt water entered the lake and surrounding aquifers

Did you know?

- Groundwater is the world's largest source of freshwater.
- Bottled water is generally sourced from groundwater.
- Most of the premium wine districts in South Australia rely on groundwater.
- Some mound springs hold spiritual significance for Aboriginal communities in Australia.
- 21% of used water comes from groundwater.
- Aquifers host their own unique ecosystems such as the stygofauna, which are tiny shrimp-like creatures that live in the fissures of aquifers.
- When groundwater use exceeds groundwater recharge the ground often collapses or forms a depression around the well.
- More than half of south Asia's groundwater is too contaminated to use.
- Groundwater can become salty through natural and human causes, including inefficient farmland irrigation and poor drainage.
- Arsenic is naturally present in soil, but levels are exacerbated by using fertilisers and wastes from mining.
- Arsenic poisoning from drinking water is a major problem in the Asia region.
- Fifteen to twenty million wells extract water from the Indo-Gangetic basin every year.
- Groundwater moves slowly compared to water in rivers.
- There are a hundred times more water in the ground than in all the world's rivers and lakes.
- A dowsing stick has been used to locate underground water.
- The type of rocks is the most valuable clue to locating groundwater.

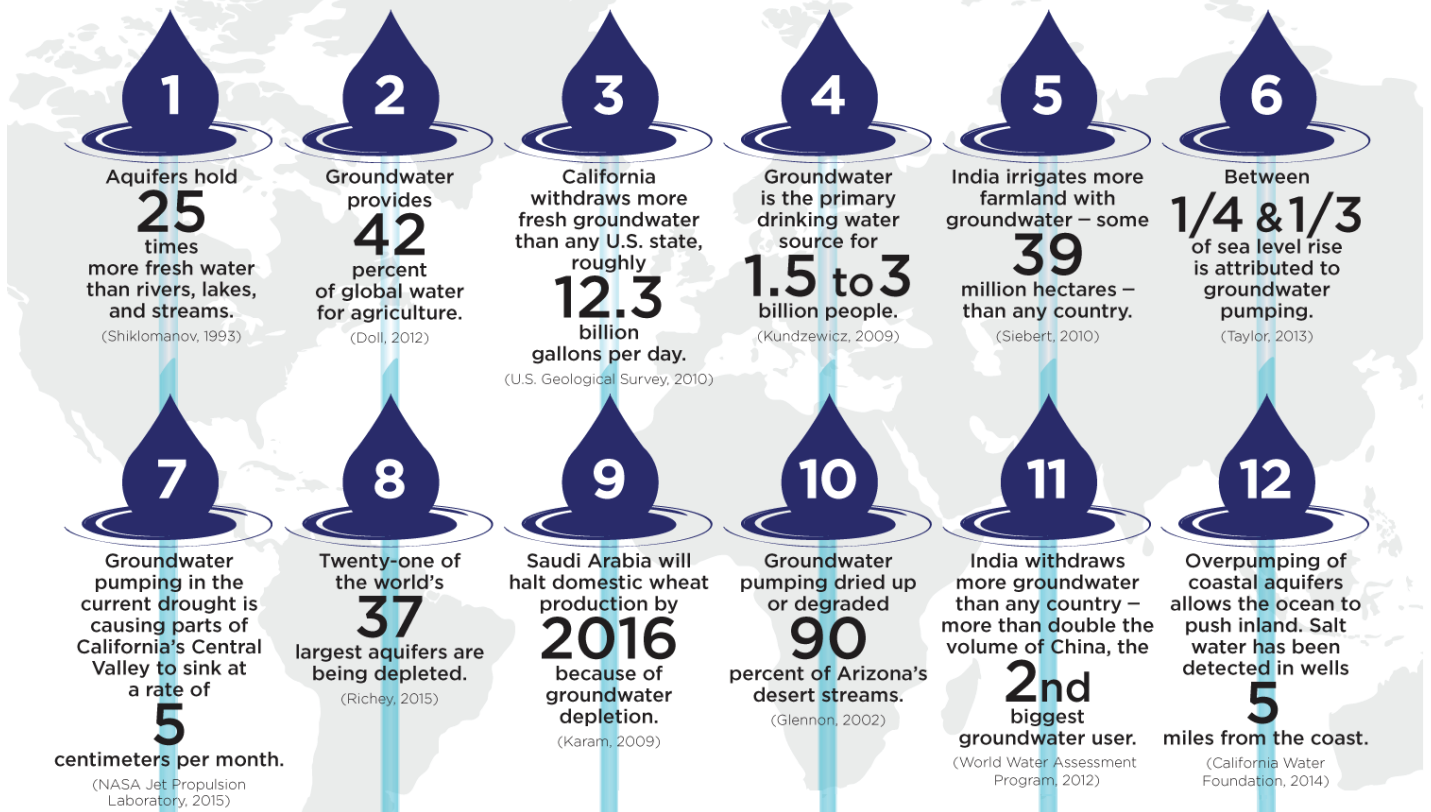
Activities

A. Things you should know about groundwater

<http://www.circleofblue.org/wp-content/uploads/2016/01/12-facts-about-groundwater1.png>

In groups design an e-poster or infographic on facts and figures on groundwater

12 THINGS YOU SHOULD KNOW ABOUT GROUNDWATER:




B. Perspectives table

There are different perspectives on using groundwater as a source of water. After reading the table determine your perspective on the use of groundwater. Present your ideas as an oral report.

Advantages of using groundwater	Disadvantages of using groundwater
<ul style="list-style-type: none"> No water is lost through evaporation It is generally less expensive to develop than surface water such as rivers Water is only removed when required Crops grown in water scarce areas to reduce hunger Establishment of farms, cities, industries and tourist developments especially in water scarce areas. 	<ul style="list-style-type: none"> Lowers water table Depletes aquifer Ground subsides when aquifer is depleted of water Intrusion of salt water if source of groundwater is from the salty ocean Chemical contamination from infiltration of industrial toxic waste and agricultural chemicals such as pesticides Reduces flow of river as there is less groundwater entering streams. This impacts on marine species

C. Cartoon analysis

Explain what the cartoon means in the comments column for the three cartoons.

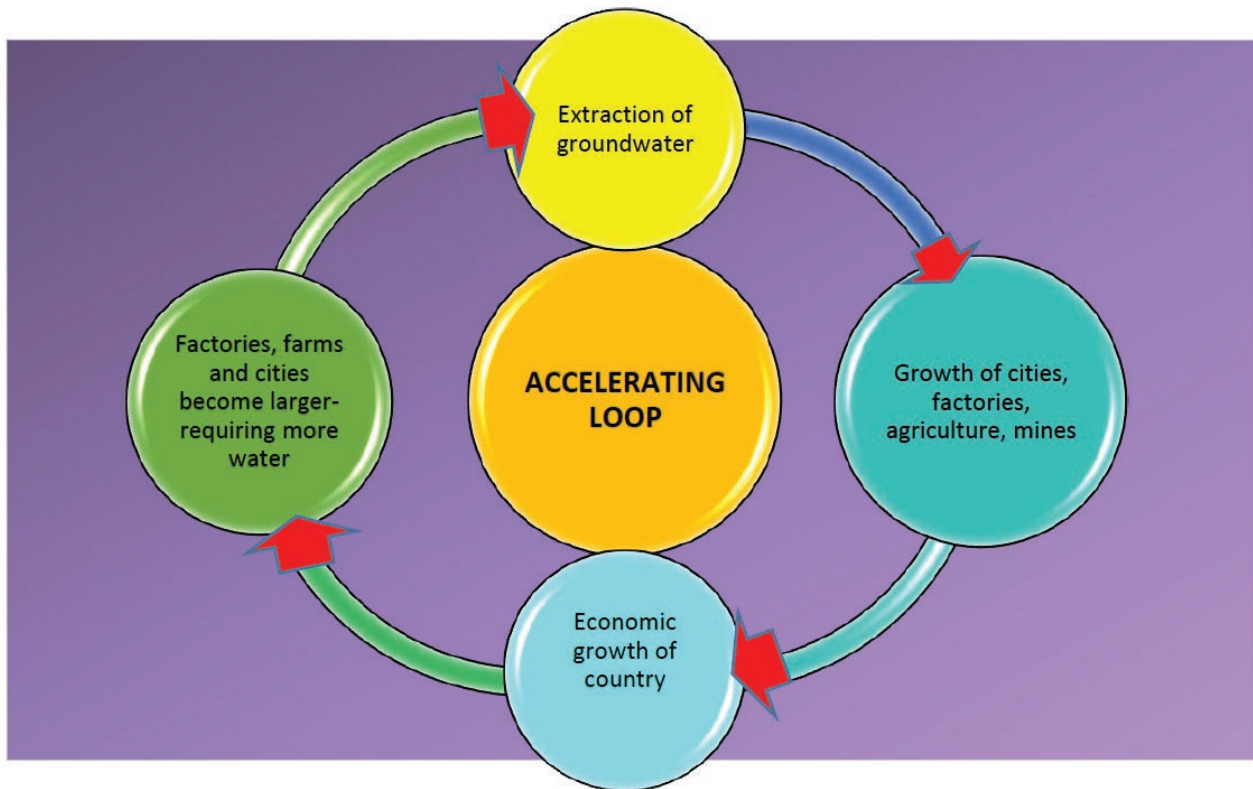
Cartoons	Comments - What is the message?
 <p>http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Binay_Groundwater_cartoon.jpg</p>	
 <p>http://images.catchnews.com/uploads/images/2015/07/13/marathwada-water-crisis-lead.jpg</p>	
 <p>http://www.downtoearth.org.in/news/groundwater-benefits-purifiers-2133</p>	

D. Extension activity

'The problem with groundwater usage is that it is a reinforcing system loop. That means as extraction goes on, more and more extraction will follow. We can see from the diagram above that groundwater extraction will lead to expansion of factories and cities. Then the growth of economy will follow resulting in bigger factories and cities. Finally the increasing population and production will require more groundwater extraction and hence reinforcing the system.'

<http://www.ott.com/blog/wp-content/uploads/2015/11/OTTgroundwaterPanel.jpg>

- Describe the systems loop.
- Explain why groundwater extraction is a global concern



E. Extension activity

In groups summarise the following graphs on groundwater in India. Present as a short report.

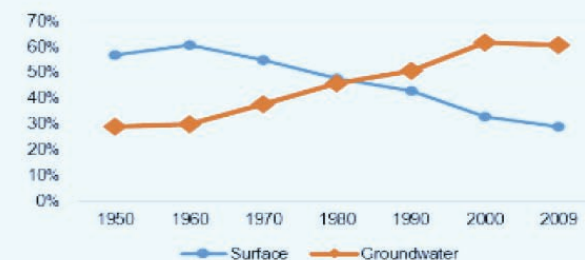
<http://www.prsindia.org/administrator/uploads/general/1455682937~~Overview%20of%20Ground%20Water%20in%20India.pdf>

Table 1: Statistics regarding water resources in India

Parameter	Unit (Billion Cubic Meter/Year)
Annual water availability	1,869
Usable water	1,123
Surface water	690
Ground water	433

Sources: Water and Related Statistics, April 2015, Central Water Commission; PRS.

Figure 4: Increase in ground water utilization for irrigation



Sources: Agricultural Statistics at Glance 2014, Ministry of Agriculture; PRS.

Table 3: States and districts affected by geogenic contamination in groundwater

Geogenic contaminants	Number of affected states	Number of affected districts
Arsenic	10	68
Fluoride	20	276
Nitrate	21	387
Iron	24	297

Source: Central Ground Water Board; PRS.

ICT questions

- What is groundwater? What are the impacts of humans on groundwater? http://www.watercare.net/wll_cc/cw_groundwater.htm; http://www.epa.nsw.gov.au/soe/soe2000/cw/cw_5.4.htm
- What is the function of the Groundwater Foundation? <http://www.groundwater.org/>
- Make an edible earth parfait and see how groundwater operates <http://www.groundwater.org/kc/activity4.html>
- List ten ways to protect and conserve groundwater <http://www.groundwater.org/ta/topten.html>
- What is the Groundwater footprint? <http://groundwaterfootprint.org/>
- Explain how satellite imagery can unlock the mysteries behind vanishing groundwater http://www.nasa.gov/topics/earth/features/india_water.html

Assessment

Answer the following inquiry questions:

1. What is fossil groundwater?
2. How is groundwater formed?
3. What is the groundwater footprint?
4. Where is the groundwater footprint largest?
5. What is the groundwater crises in India?
6. How could groundwater depletion lead to a food crisis?
7. What is the social, economic and environmental importance of groundwater?
8. How can groundwater become polluted?
9. What management strategies could be implemented to reduce groundwater pollution?

Extended responses

1. In groups, research how satellite imagery can unlock the mysteries of vanishing groundwater
2. Discuss why groundwater is considered a valuable resource and should be managed sustainably in a country in the Asia region. Present findings using Web 2.0 tools
3. Using a variety of sources discuss the problems surrounding declining water quantity and quality of groundwater in India or another country in the Asia region. Reflect on your learning and suggest what actions could be implemented to improve this water resource from the macro to the micro scale. Present findings using ICT including satellite images, GIS, maps, graphs, tables and photographs.
4. Research climate change and its impact on future groundwater resources. Explain why this topic is an emerging global issue.

YouTube

- What is groundwater? http://www.youtube.com/watch?v=oNWAerr_xEE
- Groundwater depletion in India revealed by GRACE <http://www.youtube.com/watch?v=nRQThJjuPlo>
- Groundwater depletion in Gujarat, India <http://www.youtube.com/watch?v=YymDNYROlaY>
- Groundwater, the hidden source of life <http://www.youtube.com/watch?v=Iht9WBBXepA>
- Why are we losing groundwater? <http://www.youtube.com/watch?v=2cFOYvtJeiw>
- Arsenic in groundwater <http://www.youtube.com/watch?v=W3Hvexu5SqM&list=PL96C9BD7CFE5E7263>

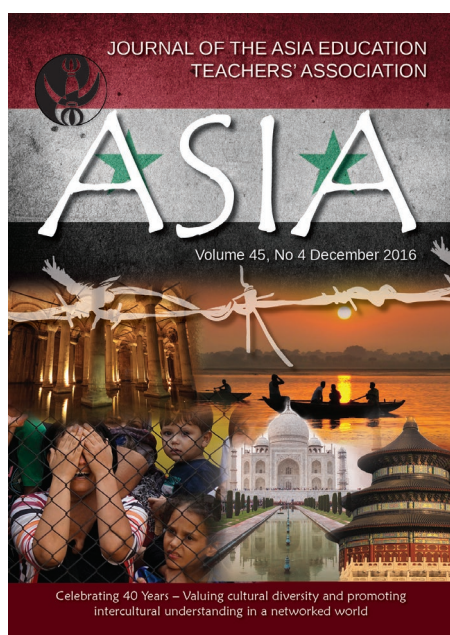
Glossary

- **Aquifer:** wet underground layer of water-bearing permeable rock or unconsolidated material.
- **Groundwater footprint:** area required to sustain groundwater use and groundwater-dependent ecosystem services.
- **Groundwater:** long term storage of the water cycle in the ground. Some water remains in rocks for millions of years (fossil groundwater) before it naturally discharges or is abstracted;
- **Sustainability:** 'the capacity of the environment to continue to support our lives and the lives of other living creatures into the future.' (ACARA Glossary)
- **Sustainable groundwater:** balance between groundwater inputs and outputs.
- **Water security:** 'The reliable availability of an acceptable quantity and quality of water for health, livelihoods and production, coupled with an acceptable level of water-related risks. Sustainable development will not be achieved without a water secure world.' (Water Policy- Grey and Sadoff) <http://www.iwaponline.com/wp/00906/wp009060545.htm>
- **Watertable:** top of the saturated portion in the ground (boundary)



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- No members of the Executive are paid for their work or contributions to the Journal.
- The authorship of all articles is acknowledged in the Journal.
- Copyright of material must be acknowledged for any material used by a contributor where original material is used, and proof of permission must be provided to the Editor.
- The use in the Journal of an article is at the discretion of the Editor.
- Material, including images submitted for publication, must be in editable digital format and may be accompanied by hard copy.



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ASIA EDUCATION TEACHERS' ASSOCIATION

GPO Box 2393, Sydney NSW 2001

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