Urban Resilience & Crisis Management Workshop

Sydney, 14-15 October 2016

<u>Session 4:</u> Eco-Resilience Case Studies

The current situation regarding future water resilience
approaching the Water-Food-Energy nexus

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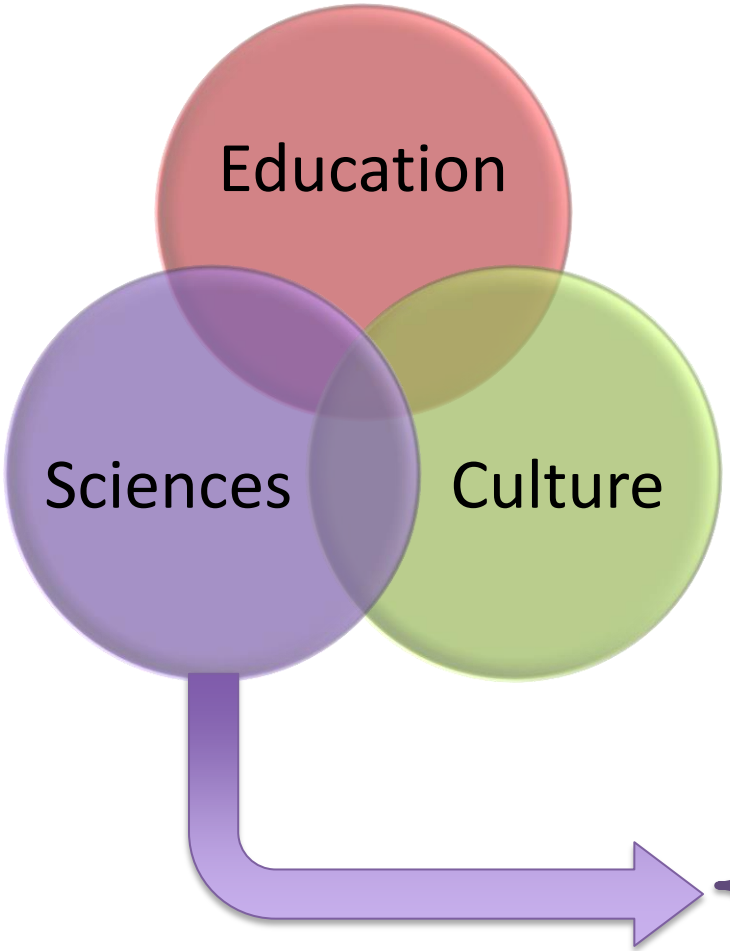
Introduction

PRESENTATION OF UNESCO

- a UN Conference for the establishment of an educational and cultural organization (ECO/CONF) was convened in London from 1 to 16 November 1945, just after the war.
- Representatives of 44 countries decided to create an organization to establish the “intellectual and moral solidarity of mankind”.
- At the end of this conference, 37 countries founded the United Nations Educational, Scientific and Cultural Organization (UNESCO) which was established by the UN General Assembly on November 16, 1945.

Introduction



Main priorities : Africa and Gender Equality

Other priorities

- Biodiversity Initiative
- Climate Change
- Education for Sustainable
- Foresight and Anticipation
- Culture of Peace & Non-Violence
- Dialogue among Civilizations
- Crisis and Transition Responses
- Small Island Developing States
- HIV and AIDS
- ICT in Education
- Indigenous Peoples
- Science Education
- Youth
- Development

- Investing in Science Technology and Innovation
- Building Capacity In Science and Engineering
- Water Security
- Geology, Ecosystems and Biodiversity
- Ethics of Science and Technology
- Science for Society

http://en.unesco.org

The UNESCO Water Family

UNESCO implements programmes to develop the knowledge and capacity to manage freshwater resources

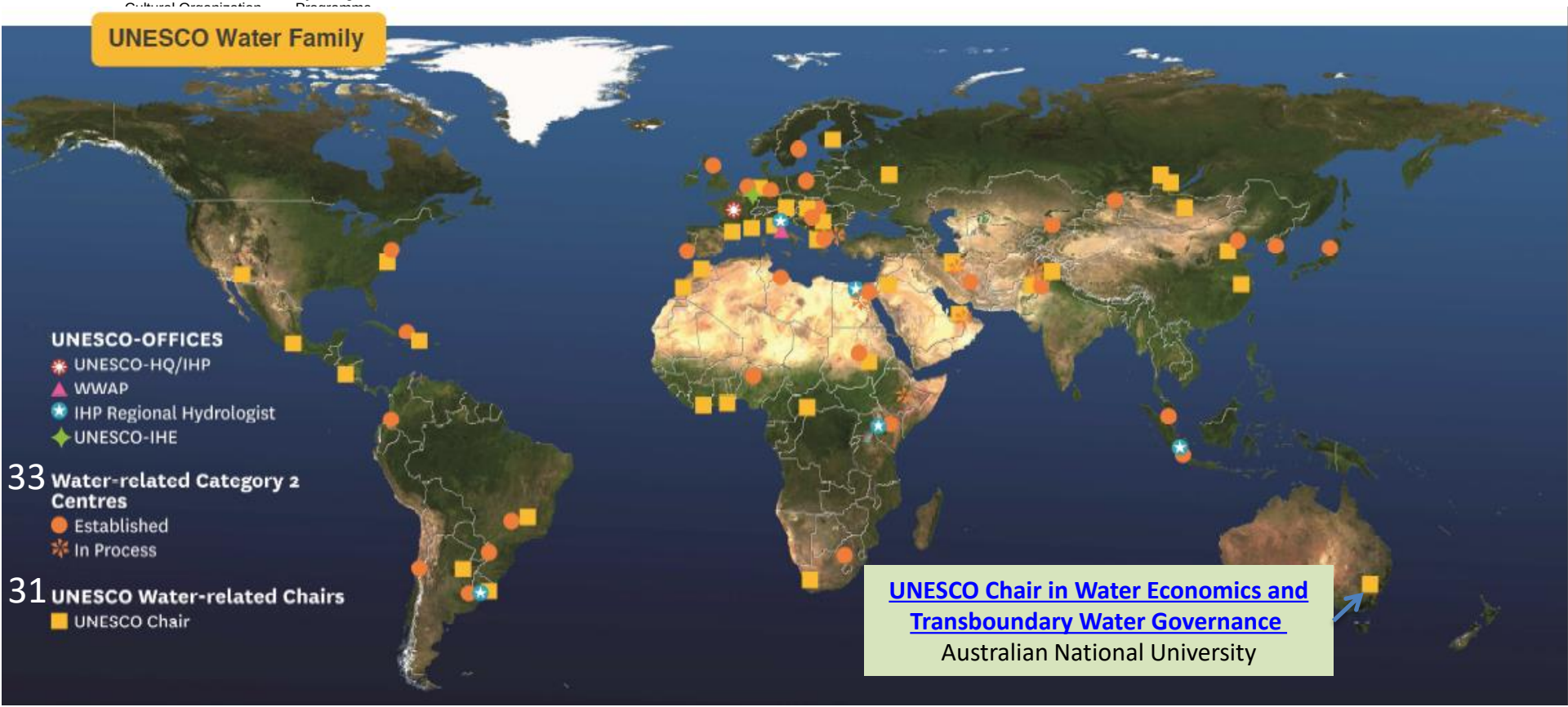
United Nations Educational, Scientific and Cultural Organization

International Hydrological Programme

United Nations Educational, Scientific and Cultural Organization

World Water Assessment Programme

UNESCO-IHE Institute for Water Education



The New SDGs

Goal 6 specifically on water

6.1
By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2
By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3
By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

6.4
By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.5
By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

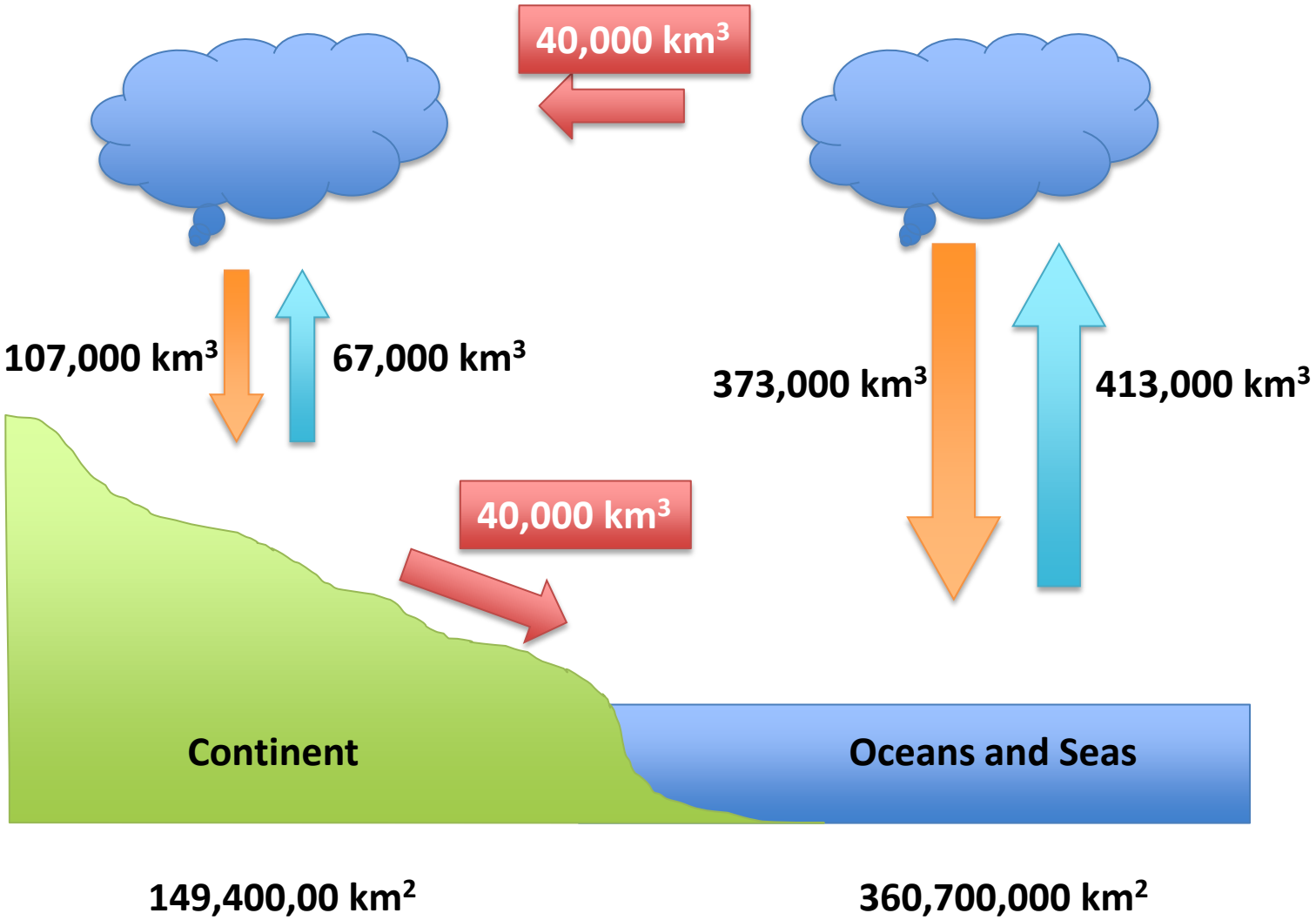
6.6
By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

6.a
By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.b
Support and strengthen the participation of local communities in improving water and sanitation management

WATER CYCLE & RENEWABLE FRESH WATER

In the Global Water Cycle, 40 000 km^3 of Fresh Water evaporates from the Oceans, precipitates on the Continents and return to the Oceans.



GLOBAL WATER DEMAND 2000-2050

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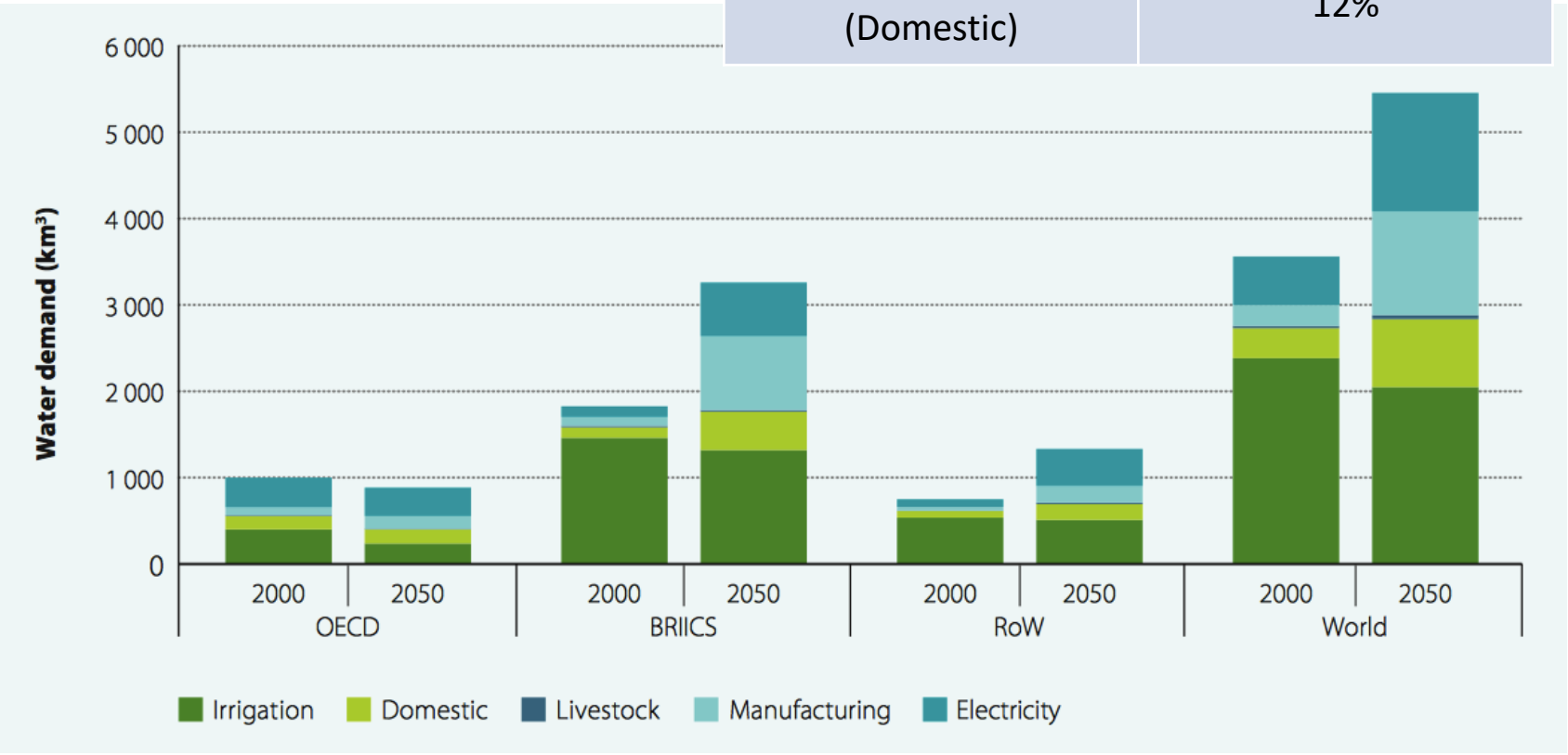
Total Water Demand in 2015 is about 4,000 km^3. This represents 10 % of available renewable water.

Main Uses of Fresh Water	Percentage of Total Withdrawal - 2015
Agriculture (irrigation)	70 %
Industry	18%
Municipalities (Domestic)	12%



BRIICS (Brazil, Russia, India, Indonesia, China, South Africa); RoW (rest of the world).

AGRICULTURE AND IRRIGATION

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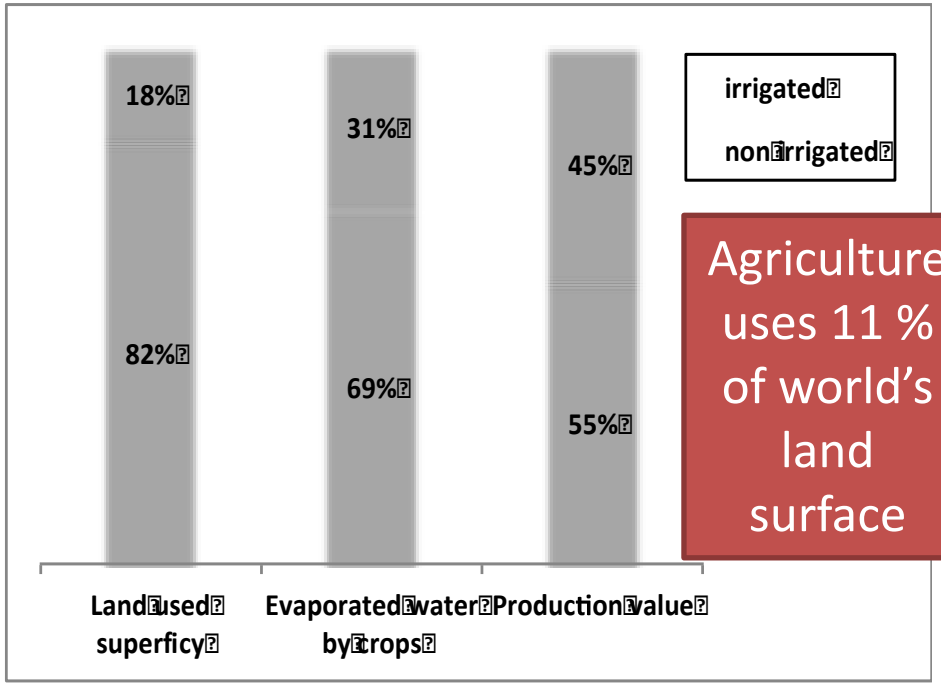
The 22 % of Agriculture Water coming from Irrigation represent 2,800 km^3 per year and 70 % of all Fresh Water withdrawals

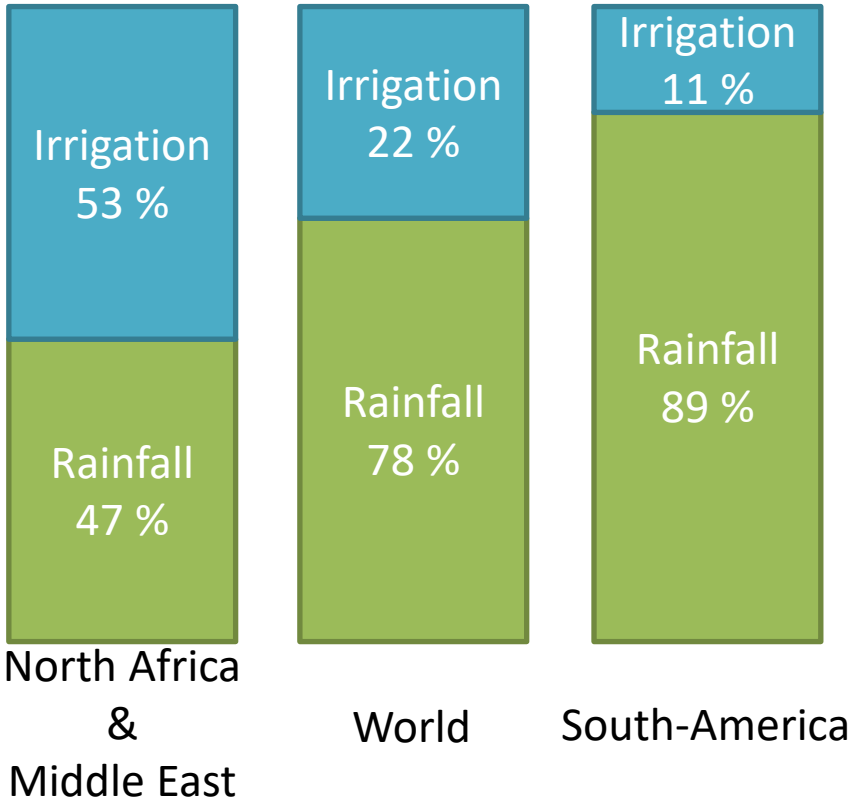
Rain fed only Agriculture has a productivity half of potential achievable with irrigation

The Water Efficiency of Irrigation on the Planet is 56 %



Agriculture uses 11 % of world's land surface

Origins of Water used for Agriculture



AGRICULTURE AND FOOD

- The average food per capita through the world is increasing thanks to the growth of agriculture production.
- In 2015, still 610 million people in the world are undernourished.
- The expected undernourished population in 2030 is 440 million
- Food production is expected to grow by + 60 % in 2050.
- Only 31 % of total land surface is suitable for agriculture, and 11 % is used.
- 30 % of total energy consumption on the planet is used for food production and supply chain.
- But according to FAO, there are 1.3 billion of tons of food wastes at different stages of harvesting, transformation, distribution and consumption. These food wastes account for 30 % of the total agriculture production in the world.
- Improving irrigation for Agriculture could save up to 1,000 km^3 of fresh water every year.

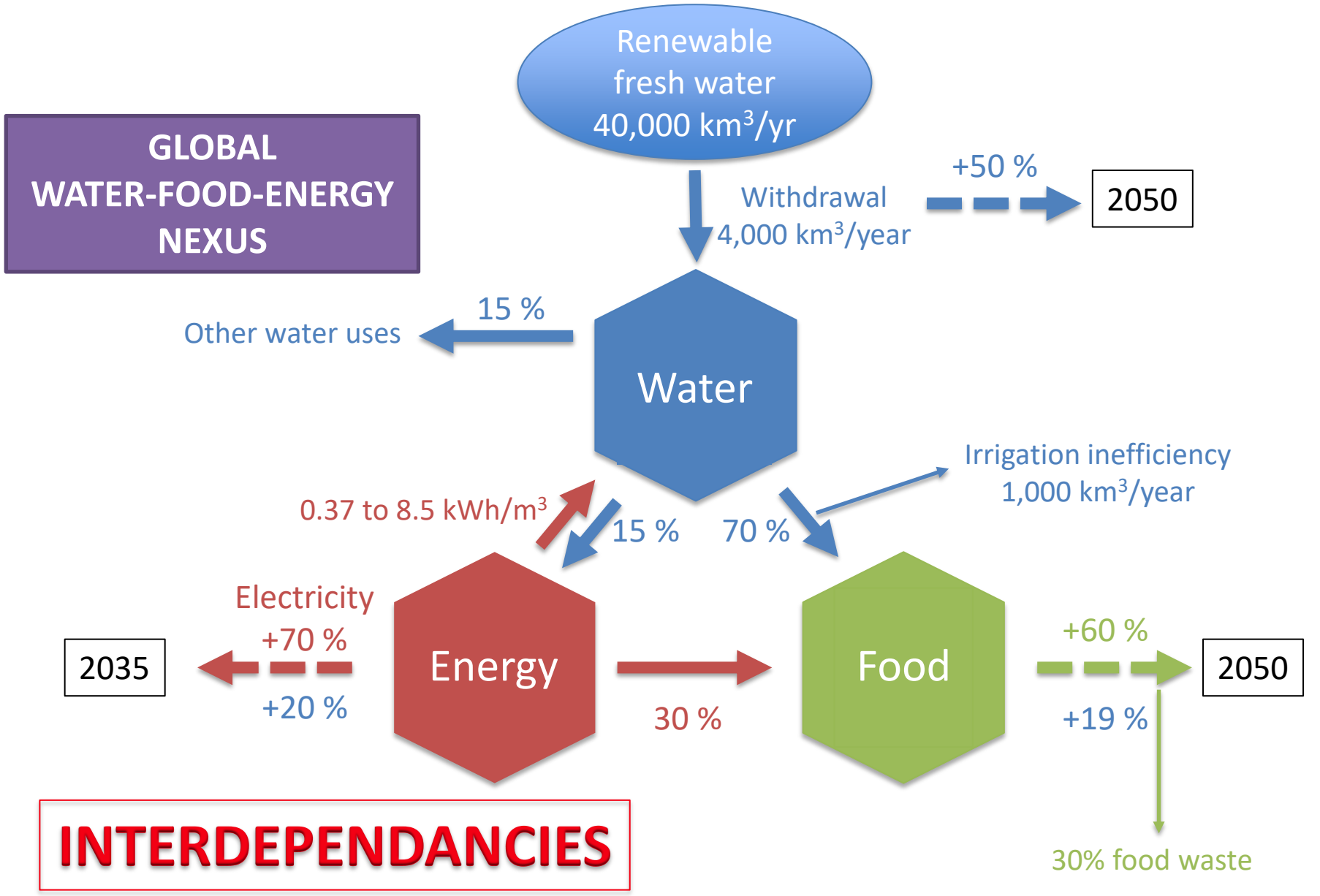
ENERGY AND WATER

- Nuclear, coal, natural gas, petroleum, solar or biomass sources power plants produce roughly 80 % of global electricity production. These thermal power plants need water for their cooling process.
- Producing energy requires water. The 70 % raise of electricity demand by 2035 will increase by + 20 % the total freshwater withdrawal, largely due to new coal power plants.
- Unfortunately, coal harvesting is located in already water stressed areas which won't be able to support overexploitation of water resources.
- Biofuel is expected to grow significantly and requires larges amount of water for production: it requires between 1,000 and 4,000 litters of water to produce 1 litter of biofuel.

DEMOGRAPHY AND WATER

- By 2050 the World population will increase from 7 to 9 billions.
- 90 % of increase located in developing countries.
- Almost 100 % of increase will be located in urban areas.
- Forecasted 70-90 % of increase in domestic demand for water.
- By 2030, up to 70% of world population will be living in high water stress areas.
- Needs in Water, Energy and Food will be concentrated in fast growing cities, requiring the use of resources coming from more and more remote areas.

UNESCO STRATEGY



WFE NEXUS: A RECENT UNDERSTANDING OF THE MAGNITUDE OF THE ISSUES

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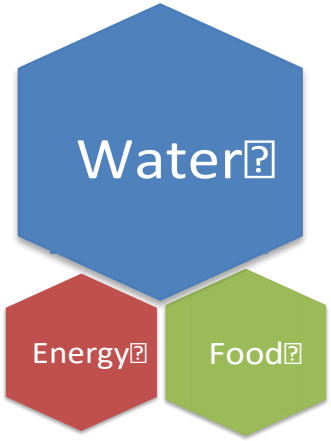
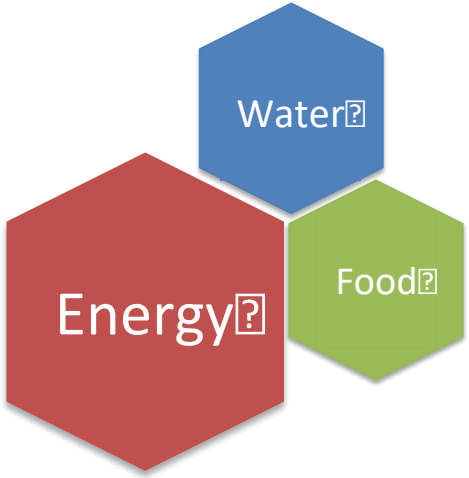
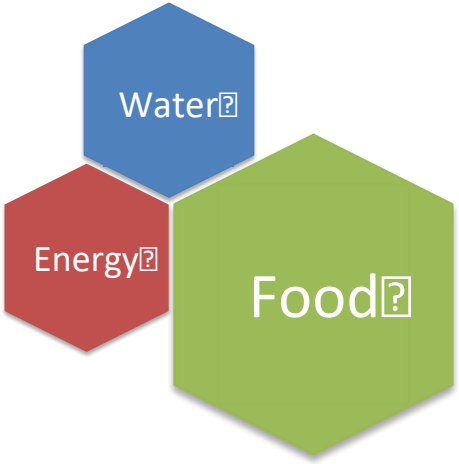
At the country level, fragmented sectoral responsibilities, lack of coordination, and inconsistencies between laws and regulatory frameworks may lead to misaligned incentives.



If water, energy and food security are to be simultaneously achieved, decision-makers, including those responsible for only a single sector, need to consider broader influences and cross-sectoral impacts.



A nexus approach to sectoral management, through enhanced dialogue, collaboration and coordination, is needed to ensure that co-benefits and trade-offs are considered and that appropriate safeguards are put in place.

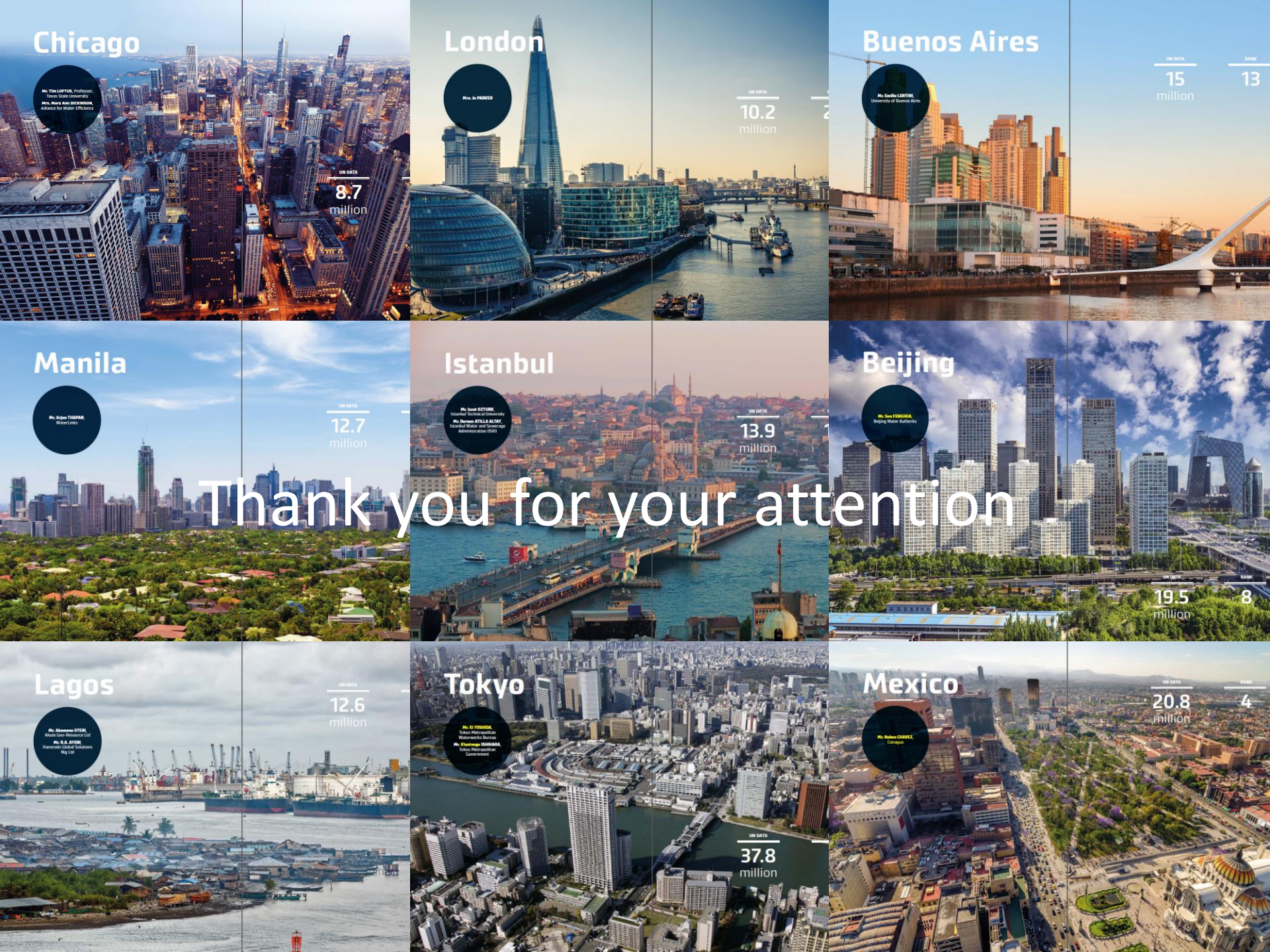


Conclusion

- If well managed and distributed, the resources of the planet in Freshwater, Food and Energy are still fully sufficient for the needs of humanity.
- Global access to Water, Food and Energy is improving.
- However, unbalanced repartition of resources and concentration of needs following demography and industrialization could impair prosperity development.
- Increasingly constraints on water will affect energy choice.
- Other impacts, particularly climate change and food needs, create further uncertainty for both energy and water availability.
- Energy and water conservation have a real potential, like modern agriculture which use less water drops for more crops.

Conclusion

- Doing as usual is not an option anymore. A global approach is needed in order to grasp all interconnected issues.
- Continue to educate decision-makers
- Increase access to WASH services, and improve existing service levels by developing capacity building through trainings and demonstration projects focusing on operators.
- Provide examples and incentives to manage and allocate water across competing developmental sectors. Learn to share the scarcity.
- **The solution to the depletion of resources as global population increases, must be recognized as a top priority by the global community.**



Thank you for your attention

CHINA'S CASE

ENERGY

- 2015 Power Capacity: **1,174 GW** (**81 %** coal-based)
- 2030 Power Capacity: **2,470 GW** (**59 %** coal-based)
- Proportion of coal-based Power in Water Scarce Provinces: **47 %**
- Risk of Power Disruption: **Extremely High**
- **77 GW** of inefficient power units closed during 11th 5-year plan
- **400 GW** added

AGRICULTURE

- Withdrawal **62 %** of freshwater, **340 km^3** of water used
- **40%** of irrigation met by groundwater
- China imported **148.6 km^3** of water in 2013
- Over **500 million tons** of grain produced each year
- Annual food waste **19 %** of total production ($32 billion)

WATER

- **2030** Water Supply: **600 km^3**
- **2030** Water Demand: **800 km^3**
- Shortfall – **33%**
- Real Shortfall? Probably much more
- China's groundwater provides **70 %** of its drinking water supplies
- Groundwater extraction constitutes **15 %** of China's total energy consumption
- **50%** of groundwater polluted
- **75%** of lakes and rivers polluted
- Aquifer levels declining >**1 meter/year**

INDIA'S CASE

ENERGY

- Current Power Generation Capacity – **234 GW** (**60 %** coal-based)
- Planned Additional Capacity to 2047 – **460 GW** (all coal-based)
- Current Efficiency Rating – **33 %**
- Current location of Power Plants in water stressed/scarce areas: **80 %**
- Assume **50 %** of future capacity in water stressed/scarce areas: **230 GW**
- Risks of Power Disruption: **Extremely High**

AGRICULTURE

- Withdrawal **85 %** of accessible freshwater
- **60 %** of Energy for Agriculture dedicated to pumping Groundwater **432** km^3
- 23 **million** pumps in operation
- **685 million** tons of foodgrains to be produced by 2030

WATER

- **2030** Water Demand: **1550** km^3
- **2030** Water Supply: **750** km^3
- Shortfall – **100 %**
- Groundwater extraction constitutes **30 %** of India's total energy consumption
- Upper Ganges Basin has largest water overuse in the world
- More than **60 %** of country's aquifers are depleted