

**ANTALYA**  
**INTERNATIONAL**  
**SCIENCE FORUM** | ANISF

**CLIMATE CHANGE** Environmental Crisis  
Migration



29 November and 1 December 2023 Antalya-Türkiye



# EFFECTS OF CLIMATE CHANGE AND MIGRATION ON MUNICIPALITIES.

**Why cities must prepare for climate  
migration**

Dursun Yıldız

**Hydropolitics Expert**

**30 November 2023**

# Amy Pope: We have officially entered the age of climate migration

- Director-General of the United Nations (UN) **International Organization for Migration (IOM)**,
- “As African countries are among the most vulnerable to the effects of climate change, they are experiencing the dire effects of the climate crisis, such as **droughts, floods**, extreme temperatures and rising sea levels.
- In 2022, more than 7.5 million people were displaced in Africa due to natural disasters.”



# Current situation and some projections

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- There are estimated to be over 30 million people worldwide are forced to move due to serious degradation of environmental conditions ,natural disasters and depletion of natural resources
- By 2050 as many as 200 million people (1 out of every 45 people worldwide) will be forced to move
- Due to ‘disruptions of monsoon systems and other rainfall regimes,by droughts ,by sea rises and coastal flooding ‘
- Prof. Myers of Oxford University
- UN Environmental Programme (UNEP) also estimates that
- By 2060 there could be 50 million «environmental refugees»  
**in Africa alone**



# The U.S. intelligence community prediction !



## Implications for US National Security of Anticipated Climate Change

- The U.S. intelligence community was released a report in 2016 finding that **global warming is already acting as a destabilizing force worldwide**, with more serious ramifications to come in the next two decades.
- **The report states:**
- **Over 20 years**, the net effects of climate change on the patterns of global human movement and **statelessness** could be dramatic,
- If unanticipated, they could **threaten the social fabric of communities**



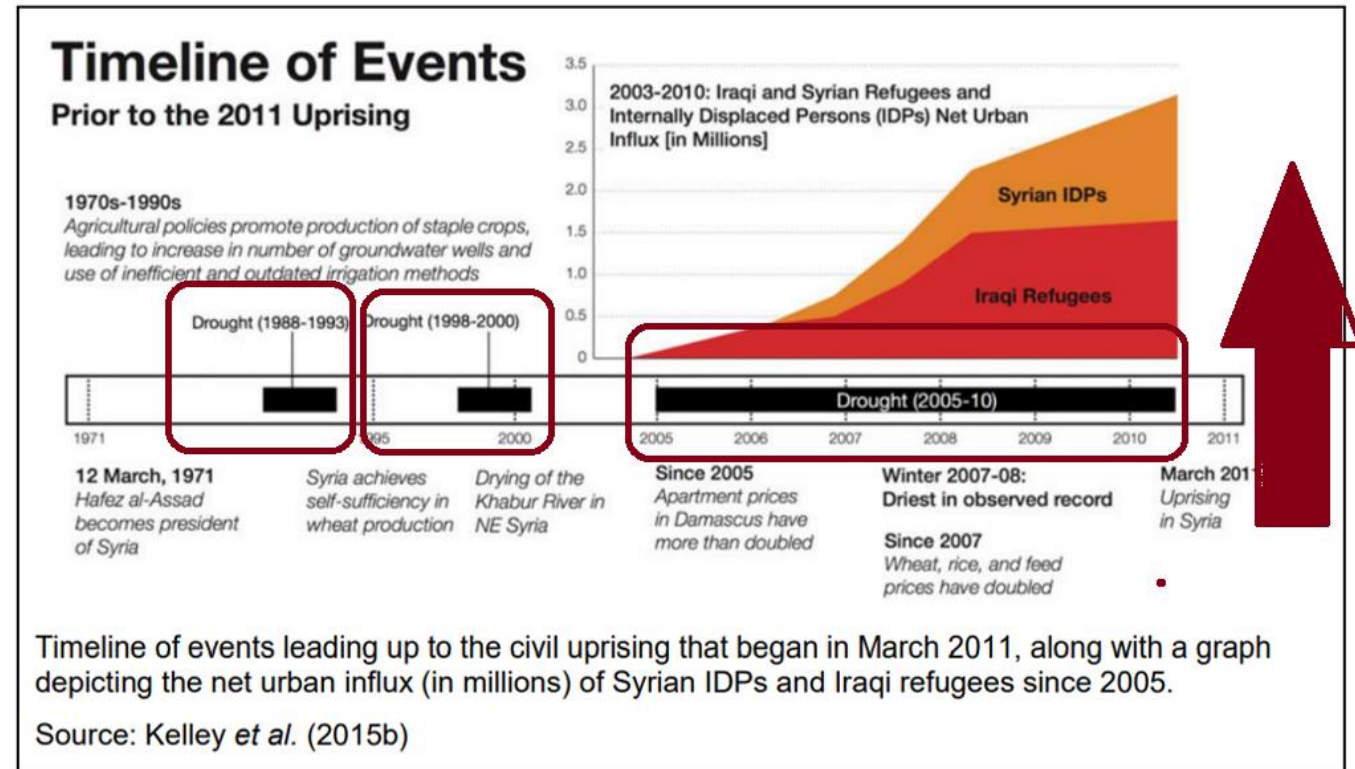
# Some Questions on Over 20 years

- From which part of the world ?
- Where will they move ?
- What the migration consequences will be in the destination countries.



# The nexus between climate change and migration is complex

- Few people migrate 'because' of climate change;
- They migrate because of **economic or socio-political factors that are affected by climate change.**
- **There is some evidence that the refugee crisis in Syria is linked with multi-year drought in 2007-2010**
- **that provoked migration from rural areas to cities and created a critical mass of rural poor before the political crisis that started in 2011.**



# Internal displacements is increasing



## INTERNAL DISPLACEMENTS DUE TO DISASTER, 2013-2022

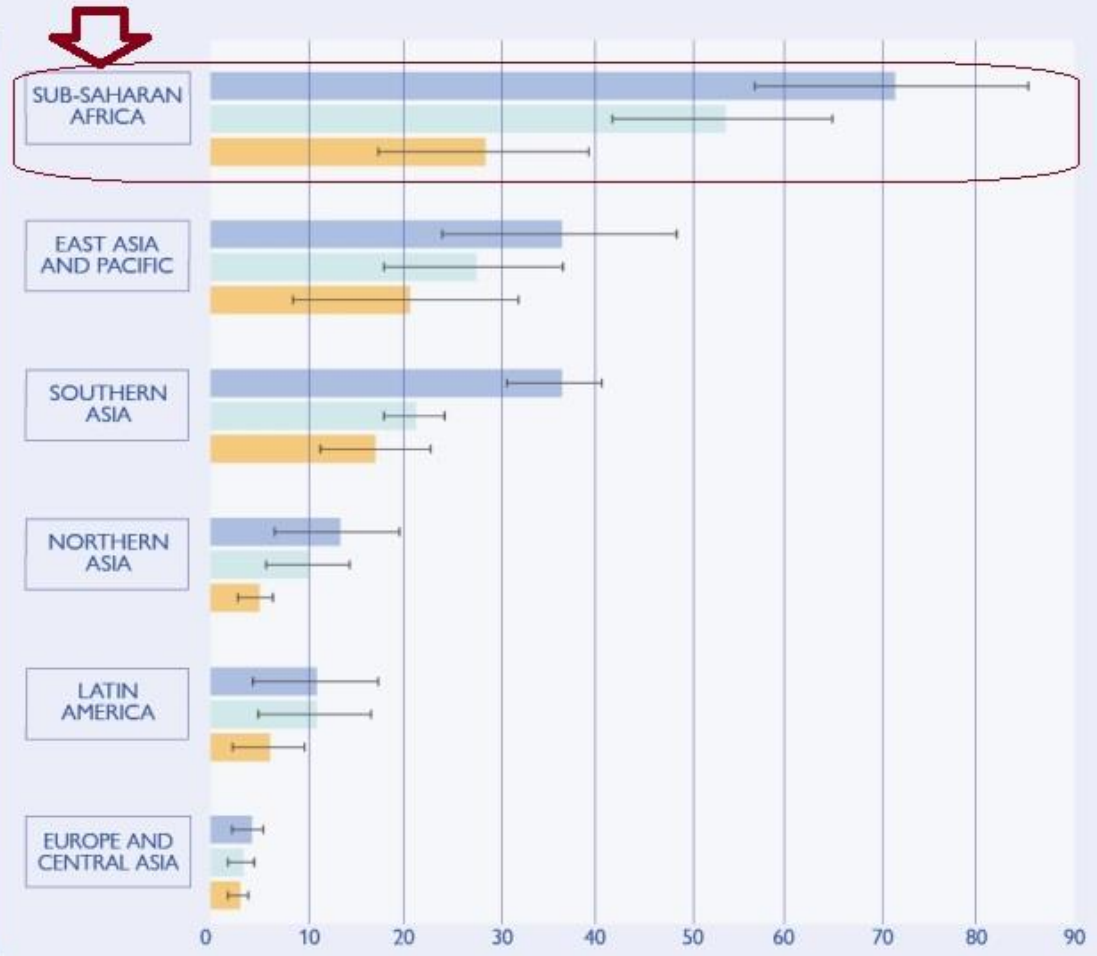


Source: IDMC, 2023.

© IOM GMDAC, 2023.  
www.migrationdataportal.org



## PROJECTED INTERNAL CLIMATE MIGRANTS BY 2050



Source: Clement et al. (2021).

© IOM Global Data Institute, 2022

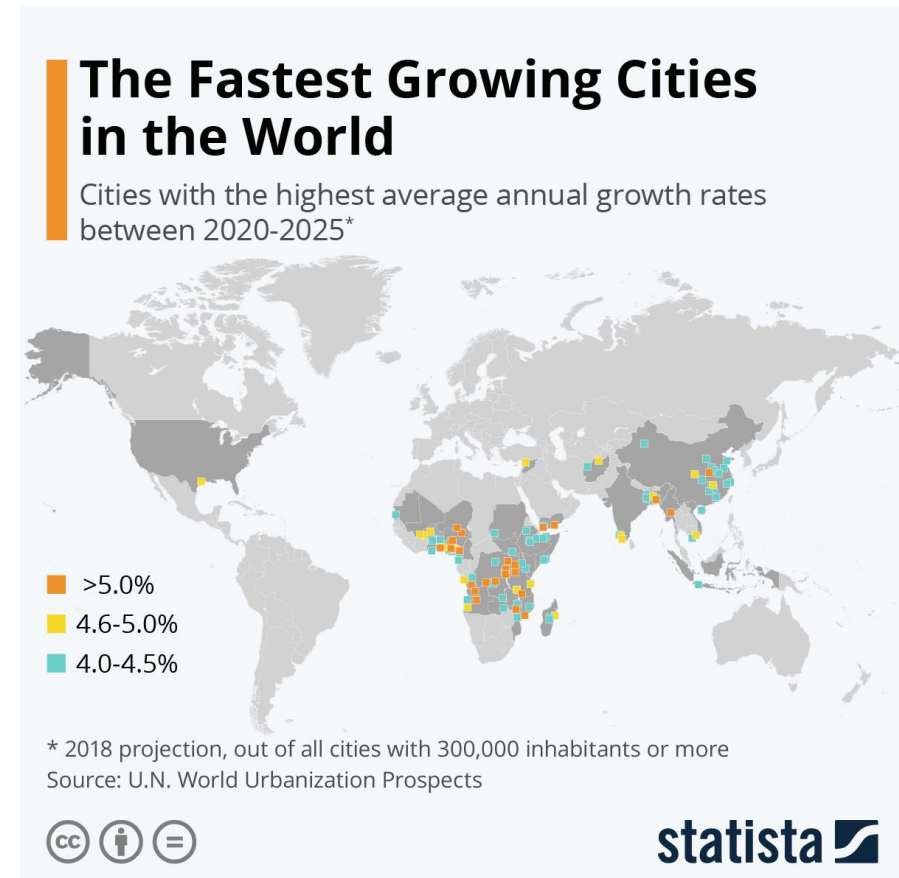
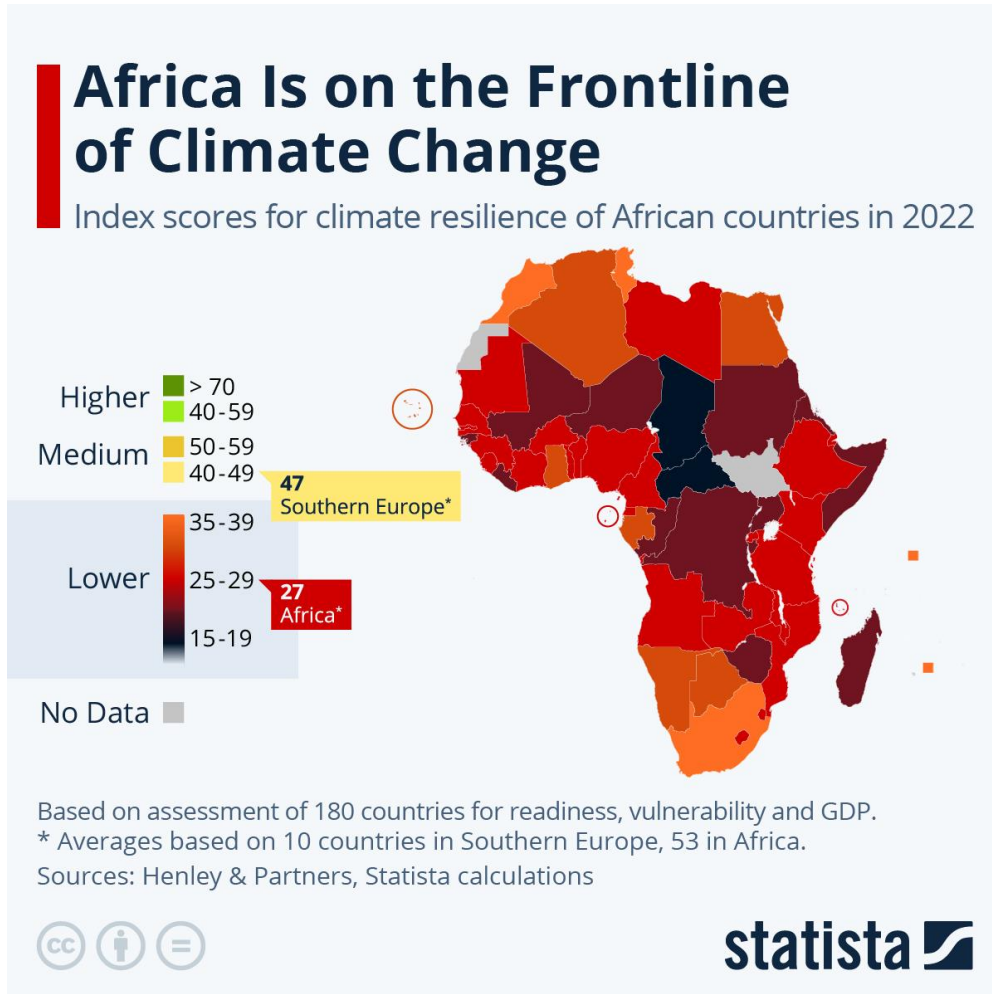


# Focusing on two subject

## 1. Africa

## 2. Water Security Risks in Growing Cities

- Growing cities with water security problems





# Why Africa ?

Climate change will diverse effects on

- Rainfed agriculture

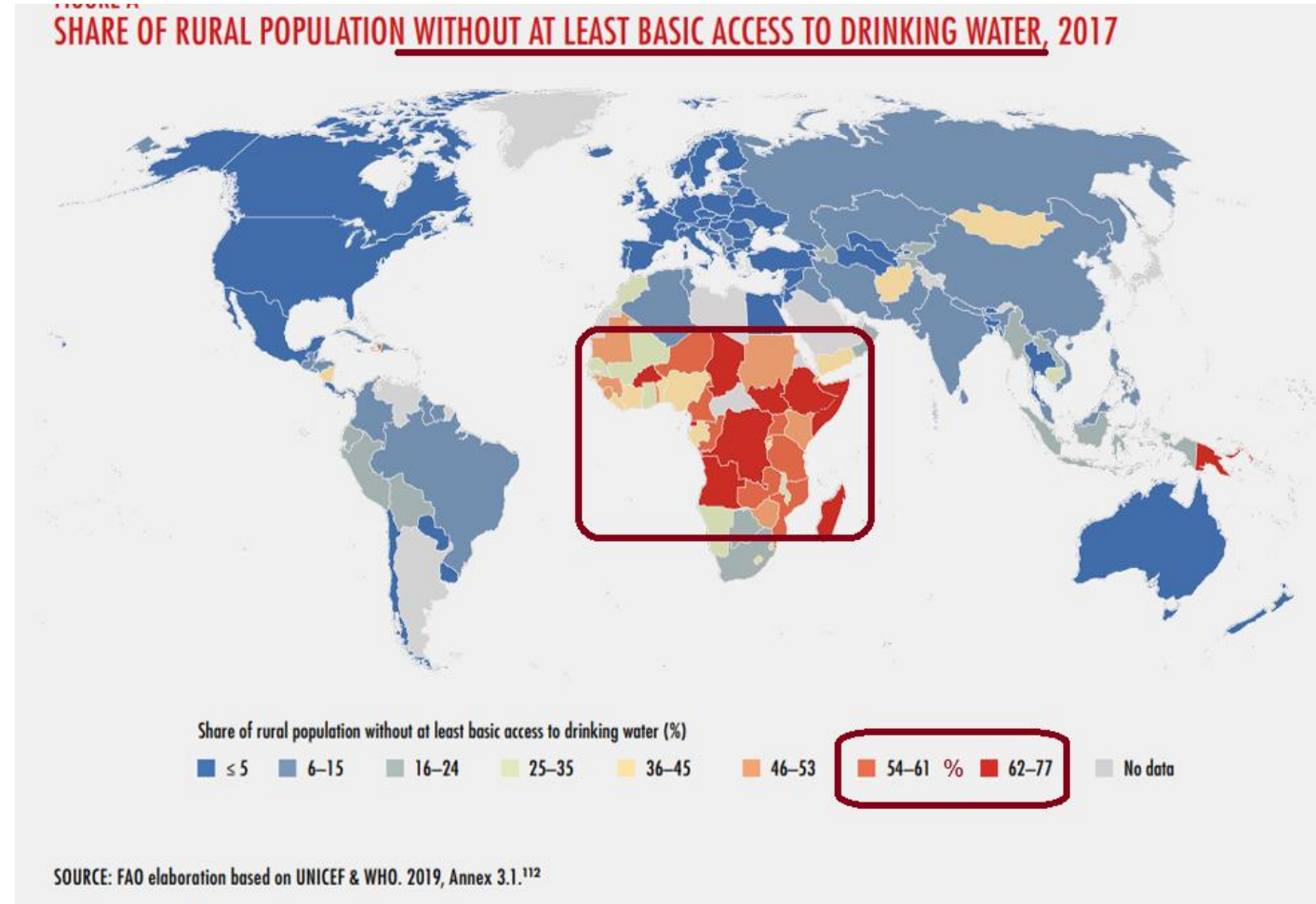
- Water and food insecurity
- Internal climate migrants
- Faster growing cities
- Urbanisation pressure on water resource

- Development policies

- Higher unemployment rate

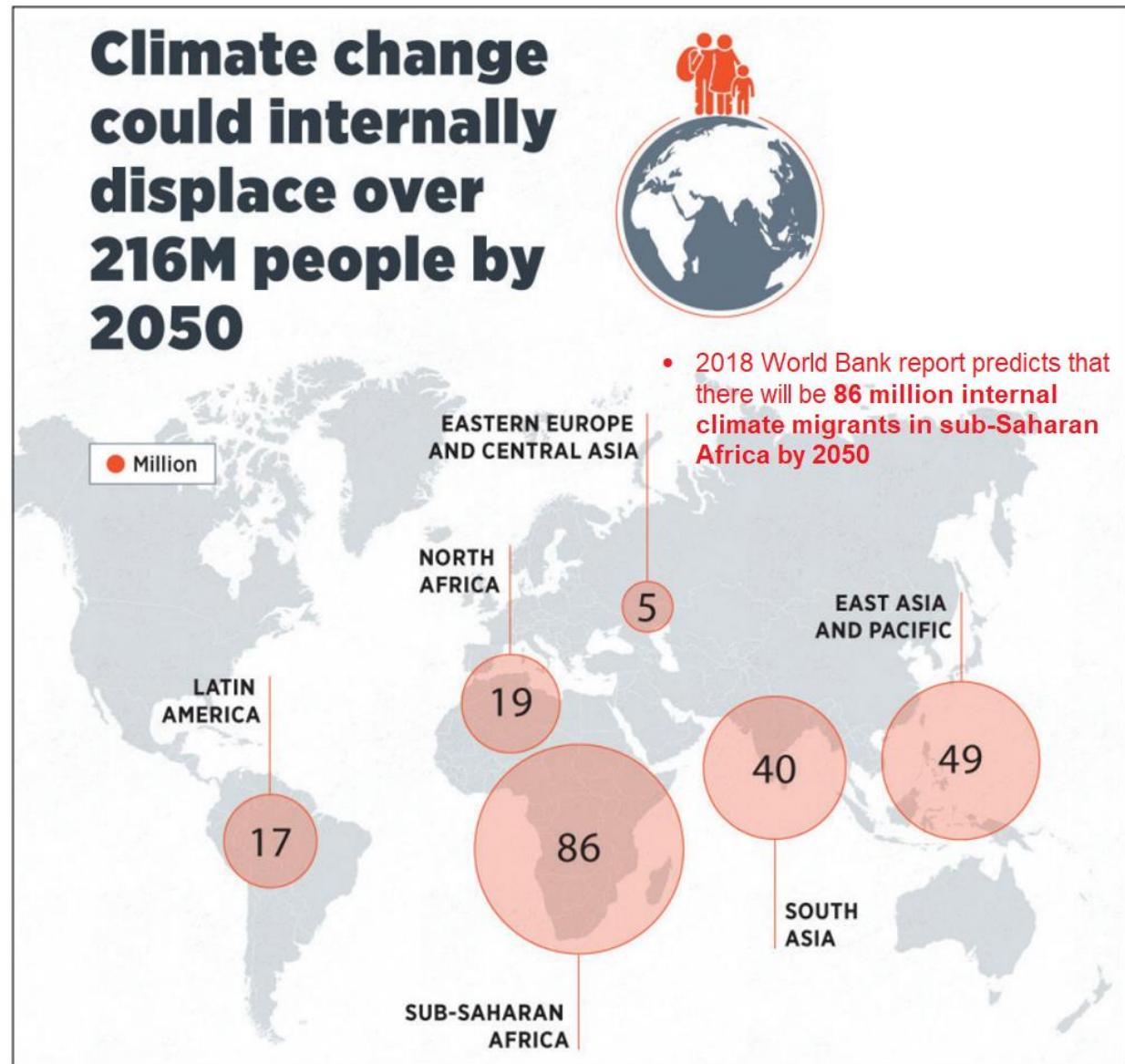
- Increase in hydropolitics tension

- Disputes or even war between neighboring countries



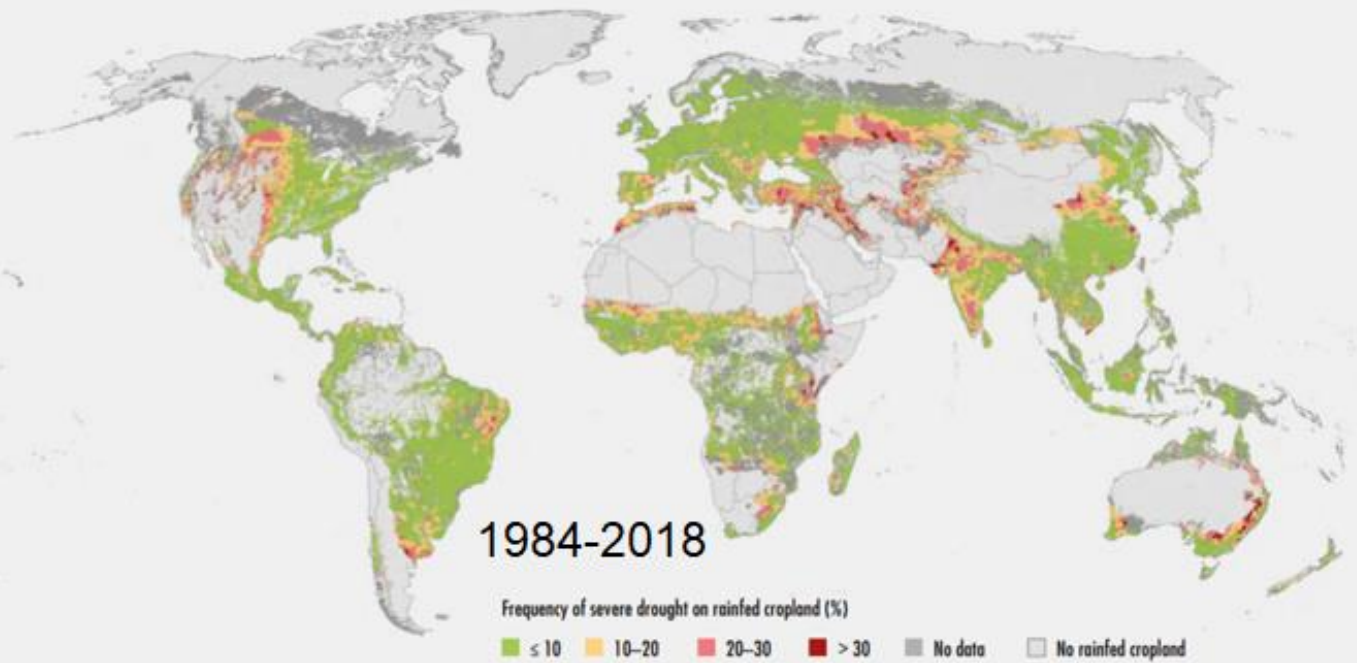
# Africa is highly vulnerable to impacts of Climate Change

- Mainly because of its strong economic dependency on climate-related activities and products and low adaptive capacity.

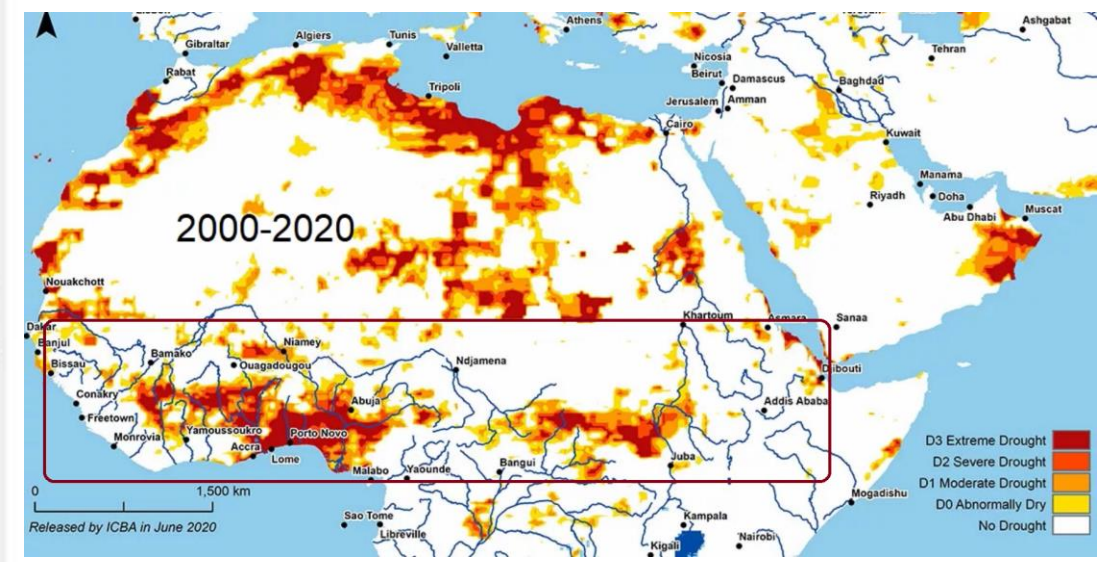


# Rainfed cropland is under the effect of climate change

HISTORICAL DROUGHT FREQUENCY ON RAINFED CROPLAND, 1984–2018



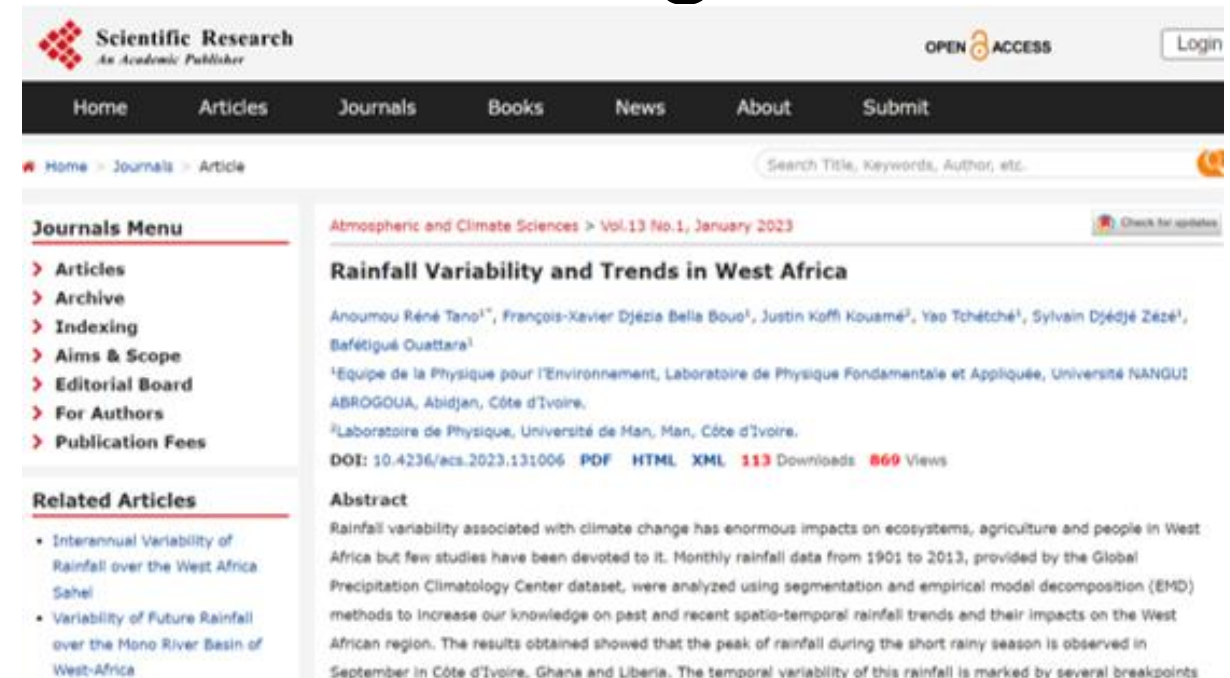
NOTES: The map depicts the frequency with which more than 30 percent of cropland (where crop areas occupy at least 5 percent of the pixel area) was affected by severe drought as follows: low when the probability of severe drought affecting cropland is less than or equal to 10 percent; medium when it ranges between 10 and 20 percent; high for between 20 and 30 percent; and very high when it surpasses 30 percent. The indicator includes two crop-growing seasons, combined by selecting the highest drought value of the two. When there is only one season, the single value is used instead. "No data" accounts for pixels for which no level of drought is available but there is rainfed cropland, according to FAO & IIASA, 2020.<sup>1</sup> The historical frequency of severe droughts is based on the entire time series (1984–2018). Source: FAO elaboration based on FAO, 2019,<sup>2</sup> and FAO & IIASA, 2020.<sup>1</sup>





# 1. Africa is particularly reliant on rainfed agriculture

- In sub-Saharan Africa, 95% of the food grown is rainfed.
- Agriculture employs 65% of Africa's labour force and comprises 32% of its gross domestic product.
- By 2030, 30 million youth are expected to enter the African labour market each year
- In sub-Saharan Africa alone, while 18 million new jobs would be needed annually to absorb new entries in the labour market,
- But only 3 million are currently being created (Source : AFRICA EUROPE FOUNDATION DEBATE)
- **Rainfall Variability in Africa**



The screenshot shows a web page from 'Scientific Research: An Academic Publisher'. The page is for an article in the journal 'Atmospheric and Climate Sciences', Volume 13, No. 1, January 2023. The article title is 'Rainfall Variability and Trends in West Africa' by Anoumou René Tano<sup>1\*</sup>, François-Xavier Djéza Bella Bous<sup>1</sup>, Justin Koffi Kouamé<sup>2</sup>, Yao Tchatché<sup>1</sup>, Sylvain Djédjé Zézé<sup>1</sup>, and Bafétigué Ouattara<sup>1</sup>. The authors' affiliations are listed as 'Equipe de la Physique pour l'Environnement, Laboratoire de Physique Fondamentale et Appliquée, Université NANGUI ABROGOUA, Abidjan, Côte d'Ivoire' and 'Laboratoire de Physique, Université de Man, Man, Côte d'Ivoire'. The article has a DOI of 10.4236/acs.2023.131006 and has been downloaded 869 times. The abstract discusses the impact of rainfall variability on ecosystems and agriculture in West Africa, mentioning the use of precipitation data from 1901 to 2013 and empirical modal decomposition (EMD) methods.

The long-term variability of this rainfall is characterized by a decrease in the amount of rainfall over all West African countries.

# Sahel and Sahara regions in Africa rely on groundwater

- Sahel and Sahara regions in Africa rely on groundwater as the only source of water, often only found at depths **greater than 500 metres.**
- continued groundwater depletion is exacerbating existing water shortages, **leading to crop failure and water-driven conflicts** (Xu and Famiglietti, 2023).
- There is evidence of migration driven by water shortage and food security issues in places such as Burkina Faso, Sudan, Mali, Senegal and Mauritania (Xu and Famiglietti, 2023).



## Groundwater depletion

Authors: Melisa Mena Benavides, Caitlyn Eberle and Liliana Narvaez

Acknowledgements: We would like to thank Ambe Emmanuel Cheo, Zita Sebesvari and Jack O'Connor for their support in this research.



2023 October

Risk Tipping Points

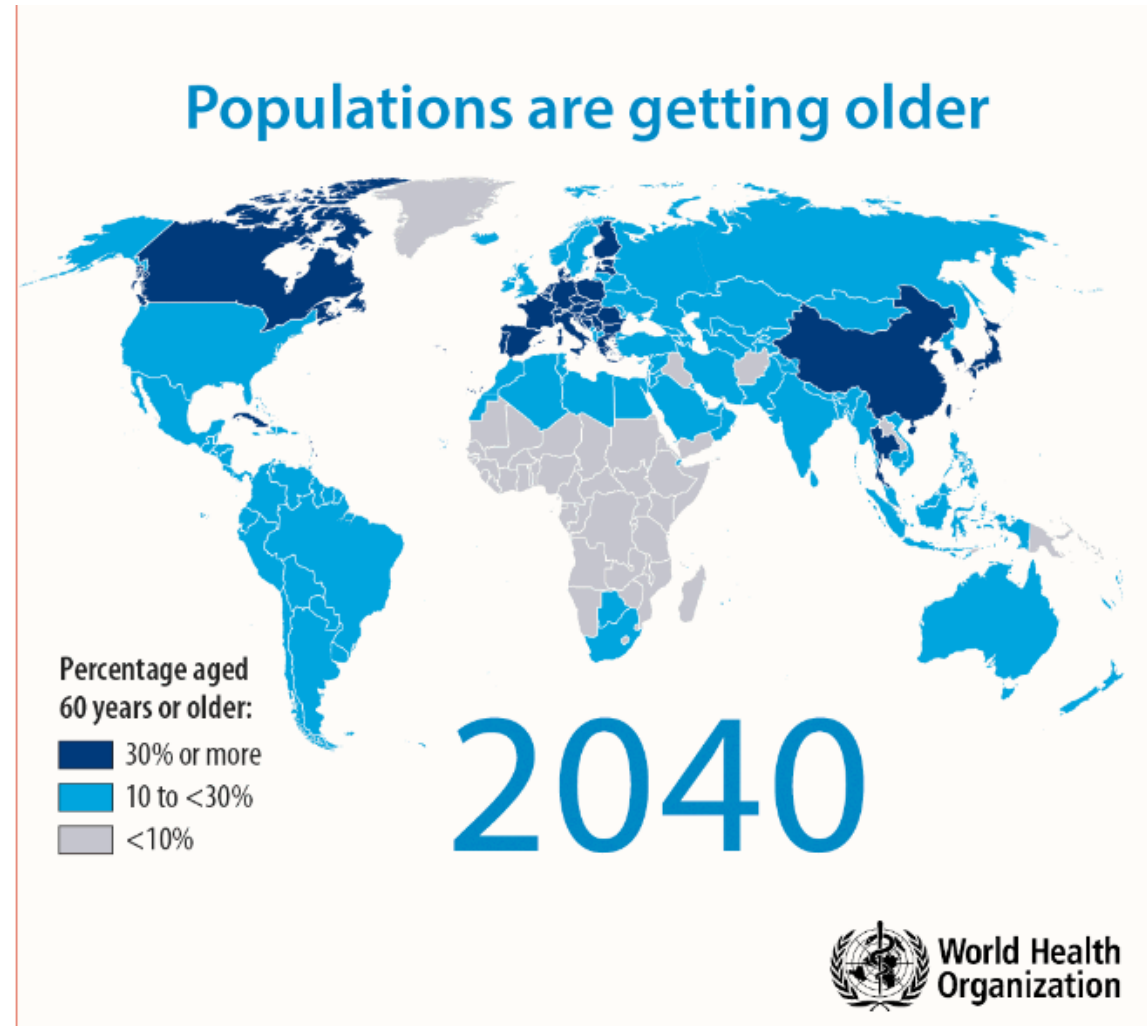
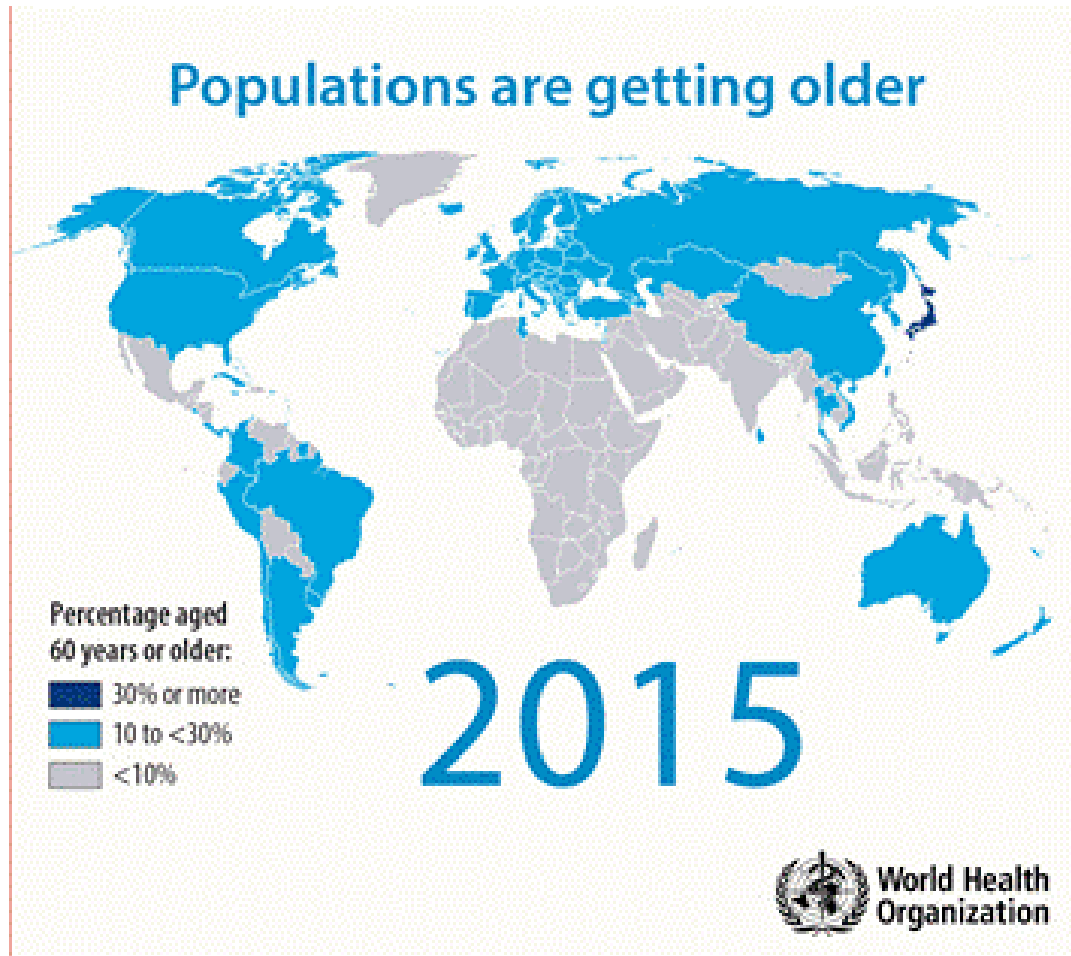
Interconnected

Disaster

Risks

2023

# 2-Demographical situation (Younger Africa)





Around 60% of Africa's population is currently younger than 25 years.

- By 2100, Africa's youth population could be equivalent to more than twice Europe's entire population.
- Africa's economic growth runs behind its demographic growth.
- In 2026, the EU's GDP per capita is estimated to still be more than 18-times larger than Africa's (Source: Africa and Europe Facts and Figures on African Migrations . AFRICA EUROPE FOUNDATION DEBATE)

Figure IV. Major routes of migration in Africa

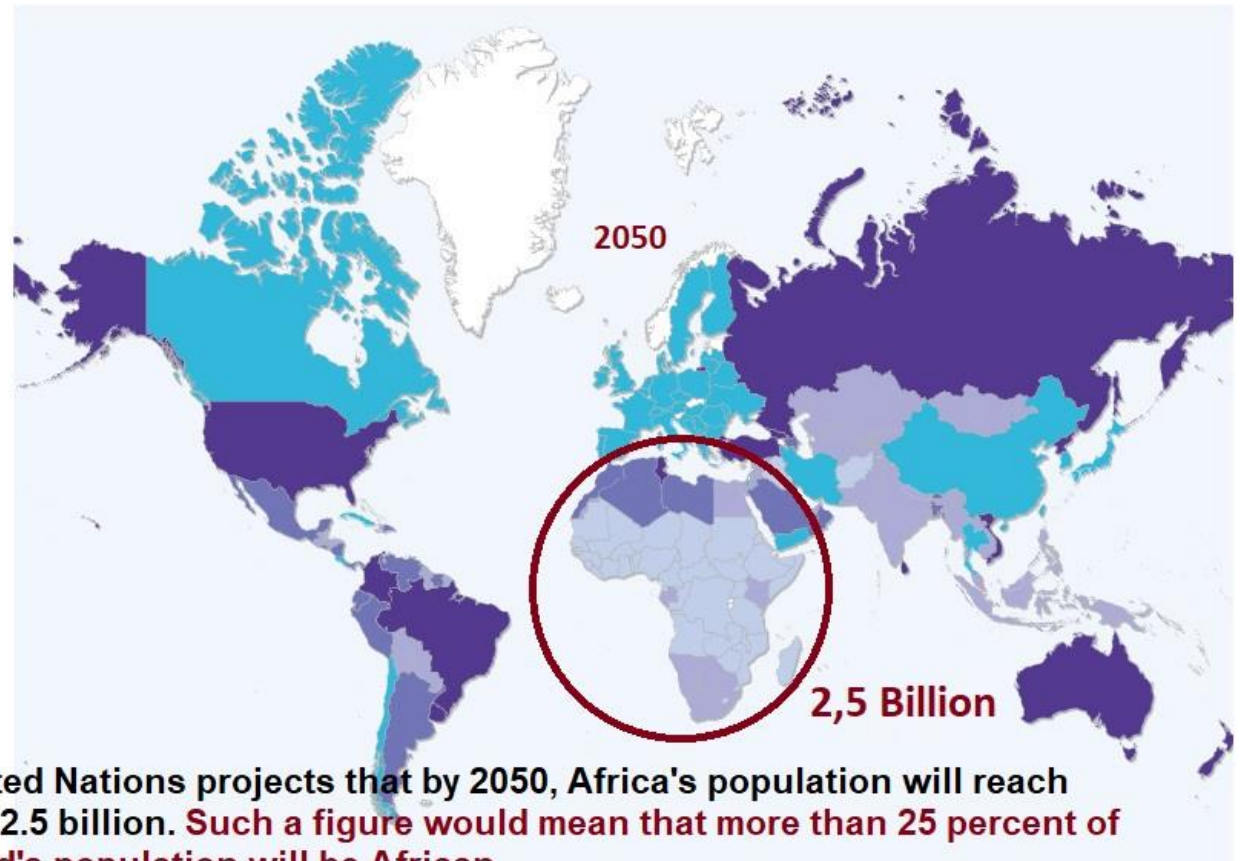


Source: [Africa Centre for Strategic Studies](#), 2019

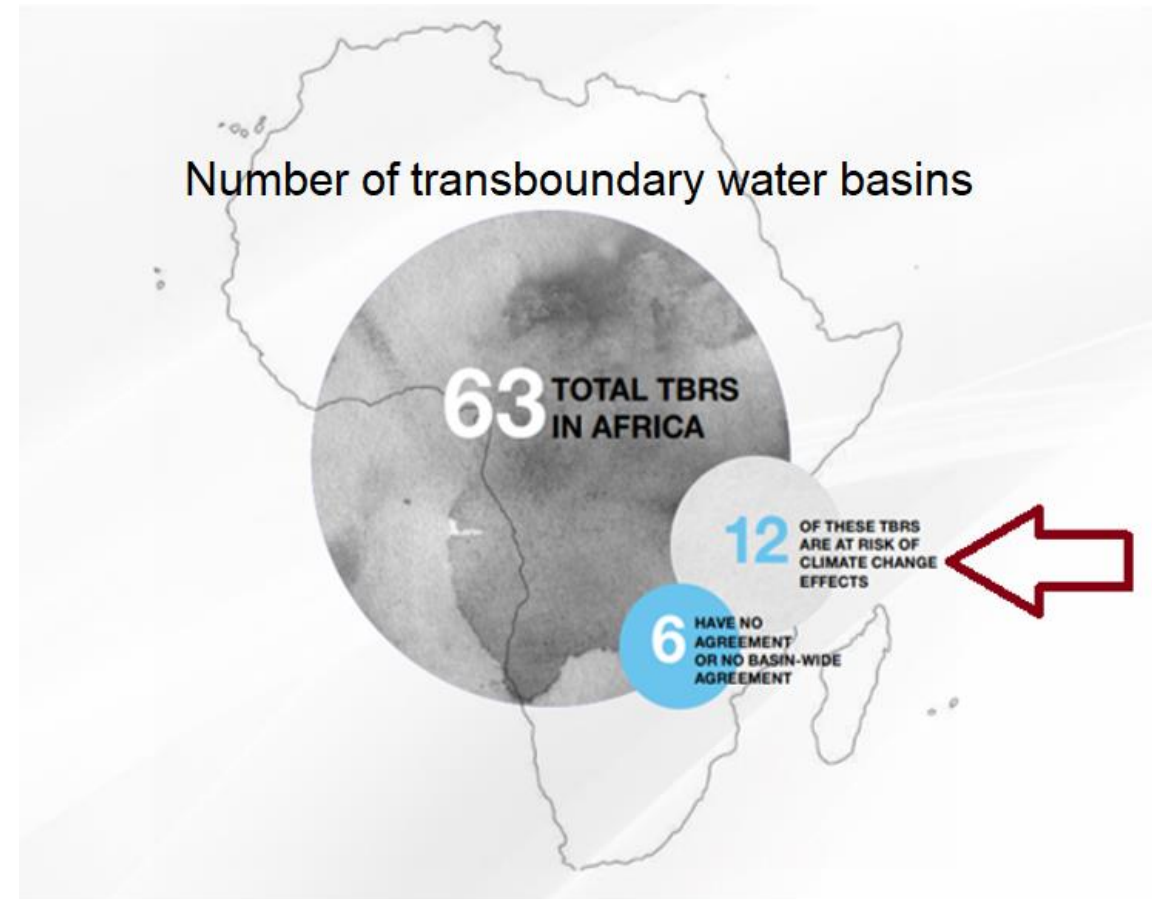
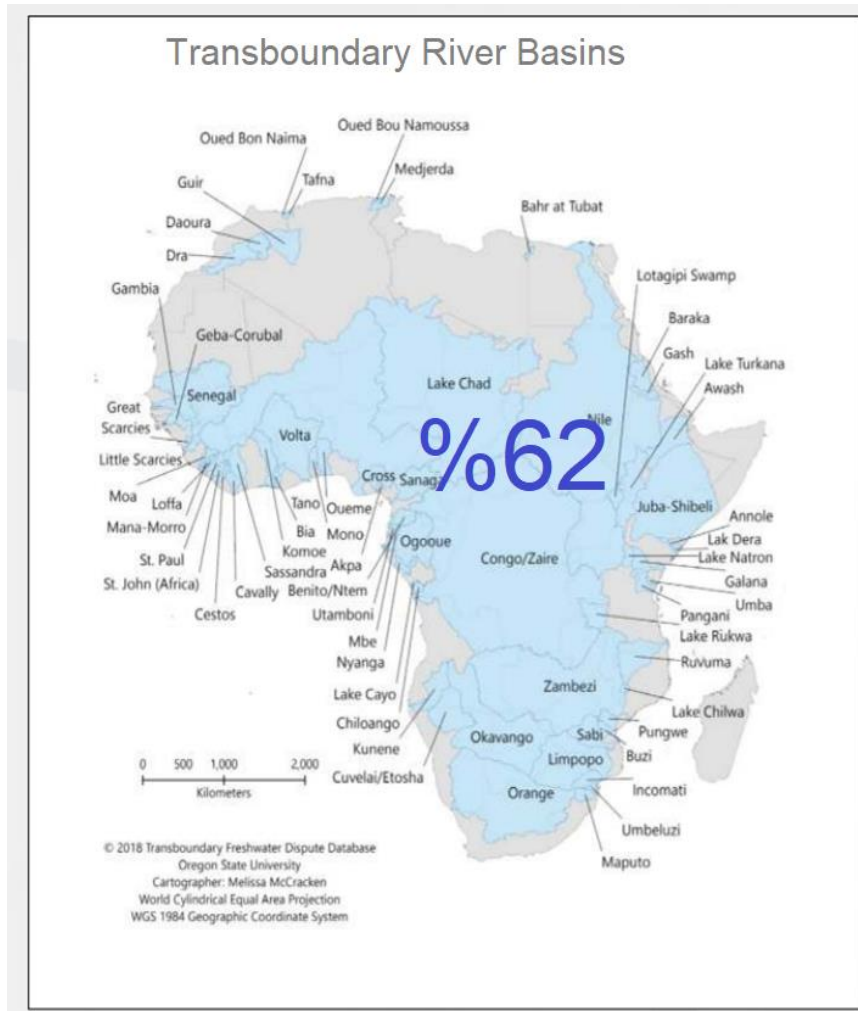


# The youngest continent with 2,5 Billion Population in 2050

## PERCENTAGE OF POPULATION AGED 60 YEARS OR OVER IN 2050



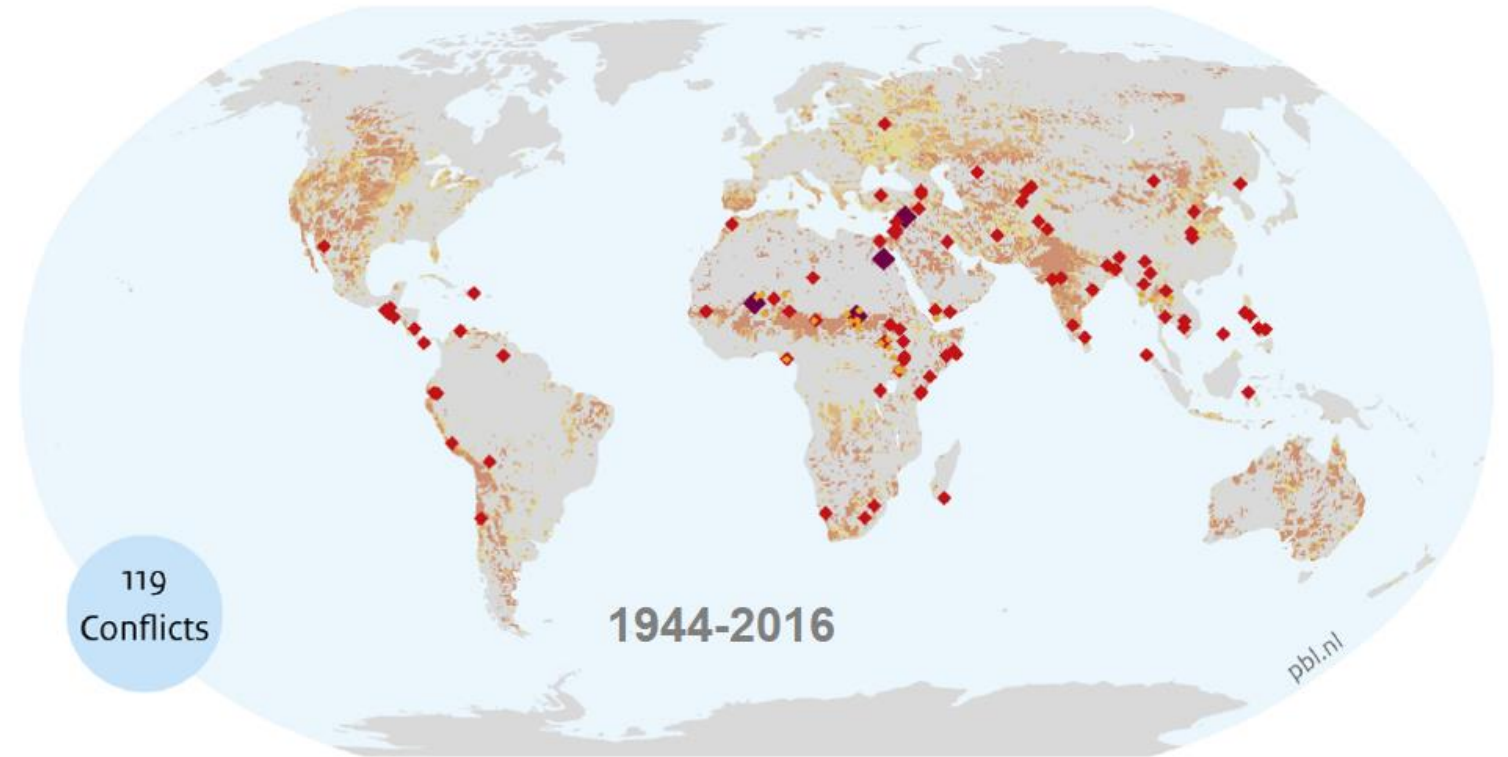
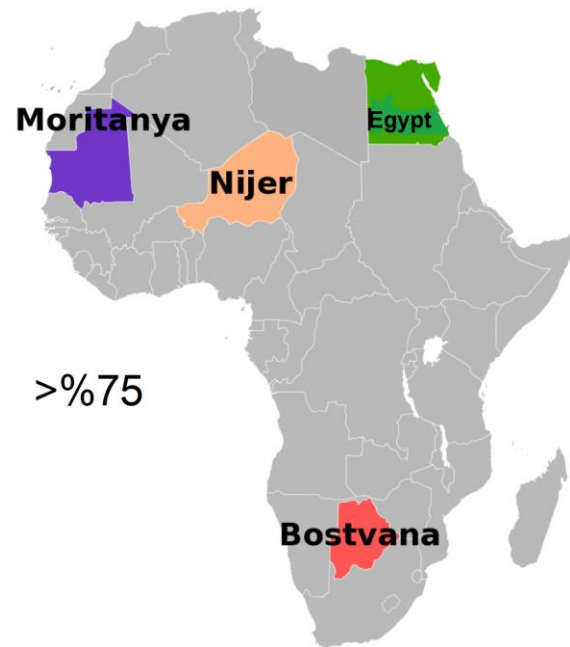
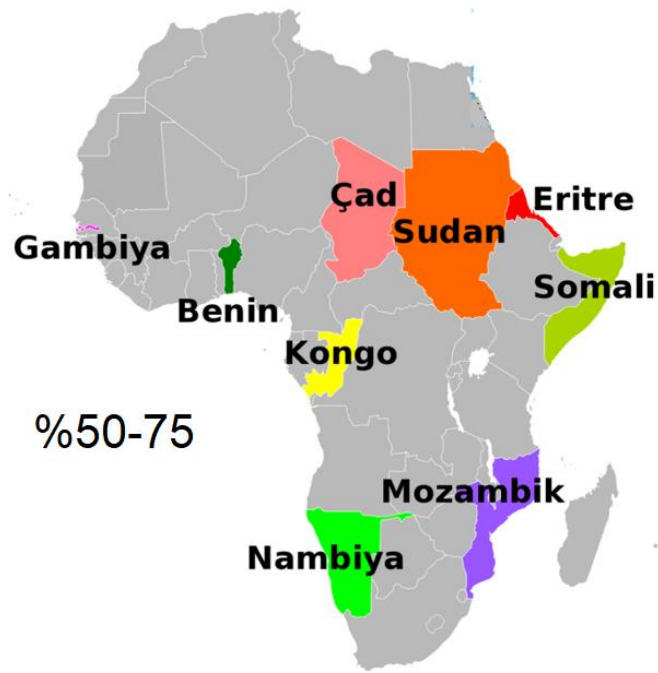
# 3-Increasing in Hydropolitics Tension Risks



Source :Climate-proofing transboundary water agreements in Africa  
ADB 2022



# Water related conflicts



Water stress



Conflicts

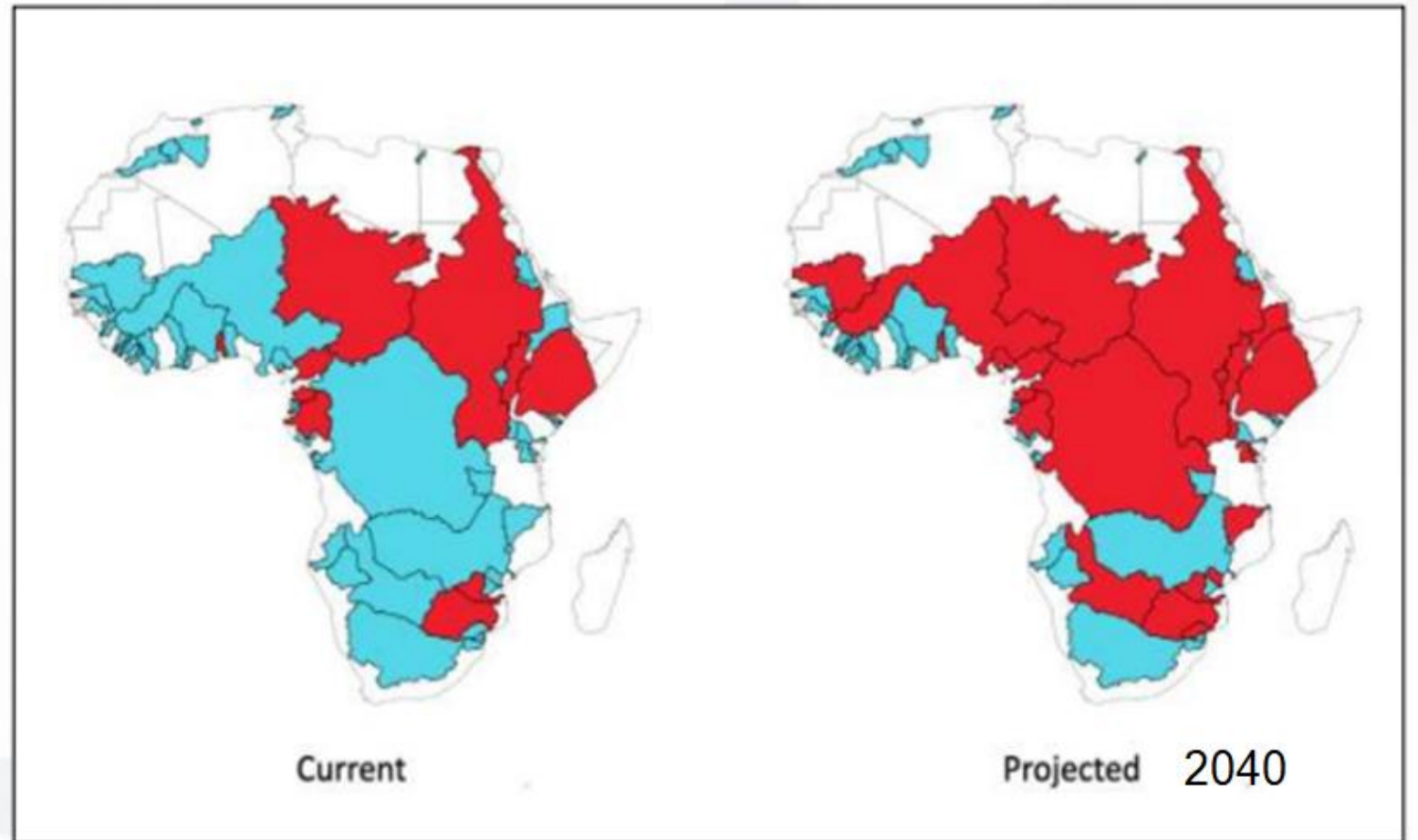
- ◆ Particularly severe and/or politically salient
- ◆ Major
- ◆ Minor

Source waterstress: Wada et al.; Computations: Utrecht University

Source conflicts: Adelphi Research Gemeinnützige GmbH (<https://factbook.ecc-platform.org>)

# Climate Change effects are likely to increase Hydro-political tension risks

- Declining water availability, with increased demand, is likely to increase in hydro-political tensions



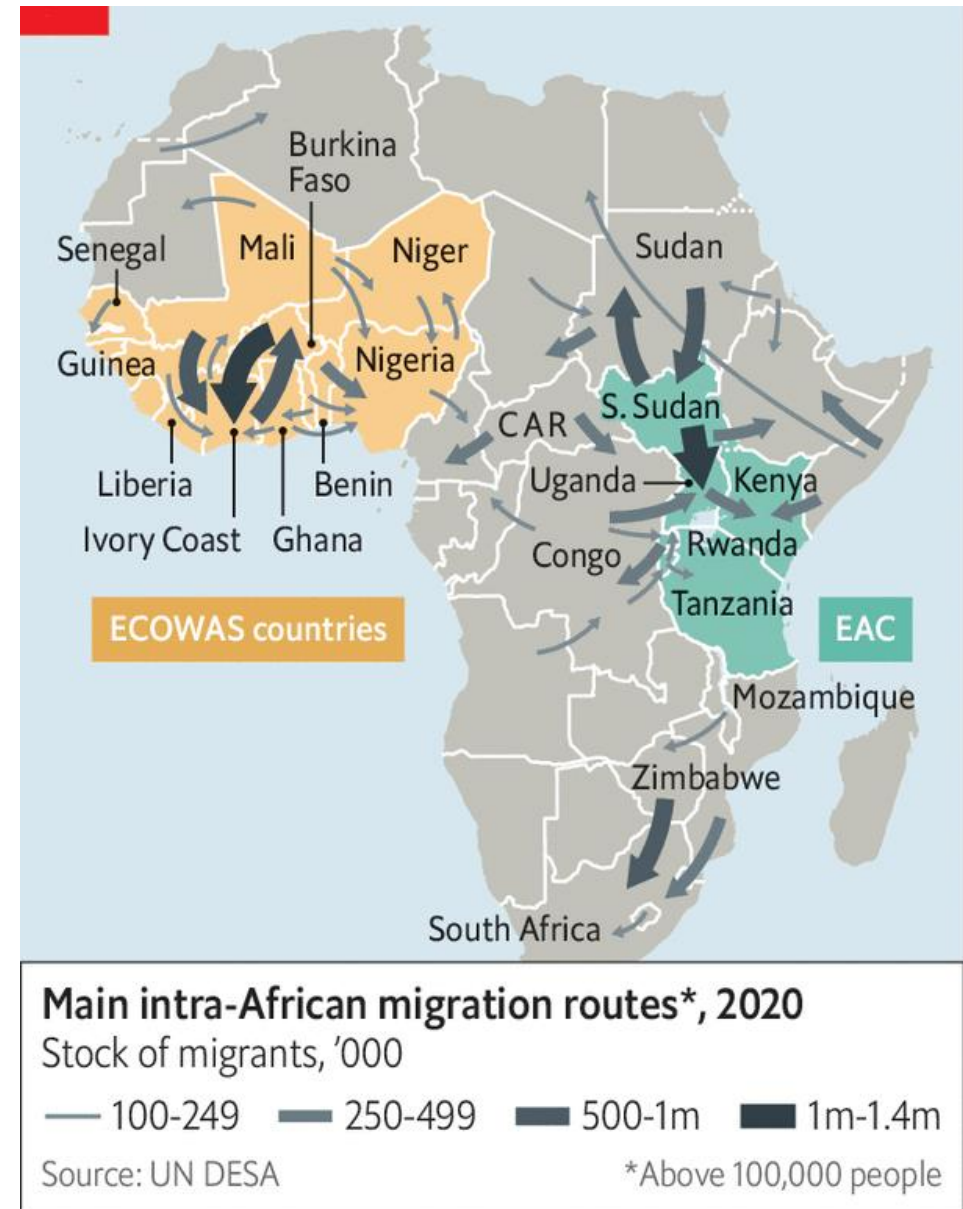
River basins that are categorized as high-risk for this indicator are shown in red; other river basins are in blue.  
Source data from TWAP.

Source :Climate-proofing transboundary water agreements in Africa ADB 2022

# These Factors will affect Africa's vulnerability might cause climate change migration

## Intra African Migrations

- In 2020, more than half of African migrants (52%) live within the continent
- Intra-African migrations since 2010 have increased by +44% compared to +26 % for Africa-Europe migrations.
- **A key climate change outcome: Rapid urbanization**





Questions arise: How long will they be able to stay in these growing cities and where they move again



# EU is aware of water-crisis induced migration flows to the European Union from Africa

- *EU Water Politics Adopted on 21/09/2023 - Bureau decision date: 25/01/2023*
- EU proposes to pay special attention to **blue diplomacy** in **sub-Saharan Africa**.
- Proactive tools should **reduce** water-crisis induced **migration flows** to the European Union





A close-up photograph of a person's hands holding a small, round, woven basket. The basket is intricately decorated with horizontal bands of colorful beads in shades of blue, yellow, orange, red, and green. The overall shape of the basket is a map of the African continent. The person holding the basket is wearing a vibrant, patterned garment with geometric designs in yellow, red, green, and black. The background is a soft-focus green, suggesting an outdoor setting with foliage.

Africa is going to come  
Who will welcome ?



## 2.WATER SECURITY RISKS IN GROWING CITIES



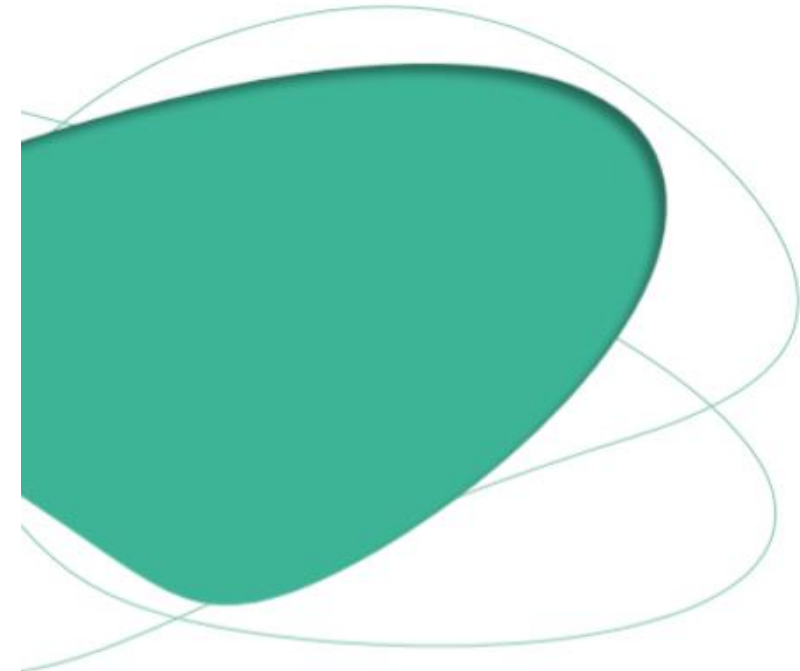
In the next 3 decades,  
demand for water in  
cities is projected to  
increase by

**50-70%**



# Some key findings

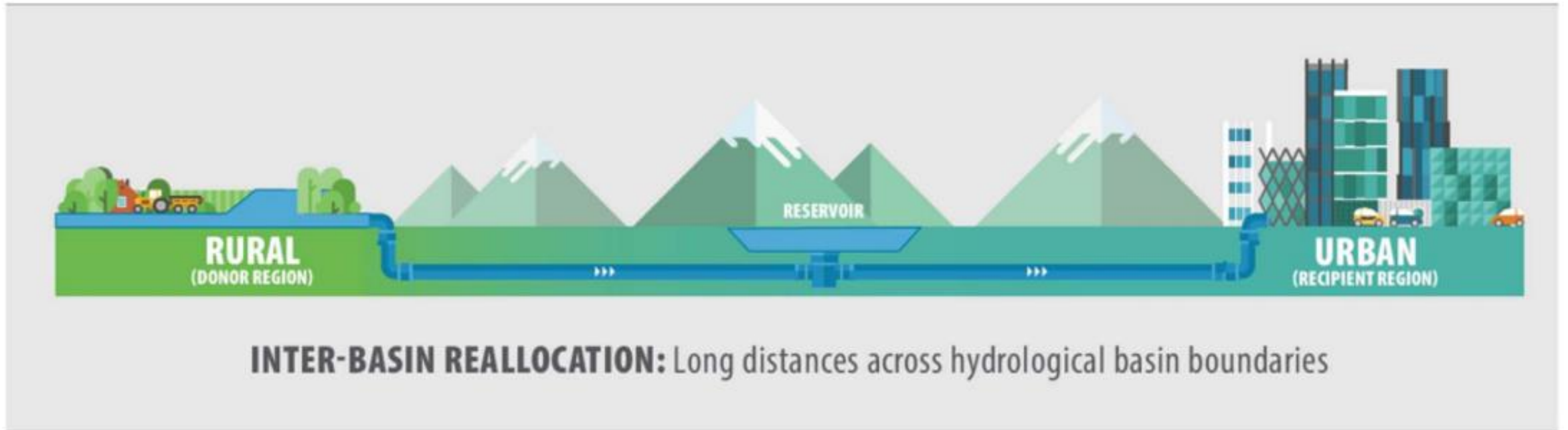
- Urban water demand will increase by 80 % in the next 30 years
- Water demand of 27 % of the cities worked with a population of 233 million will exceed the amount of surface water that can be obtained in the region.
- Water allocation tension between 90 cities transferred from other basins and agricultural sector will increase.



THE CITY WATER  
RESILIENCE APPROACH

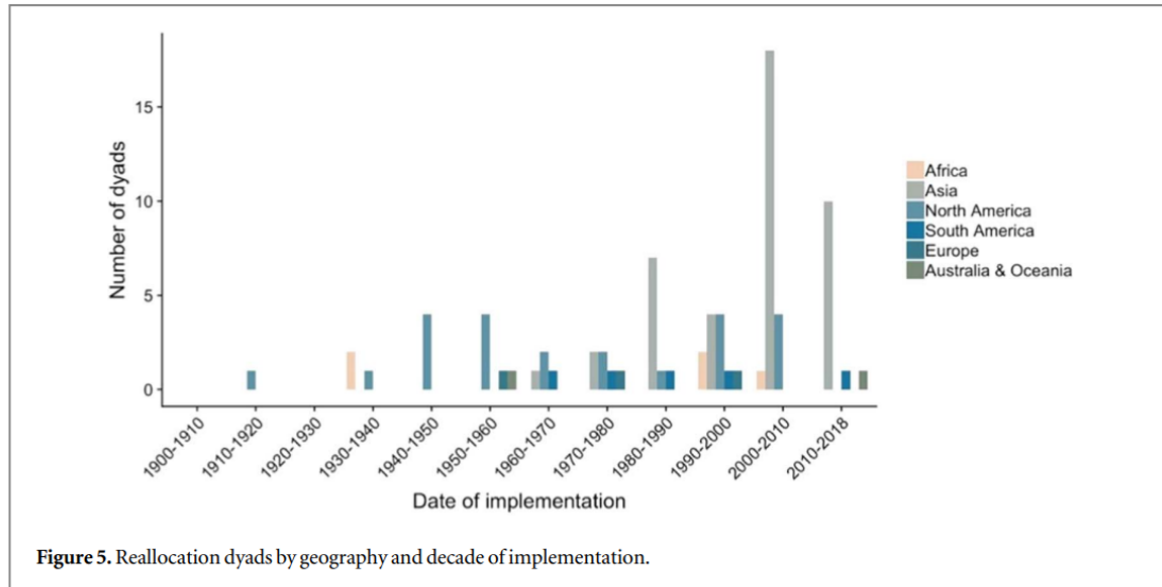
**WATER RESILIENCE  
LITERATURE  
REVIEW**

# Inter Basin water reallocation

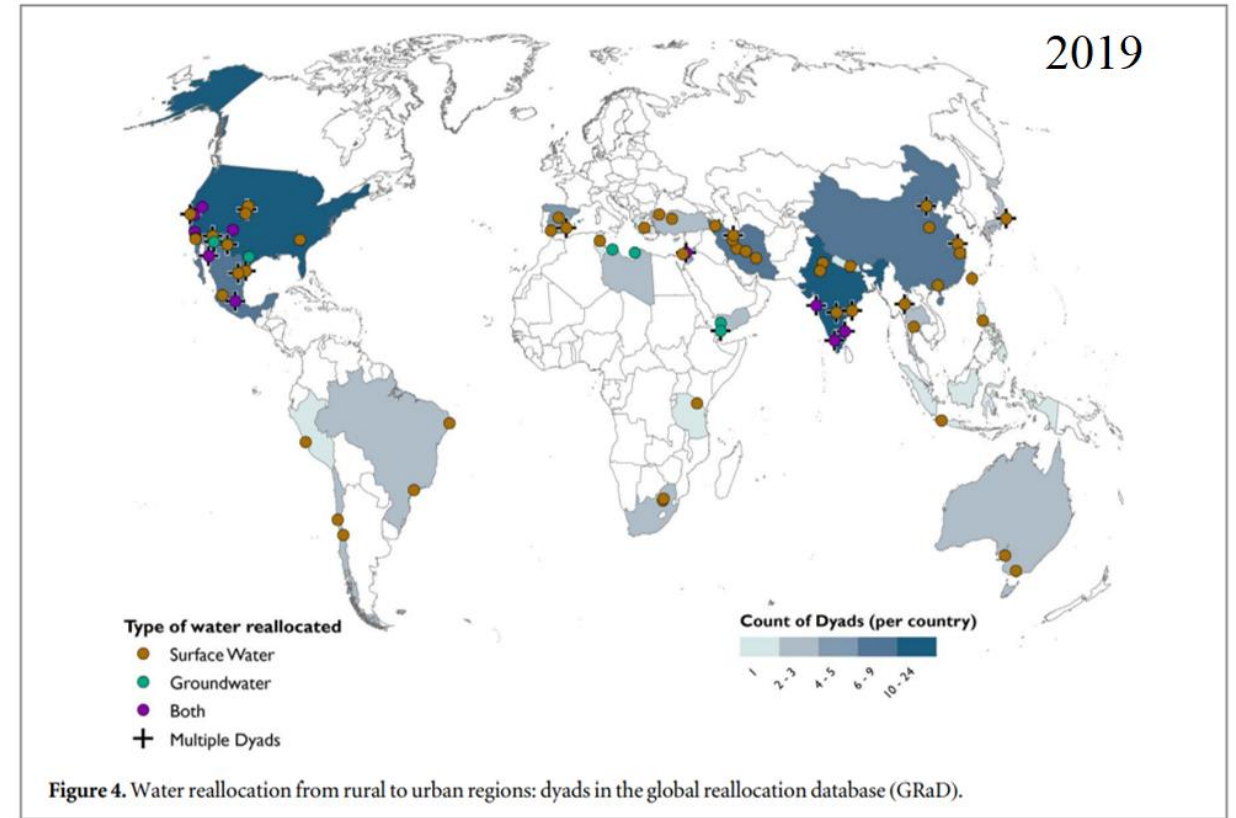




# Water reallocation from rural to urban regions



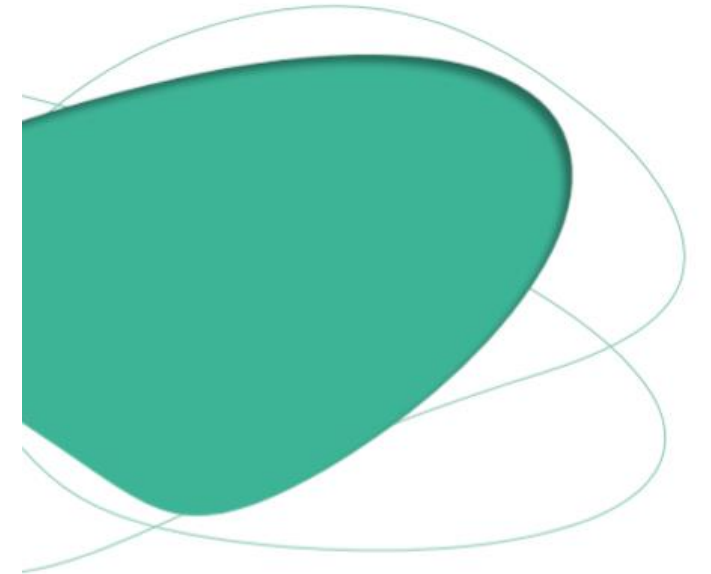
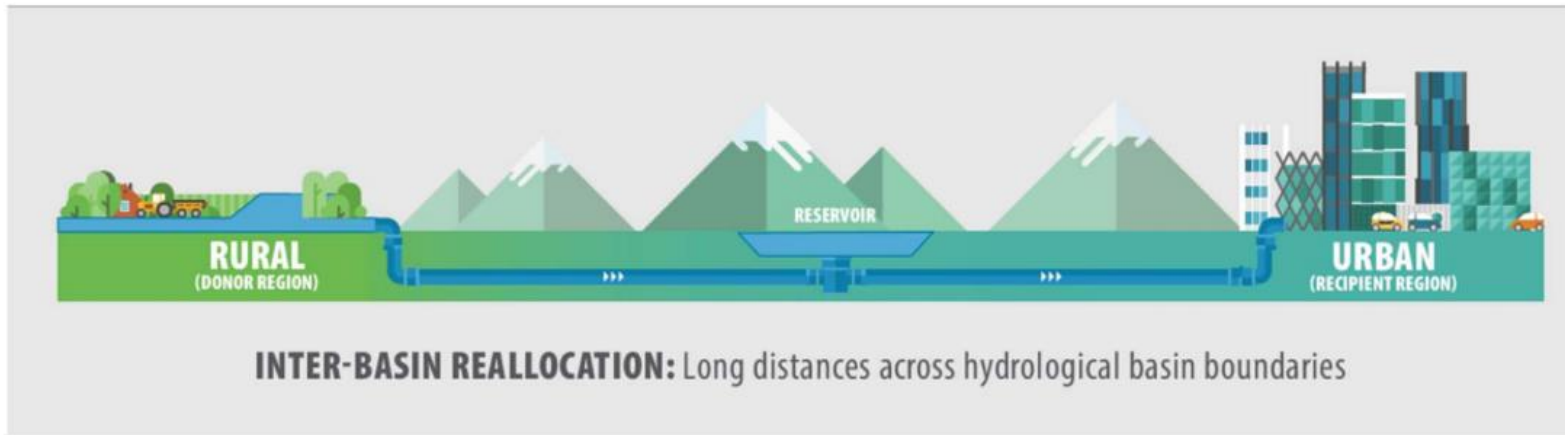
Source :Dustin Garrick et al 2019 Environ. Res. Lett. 14 043003



Source : Dustin Garrick et al 2019 Environ. Res. Lett. 14 043003

# Water allocation tension will increase

- From an average distance of 90 km per project
- To a total of 383 million people
- 16 billion m<sup>3</sup> of water is supplied annually



# Possible consequences : internal water conflicts

## ISPARTA ANTALYA'ya barajdan su verilmesini istemedi



Yrd Doç Dr. Cem Oğuz

14 Mart 2016

### ISPARTA LOBİ ÇALIŞMASIYAPTI

Yrd. Doç. Dr. Cem Oğuz şunları söyledi: "Tabi Burdur ve Isparta'da suyu KARACAÖREN 2 barajından almayı planlıyor. Sıkıntıda oradan kaynaklanıyor. Isparta'da bize vermek istemiyor. SDÜ Su Enstitüsü Müdürü Prof. Dr. İbrahim Diler de baraj suyuna atık suların karıştığını, içme suyu olarak kullanılmasının bilimsel açıdan uygun olmadığını bile ileri sürmüştü. Böyle bir lobi çalışmasıyla bizi devre dışı bırakmak istediler ama başaramadılar. Karacaören'den su getirme projesi halen devam ediyor.

## Köylülerden sularının Belediyeye içme suyu olarak tahsisine tepki !

Niğde'nin Çamardı ilçesinde köylerinden çıkan suyun ilçe merkezine dağıtılmak istenmesine tepki gösteren köylüler, Niğde-Çamardı yolunu trafiğe kapatmak istedi.

24 Şubat 2019



**Bu su üç köyün sulama suyu.** Başka su kaynağımız yok. Bizim köylerimizin içme suyu bile yetersiz. **Bu suyun hemen hemen yarısını Çamardı Belediyesine içme suyu olarak vermek istiyorlar.** Bu su yetersiz. Ama Çamardı Belediyesi hala ısrarla içme suyu olarak götürmeye çalışıyor. 21 köy içerisinde en çokta tarımla uğraşan bizim köy. Ama suyu yetersiz olan da tek bizim köy. Neden bir barajımız yok? Bir göletimiz yok. NİĞDE

Kaynak: İHA

SON DAKİKA TV PROGRAMLARI VIDEO FOTO HABER YAZARLAR CANLI YAYIN

türkiye haberleri

Haberler > Türkiye Haberleri > Suyu vermek istemeyen köylülere sert müdahale

## Suyu vermek istemeyen köylülere sert müdahale

2/10/2015

Sivas'ın Suşehri İlçesi'ne bağlı Tatar Köyü halkının, kendi köylerindeki su kaynağından başka köylere su verilmesine karşı çıkarak iş makinelerini engellemesi üzerine polis ve jandarma ekipleri TOMA ve gaz bombası ile müdahale etti. Olaylarda 11 asker 4 kişi yaralanırken, bazı köylüler gözaltına alındı.

## Sularını vermek istemeyen köylüler ateş açtı. 1 köy korucusu şehit

9 12 2014

Adıyaman'ın Çelikhan ilçesinde çıkan su kavgasında köylülerin ateş açması sonucu koruculardan 1'i şehit olurken 1'i de ağır yaralandı.



Çelikhan Belediyesi tarafından sulama dönemi dışında içme suyu olarak kullanılmak üzere Yesilyayla köyünden tahsis edilen Karmukuk Suyu Projesinin ölçüm çalışmalarını yapmak üzere bölgeye gelen Devlet Su İşleri Bölge Müdürlüğü görevlilerini engellemek isteyen köylülere İlçe Jandarma Komutanlığı ekipleriyle geçici köy korucuları izin vermedi. Köylerinde çıkan suyu vermek istemediklerini belirten köylüler, geçen Eylül ayında da Adıyaman'da eylem yapmıştı

## Maraşlı Köylüler Göksu çayından Gaziantep'e 52 Km lik Su Transferi Projesine karşı çıktı, iş makinelerini durdurdu

16 Ağustos 2017

Emrah Yusufoglu / Demokrat Haber

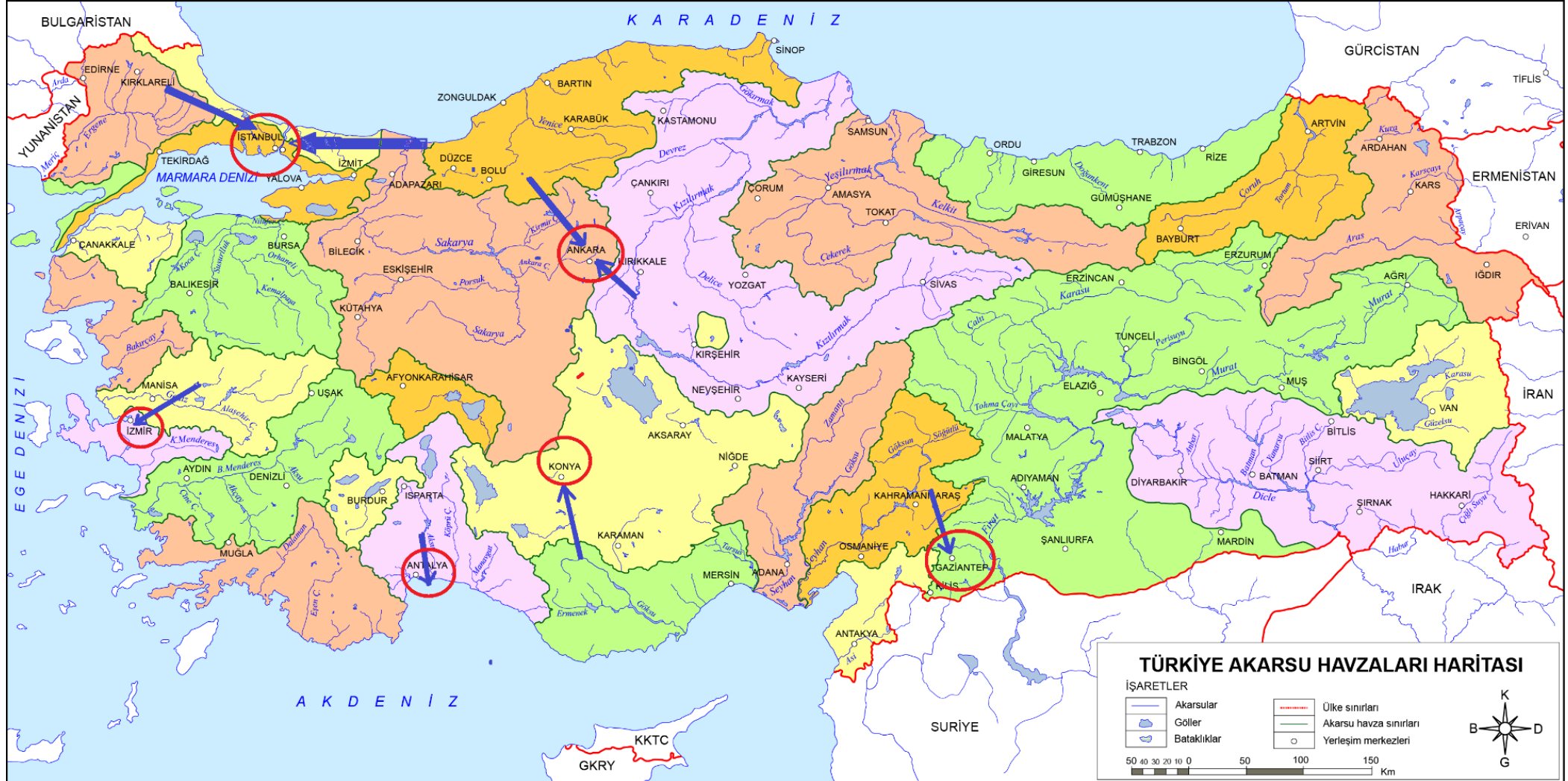
Kahraman Maraş'ın Çağlayancerit İlçesine bağlı Helele Mahallesi'nde sularını vermek istemeyen mahalle halkı jandarma barikatlarını aşarak şantiye alanında bulunan iş makinelerini durdurdu. Düzbağ İçme Suyu Projesi kapsamında, Çağlayancerit'ten çıkan Göksu çayının 52 kilometre mesafeden Antep'e taşınarak kentin içme suyu ihtiyacının yüzde 73'ünü karşılayacağı açıklanmıştı.



Bize 1 metre küpün altında su verecekler. Biz 3 metre küp suyumuzu istiyoruz. Bu su giderse biz ölüyoruz" diyen altı bin nüfuslu Helele Mahallesi sakinleri ise mahallenin en önemli değeri olan suyun gitmesiyle büyük bir nüfus kaybının yaşanacağını, yeşil alanların kuruyacağını ifade etti



# Inter basin water transfer in Türkiye



+

○

From 2015 to 2050, the world's urban population is expected to nearly double

●

- in part because migrants from rural areas devastated by climate change are being driven to cities in search of economic and social stability. (Dr. Blaine-Director, Climate, Environment & Conflict-US Institute of Peace )
  - From rising seas to **freshwater scarcity**, the complex interplay of climate change, population growth and fragility in cities **has made them hotbeds for social and economic inequalities** —
  - increasing the risk of violence in urban centers around the world.
- ||

Migration movements due to climate change, among other factors, are likely to accelerate in the future.

- it is critical to consider migration management together with the effects of climate change.
- it is inevitable that these migrations will have further, significant effects across environmental, economic, and social dimensions





# Impacts of Migration on Municipalities

Rapid urbanisation and the growth of informal settlements mainly on urban edges of major cities have led to challenges of:

- ***Difficulties in achieving the delivery of basic services (Water and sanitation)***
- ***Inadequate provision of housing***
- ***Exposure to health hazards***
- ***Increasing claims for public services which in turn affects proper planning and budgeting.(water and sanitation management)***

**It requires Integrated Urban Development Framework**

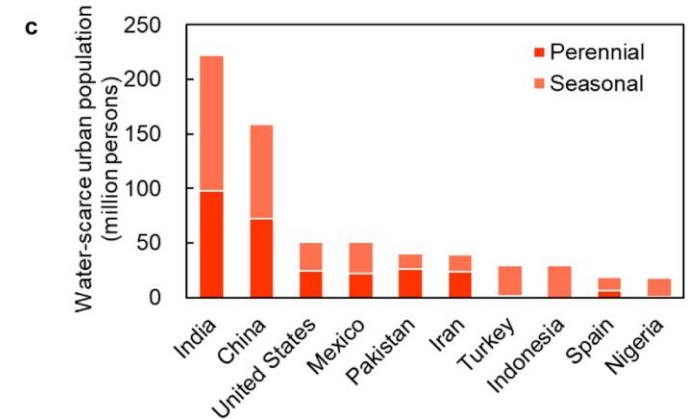
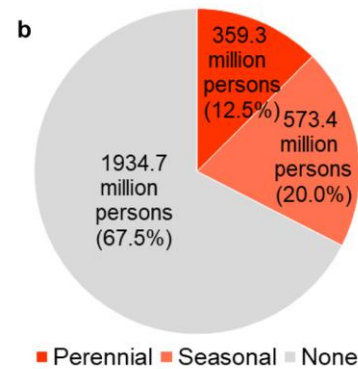
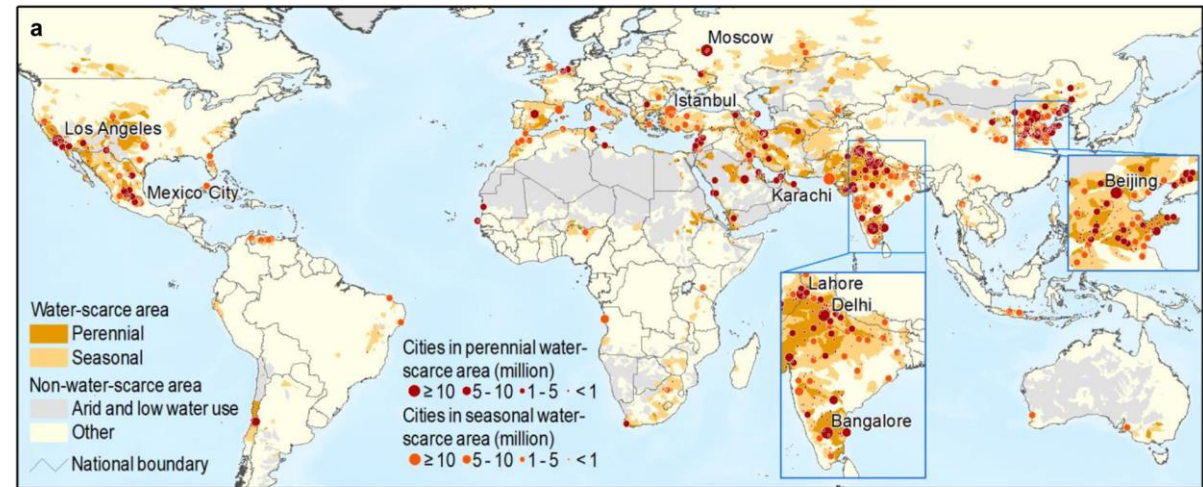
# Integrated Urban Development Framework

- Propose the principles and desired outcomes for urbanisation, **including migration**
- Provide a national framework for municipalities to manage rapid urbanisation more efficiently and effectively.
- Propose strong relation between central government and municipalities for key functional areas.
- Identify sector-specific policies and possible revised regulatory arrangements to manage rapid urbanisation more effectively



# Water –scarce urban population

- 32,5% of Urban Population lives under water-scare
- Many of the world's fastest-growing cities are already struggling to handle their own climate issues.





The Municipalities  
need to be ready to



Climate change induces  
uncertainties

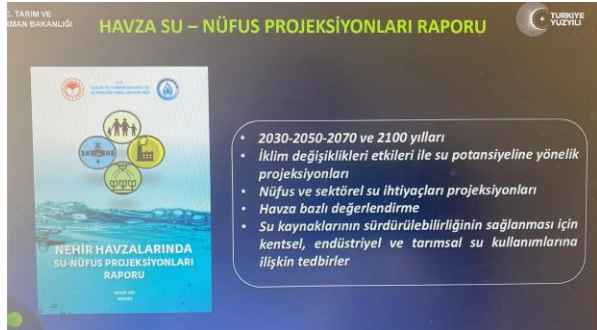
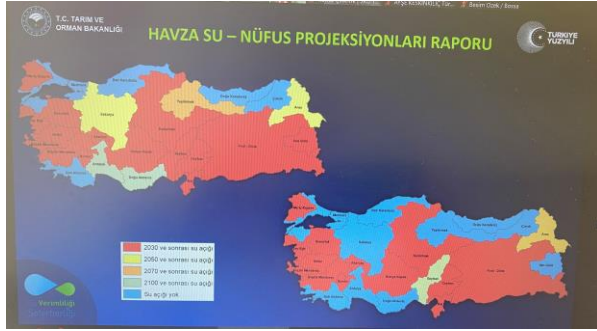


Internal or external migration  
forced by climate change



Increasing pressures on water  
management (conflicts  
between cities)

# Water Budget Deficits in the River Basins



T.C. ORMAN VE SU İŞLERİ BAKANLIĞI  
SU YÖNETİMİ GENEL MÜDÜRLÜĞÜ  
İKLİM DEĞİŞİKLİĞİNİN SU KAYNAKLARINA ETKİSİ PROJESİ  
Proje Nihai Raporu

Haziran 2016



Şekil 4.25 Türkiye Geneli için İklim Projeksiyonları HadGEM2-ES RCP4.5 Senaryolarına göre Havza Bazlı Brüt Su Potansiyellerinin Referans Dönemlerine Göre Yüzde Farklarını Gösteren Tematik Harita (2015-2040)

# İstanbul is under water stress 5 September 2023

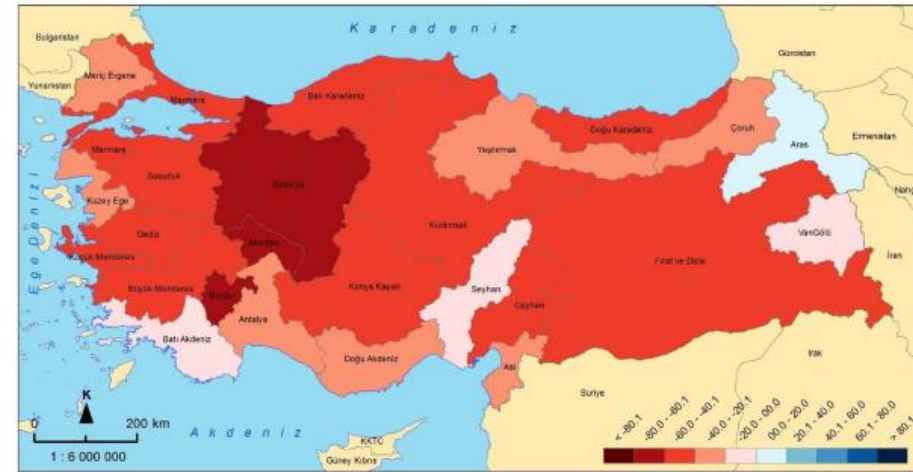
- Ekrem İmamođlu: 20 percent more water is consumed because of asylum seekers





Because of the climate change induced internal or external migration,

water security risk of growing cities will increase in coming decades



Şekil 4.25 Türkiye Geneli için İklim Projeksiyonları HadGEM2-ES RCP4.5 Senaryolarına göre Havza Bazlı Brüt Su Potansiyellerinin Referans Dönemlerine Göre Yüzde Farklarını Gösteren Tematik Harita (2015-2040)

•Thank You

