



TAKING  
**COOPERATION**  
FORWARD



Torino, 7/5/2020



**Introduzione alla gestione sostenibile delle acque**

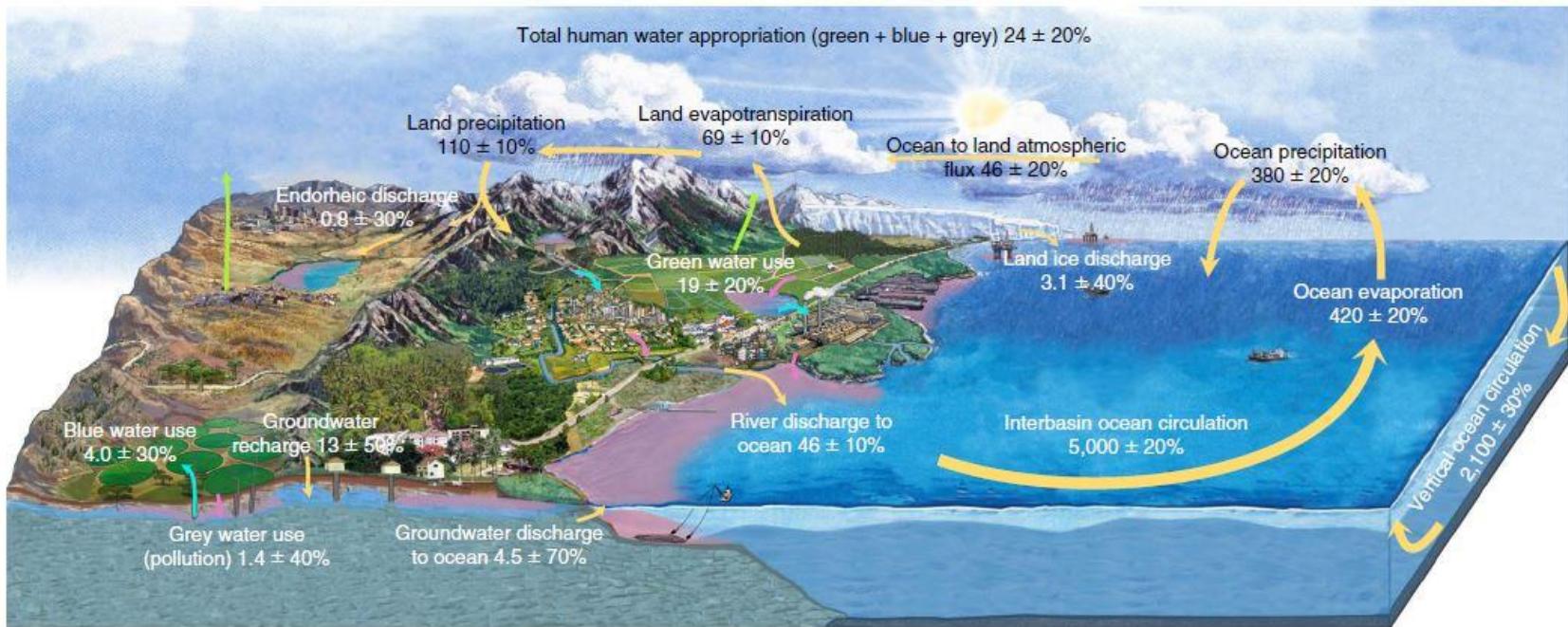


PhD Ing. Anacleto Rizzo, IRIDRA SRL

# CICLO ACQUA: IDROLOGIA



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nature  
geoscience

ARTICLES

<https://doi.org/10.1038/s41561-019-0374-y>

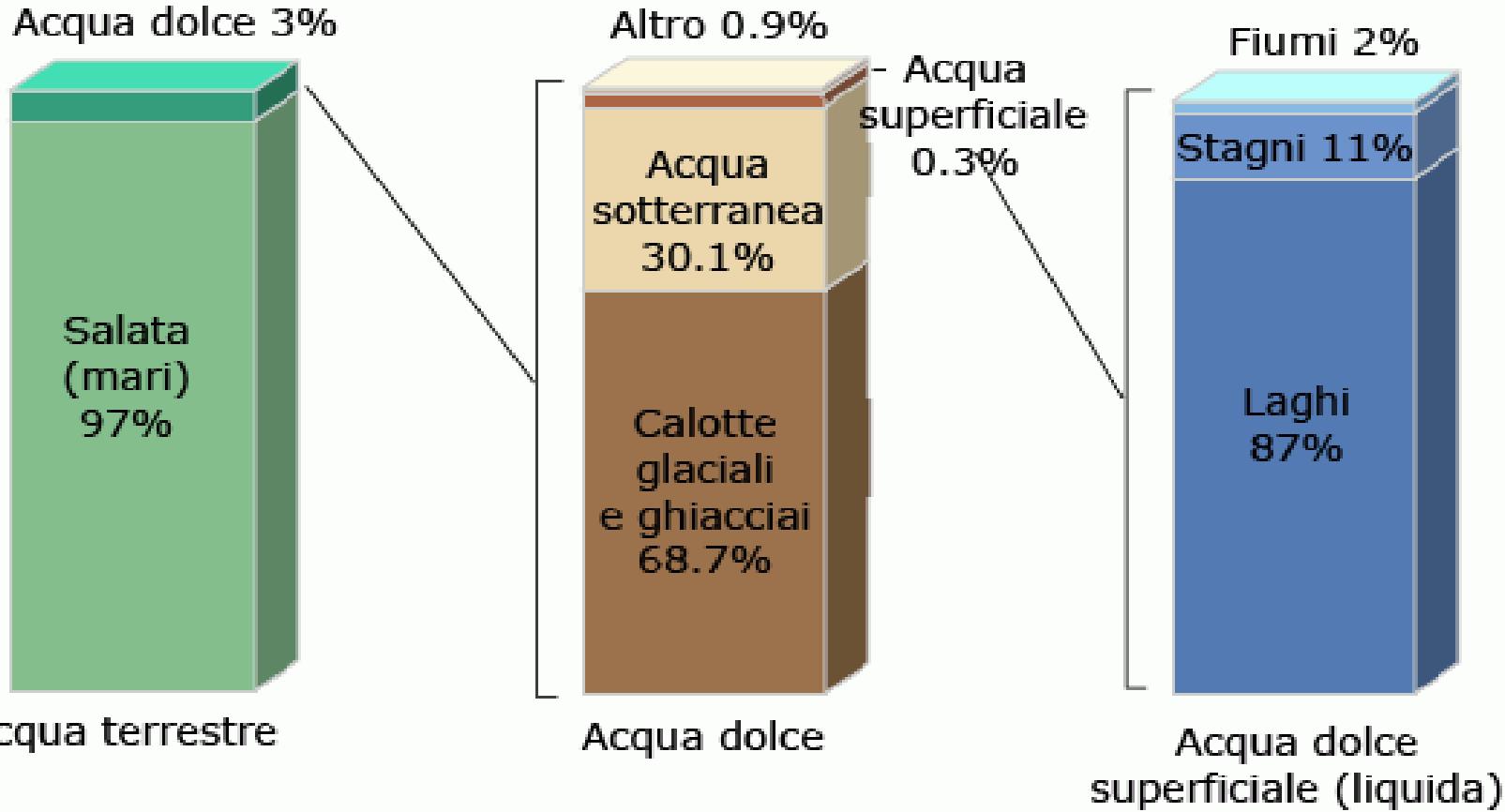
## Human domination of the global water cycle absent from depictions and perceptions

Benjamin W. Abbott<sup>①\*</sup>, Kevin Bishop<sup>②</sup>, Jay P. Zarnetske<sup>③</sup>, Camille Minaudo<sup>④⑤</sup>, F. S. Chapin III<sup>⑥</sup>, Stefan Krause<sup>⑦</sup>, David M. Hannah<sup>⑧</sup>, Lafe Conner<sup>⑨</sup>, David Ellison<sup>⑩</sup>, Sarah E. Godsey<sup>⑪</sup>, Stephen Plont<sup>⑫⑬</sup>, Jean Marçais<sup>⑭⑮</sup>, Tamara Kolbe<sup>⑯⑰</sup>, Amanda Huebner<sup>⑱</sup>, Rebecca J. Frei<sup>⑲</sup>, Tyler Hampton<sup>⑳㉑</sup>, Sen Gu<sup>㉒</sup>, Madeline Buhman<sup>㉓</sup>, Sayedeh Sara Sayedi<sup>㉔</sup>, Ovidiu Ursache<sup>㉕</sup>, Melissa Chapin<sup>㉖</sup>, Kathryn D. Henderson<sup>㉗</sup> and Gilles Pinay<sup>㉘</sup>

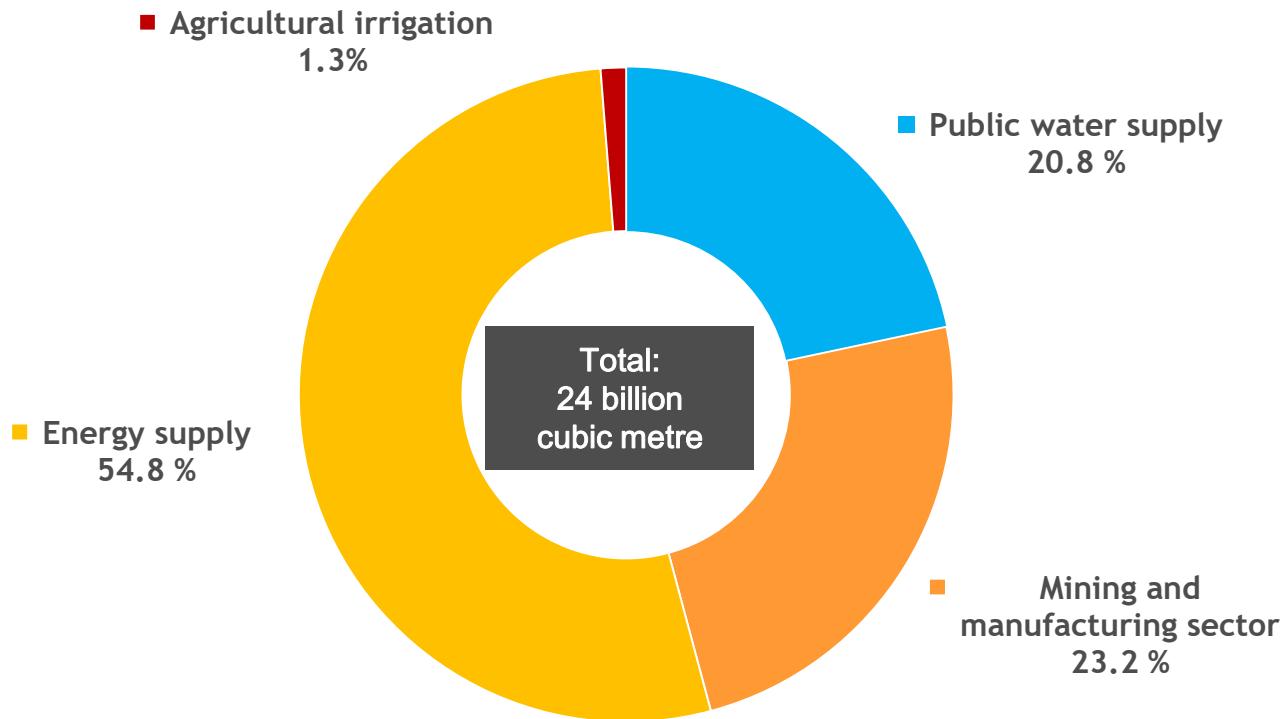


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## Distribuzione dell'acqua globale



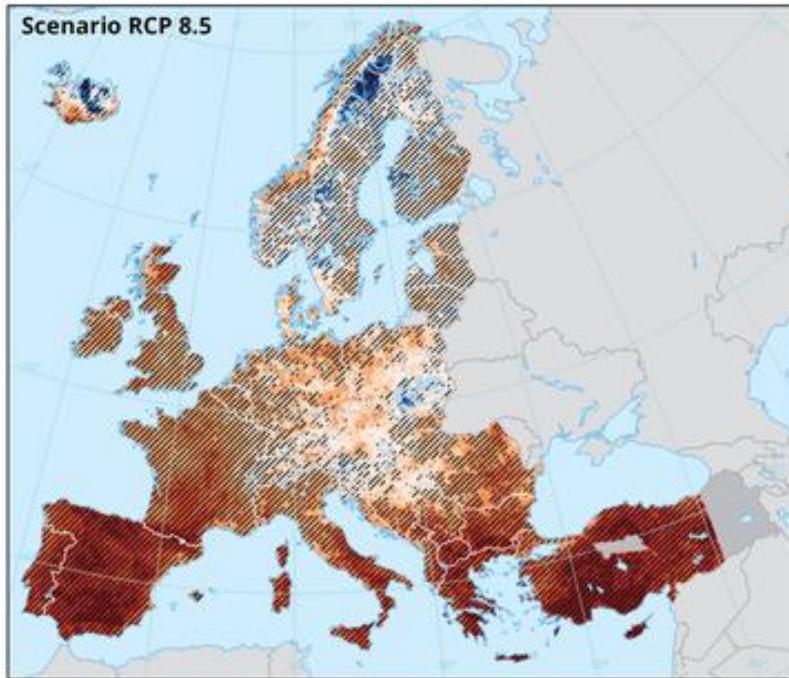
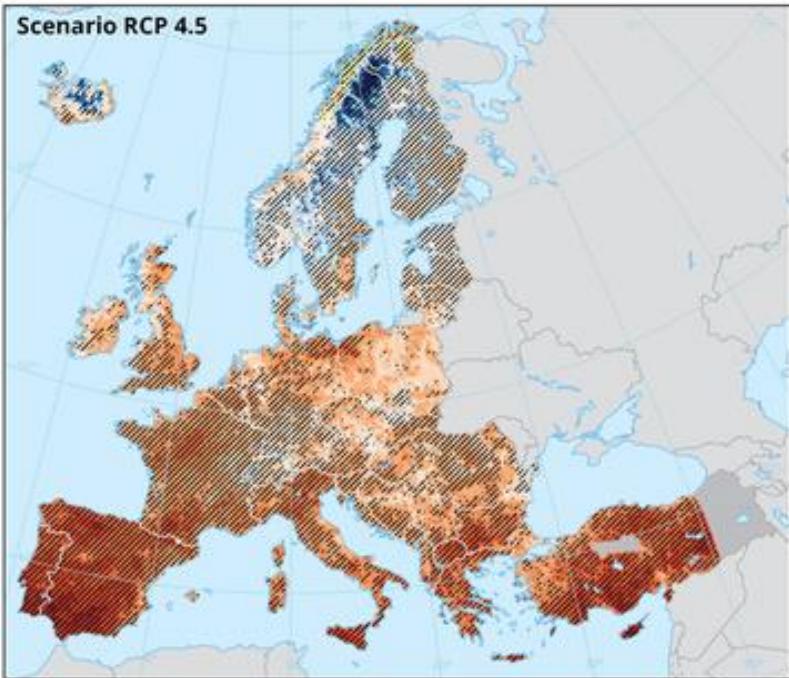
## Estrazione d'acqua nei diversi settori in Germania (2016)



(Source: German Federal Statistical Office. Fachserie 19, R. 2.1.1 & 2.2, Wiesbaden, for several years)

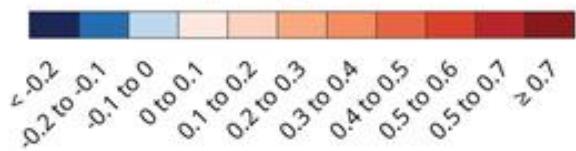


# PREVISIONI FUTURE: SICCITA'



Projected change in meteorological drought frequency between 1981-2010 and 2041-2070 under two climate scenarios

Number of events per 10 years



At least two-third of  
the simulations used  
agree on the sign of change

No data

Outside scope

0 500 1 000 1 500 km

© European Commission, Source: Joint Research Centre



European Environment Agency



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# PREVISIONI FUTURE: RISORSE



# PREVISIONI FUTURE: ACQUA E PACE

## Water and Security: Pressure Points to Watch in 2016

Around the world, climate change, population growth, and industrial development are together disrupting familiar patterns of water availability. Droughts and floods are becoming more frequent and extreme. Clean water supplies are becoming scarcer. Competition for water is growing. While outright conflict over water is rare, these water stressors can join with social and political triggers to destabilize already vulnerable regions. The result can be major food shortages, forced migration, or, in extreme cases like Syria, devastating war. Combining data from water and conflict indices with an analysis of geopolitical factors, Circle of Blue identified 10 places where water could play a role in developing or exacerbating humanitarian crises.



**Gaza** ● ●  
1.8 million Gazans rely almost solely on the aquifer beneath them, which is being rapidly depleted by over-extraction, seawater intrusion, and sewage pollution from lack of treatment infrastructure. Although Israel dissolved its sales of water to Gaza in March of 2013, from 2.0 to 2.5 billion cubic meters per year, it still controls most of the water that must cross the border to reach Gaza. The most recent war over Gaza in July 2014 caused significant damage to Gaza's water infrastructure. The ongoing Egyptian and Israeli blockade of Gaza has prevented the Palestinian Authority from not only rebuilt that infrastructure, but to build essential new infrastructure for treating wastewater, trading, storing and transporting drinking water, and developing new water sources such as desalination.

**Jordan & Lebanon** ● ●  
These two countries have accepted a combined total of 1.2 million refugees since the Syrian civil war began in 2011. In addition to straining job markets, housing, and government services, the influx of refugees has put further strain on fragile water supplies in both countries. Jordan is struggling to meet the needs of its own over-exploited aquifers, and waterborne disease threatens refugee camps. In Lebanon, groundwater salinization has surfaced; some of it water-related, and although both countries have slowed the pace of growth, they neither have the situation under control.

**Afghanistan, Tajikistan & Uzbekistan** ● ● ●  
The Amu Darya, one of the largest rivers in Central Asia, originates in the Pamir mountains and flows toward the Aral Sea. The river basin includes the frontier border between Uzbekistan and Tajikistan. The governments plan to build one of the world's tallest dams there, but the environmental impact of the dam will be severe. The region is poor, and the countries' water and energy needs are high. Afghanistan recovers from war and restarts economic and agricultural production, what it does with water will pose critical questions for the region.

**India & Pakistan** ● ● ●  
Despite a decades-old treaty promising to share the Indus River, relations between India and Pakistan remain tenuous. Water-stressed Pakistani provinces are facing severe drought, but India controls the headwaters of most of the Indus system. The two countries share its clean to the long-disputed Kashmir region, which remains a point of contention. Pakistan's water supplies continue to decline due to groundwater depletion and pollution. India, in turn, is facing acute chronic energy shortages.



**El Salvador, Guatemala & Honduras** ● ●  
With as many as 3.5 million people across Central America in need of food assistance, violence and lack of economic opportunity have forced millions of children to flee the region in 2014, many of them to the United States. The dispute over mining and water pollution in El Salvador, Guatemala, and Honduras have grown as multinational corporations seek to develop mineral resources.



**Brazil** ● ●  
Once one of the world's most dynamic economies, Brazil's economy is faltering. Gross domestic product declined 4 percent during the first quarter of 2015, the largest drop since 1996. The dire economic news, coupled with political corruption, has helped spark conflict in the Niger Delta, sometimes over oil-rich land, sometimes over water. The need for significant infrastructure investments to allow for water infrastructure to cope with severe dry in early 2015 after two years of severe drought.



**Nigeria** ● ●  
Nigeria is on track to become the world's third most populous country by 2020. But the same oil money that has funded its rapid growth has also sparked conflict in the Niger Delta, sometimes over oil-rich land, sometimes over water. The need for significant infrastructure investments to allow for water infrastructure to cope with severe dry in early 2015 after two years of severe drought.



**South Africa** ● ●  
Water scarcity has become a major challenge of energy and water. Droughts and heatwaves in 2015 placed even more pressure on the country's aging water infrastructure, and the country declared drought emergency. The lack of basic provision of basic services has added fuel to the fire. The combination of severe government and unemployment in Africa's second largest economy.



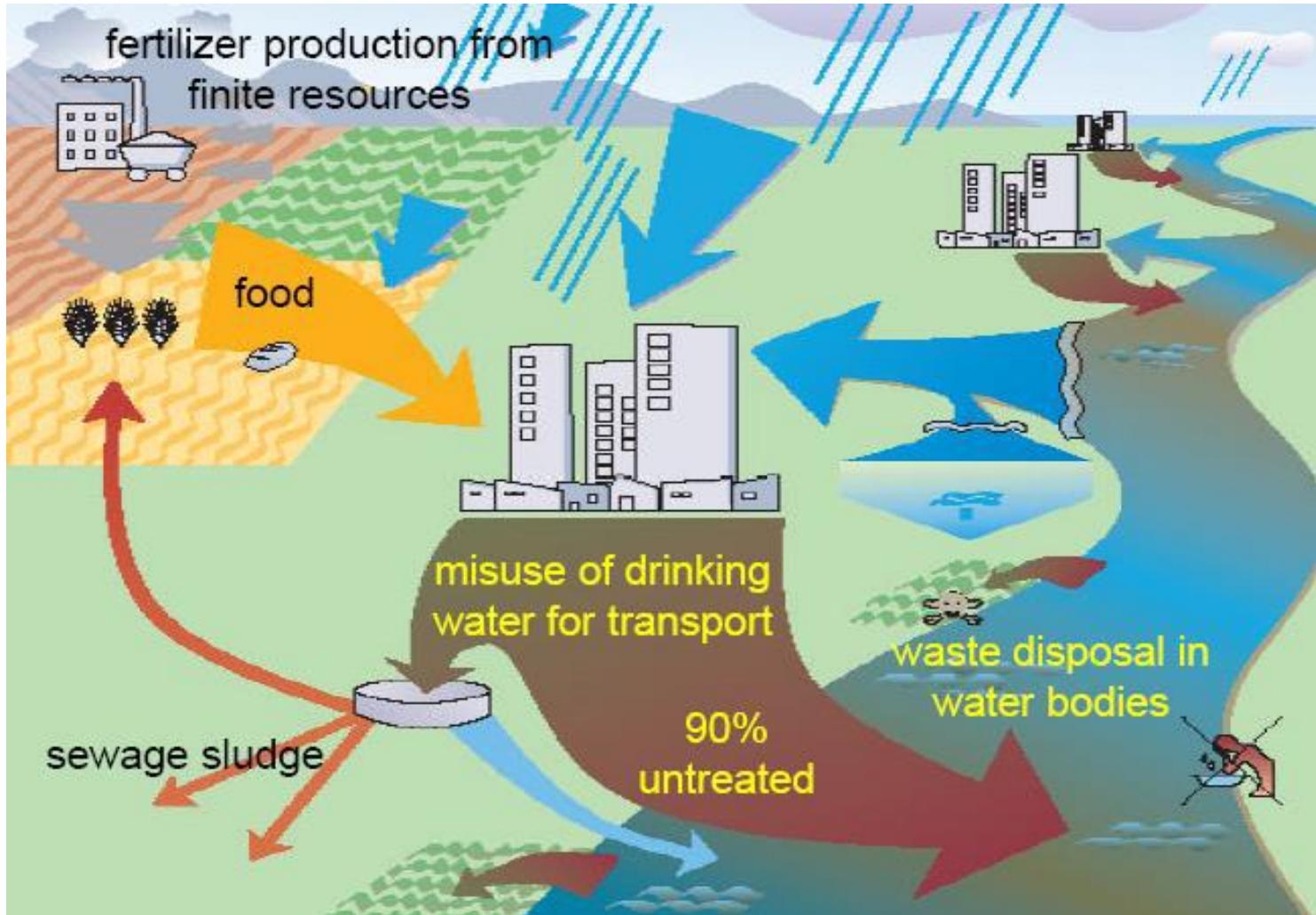
**Ethiopia, Somalia & South Sudan** ● ● ●  
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**Saudi Arabia** ● ●  
Saudi Arabia is a water-scarce, oil-rich state, with oil reserves counting as the result of competition from a North American energy boom. In 2016, Saudi will rely almost entirely on its oil wealth to support its population. A famine in 2011 affected 1.3 million people in the Horn of Africa, and Saudi Arabia had 260,000 people in Somalia. In the midst of a severe drought, Saudi Arabia is funding a massive project a "major food security emergency" in Ethiopia in 2016.



# GESTIONE DELLE ACQUE CONVENZIONALE



# GESTIONE SOSTENIBILE DELLE ACQUE

- Risparmio idrico e riduzione delle perdite
- Raccolta e gestione sostenibile delle acque di pioggia
- Riuso delle acque reflue e dei nutrienti per  
ribilanciare i cicli idrici e biogeochimici naturali



# GESTIONE SOSTENIBILE DELLE ACQUE



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## Approccio multidisciplinare



# RELATORE



## Anacleto Rizzo

R&D Design: Constructed Wetlands,  
Sustainable water management,  
Sustainable drainage systems  
(SuDS), River restoration

## IRIDRA SRL

Soluzioni naturali (NBS Nature-Based Solutions) e Gestione sostenibile delle acque

rizzo@iridra.com



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