Food, Water and Energy - Resources that are Depleted as Mankind Grows:

A Global Overview

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GLOBAL RESOURCES and PEOPLE

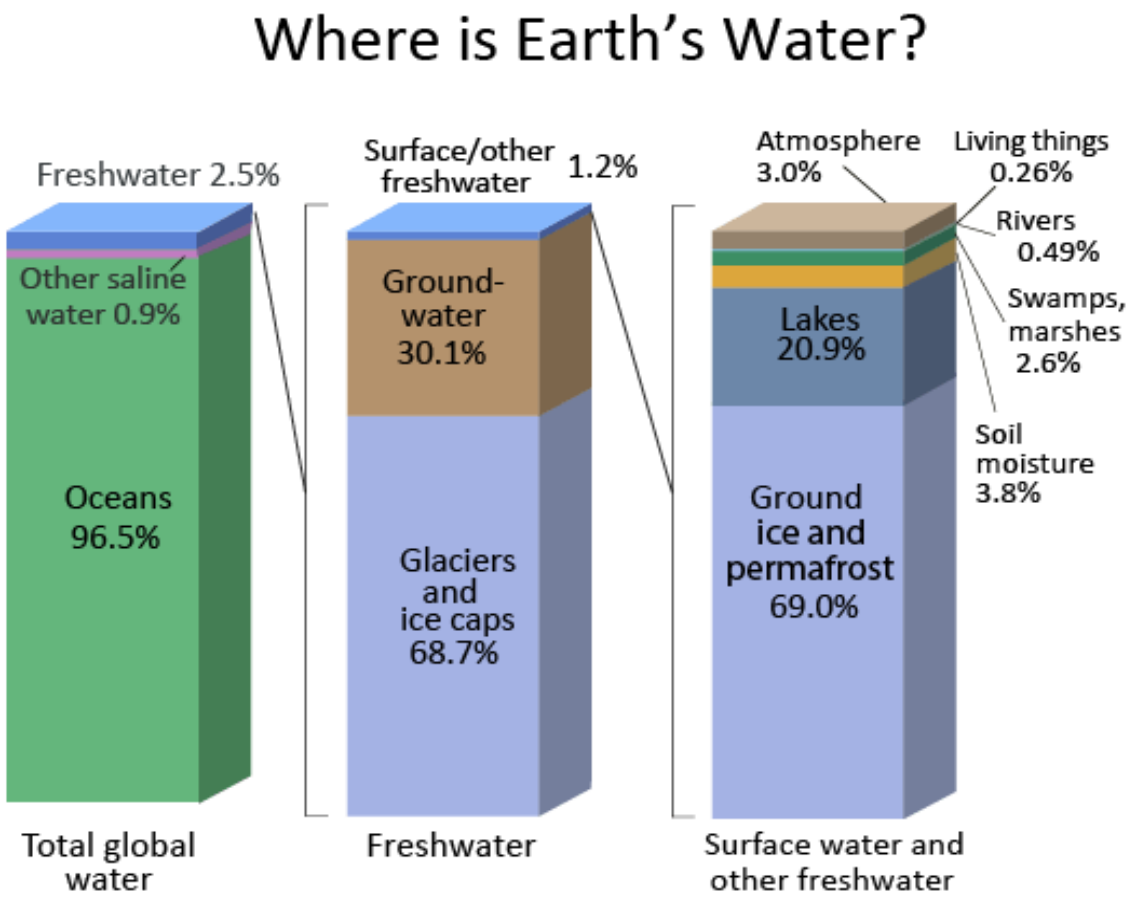
There is fixed amount of water in the world - for many years ….

There are many more people on earth with an ever increasing standard of living!….

There is limited amount of energy, and land for agriculture ….

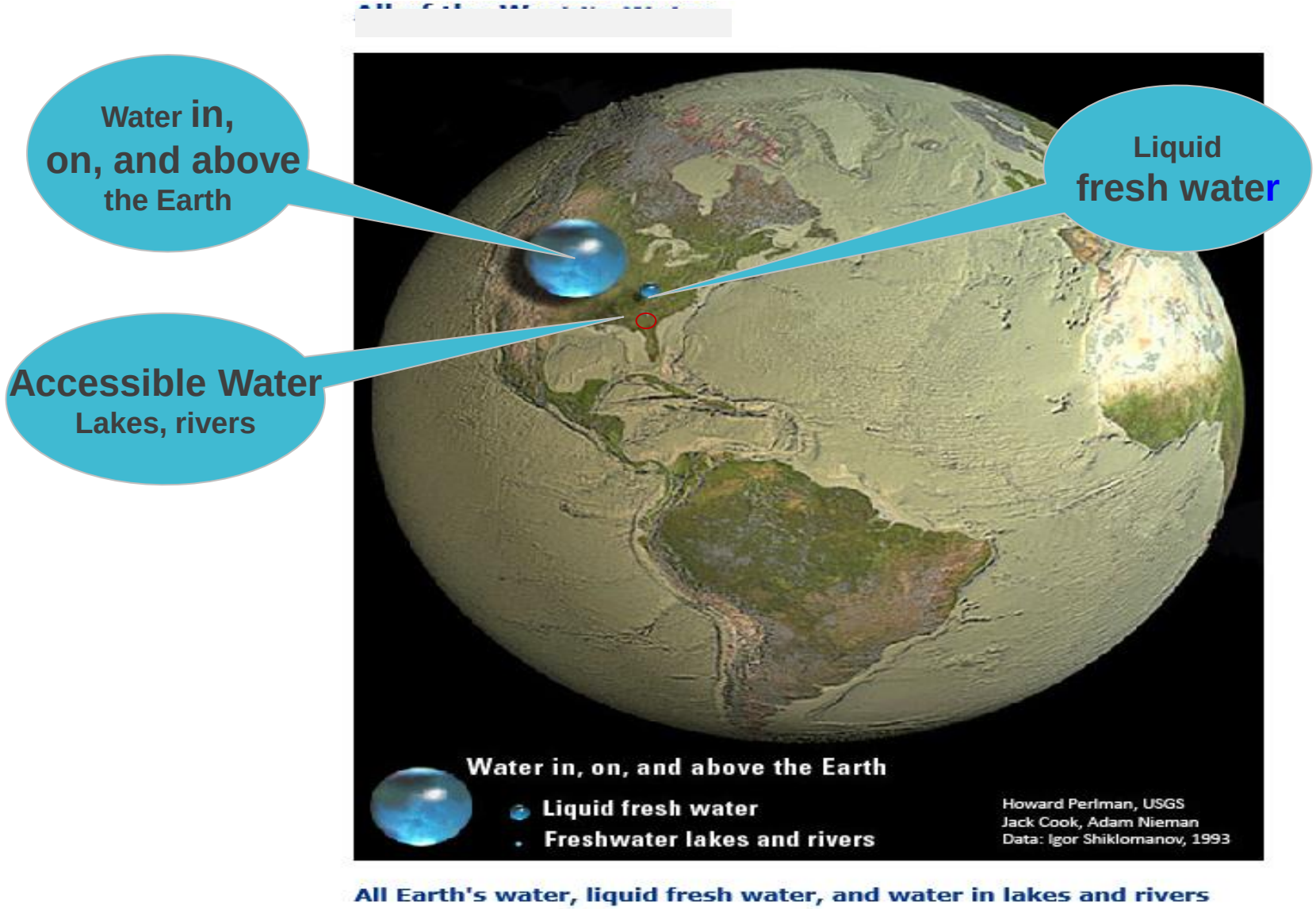
Where is Earth's Water

Distribution of Earth's Water



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources.
NOTE: Numbers are rounded, so percent summations may not add to 100.

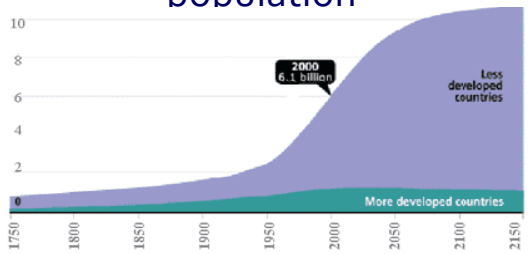
All of the World's Water



All Earth's water, liquid fresh water, and water in lakes and rivers

Causes of the growing water shortage

Dramatic increase in world population

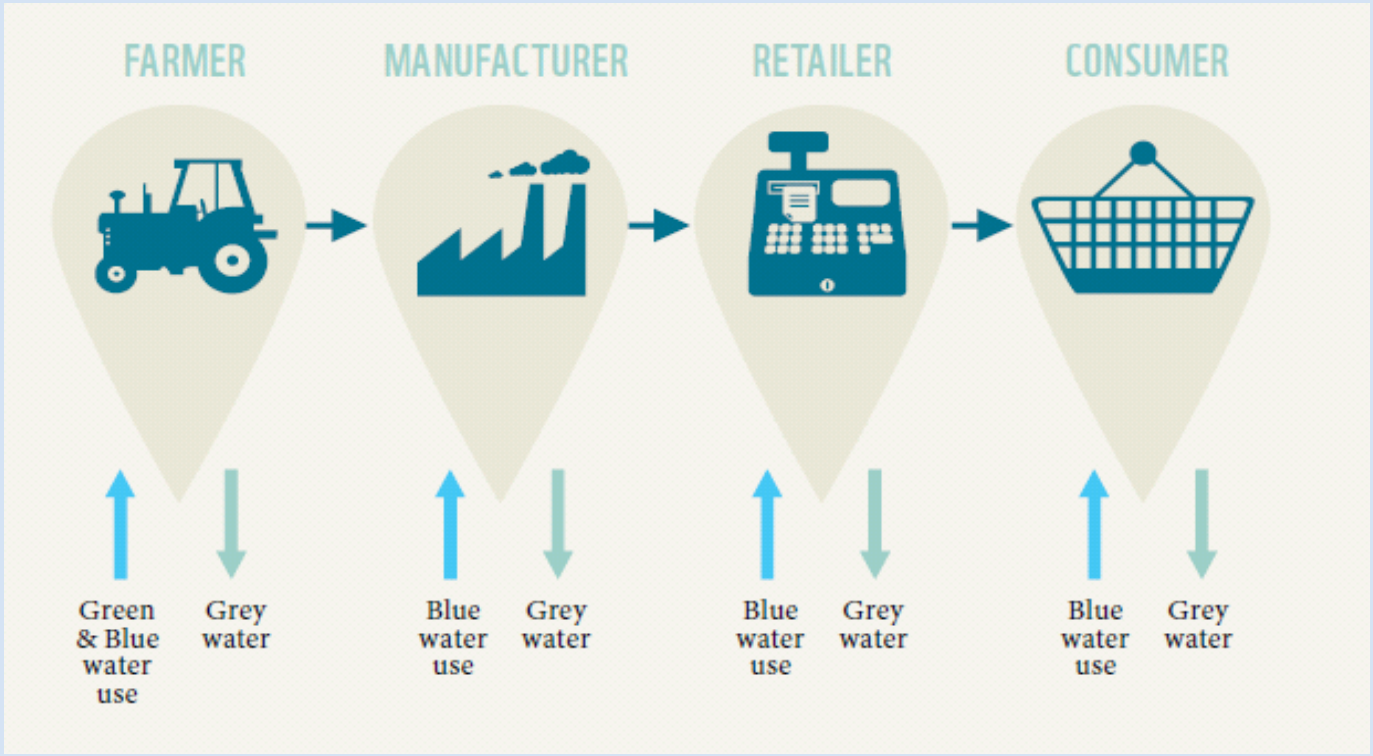


Economic growth and quality of life

Climate change

Water resources' pollution

Water Footprint

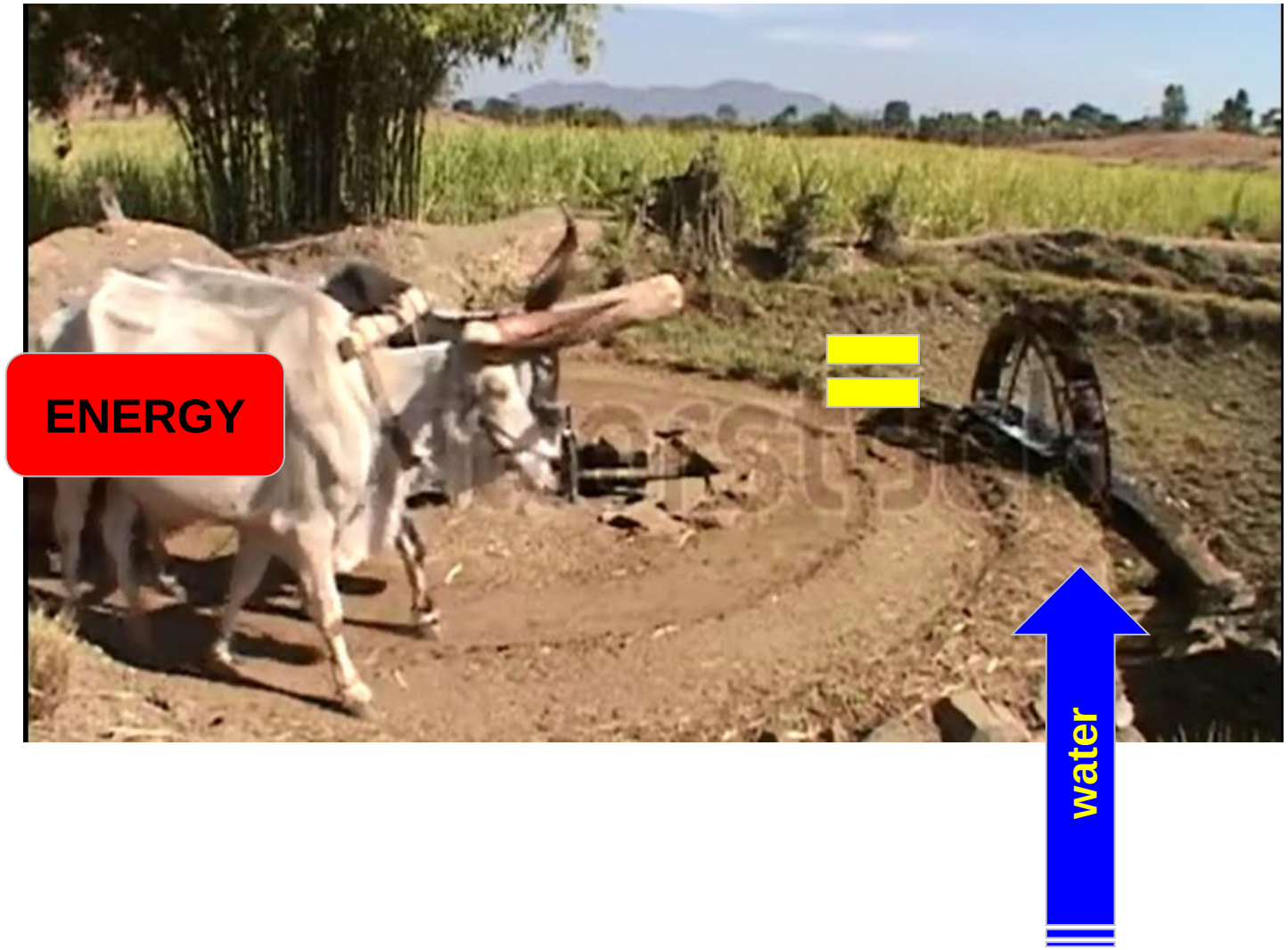


Food = Water

Tea needs about one-sixth of the volume of water used in the production of coffee, but that still amounts to 30bn cubic metres of water each year globally

Food = Water

Water=Energy



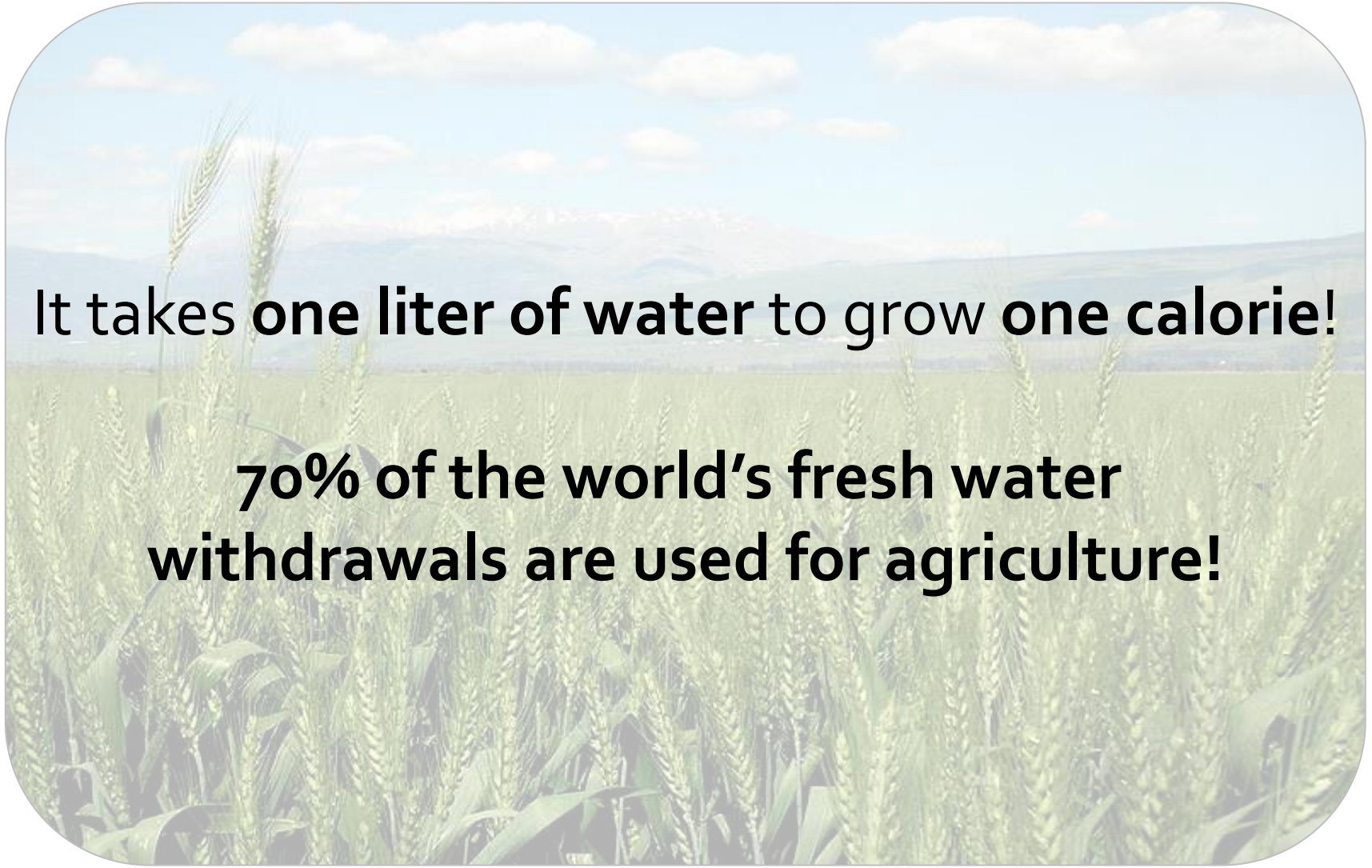
Water = Food = Energy

Water = Food = Energy

100 kg

Water = Food = Energy

Food = Water



It takes **one liter of water** to grow **one calorie**!

70% of the world's fresh water withdrawals are used for agriculture!

Sources: BCG, McKinsey, FAO, press

Water Scarcity Creates Unrest

Jordan – water scarcity threatening government stability

AMMAN
Running water only one day per 10

Rural areas
Water scarcity and salinity problems

Destroying agriculture!

Water Scarcity Causes People to Migrate

Syria - water scarcity contributes to political instability!

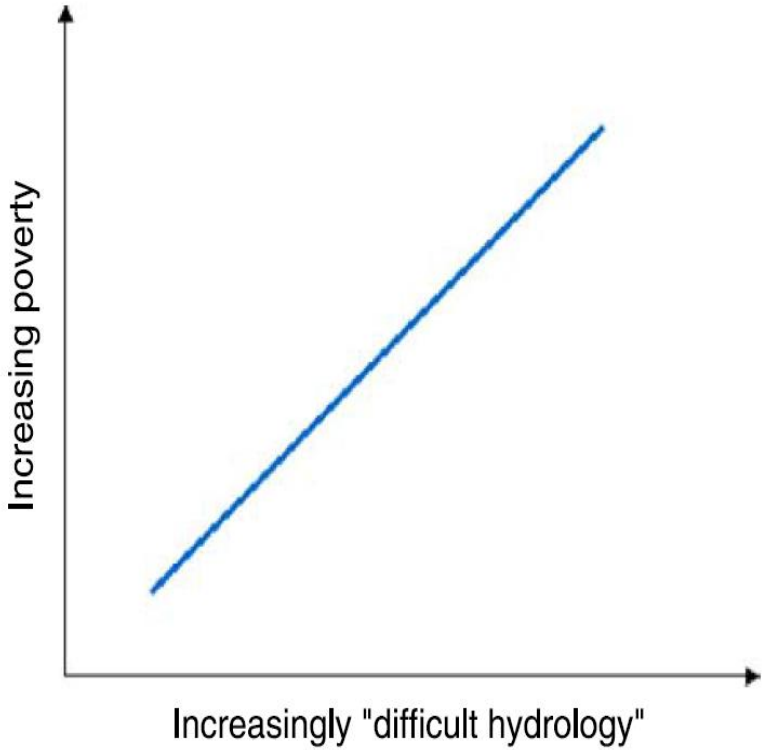
Damascus
Running water once a week!

Almost **1 million** framers immigrated from northern **Syria** to **Damascus** because of water shortage which dried their farms!

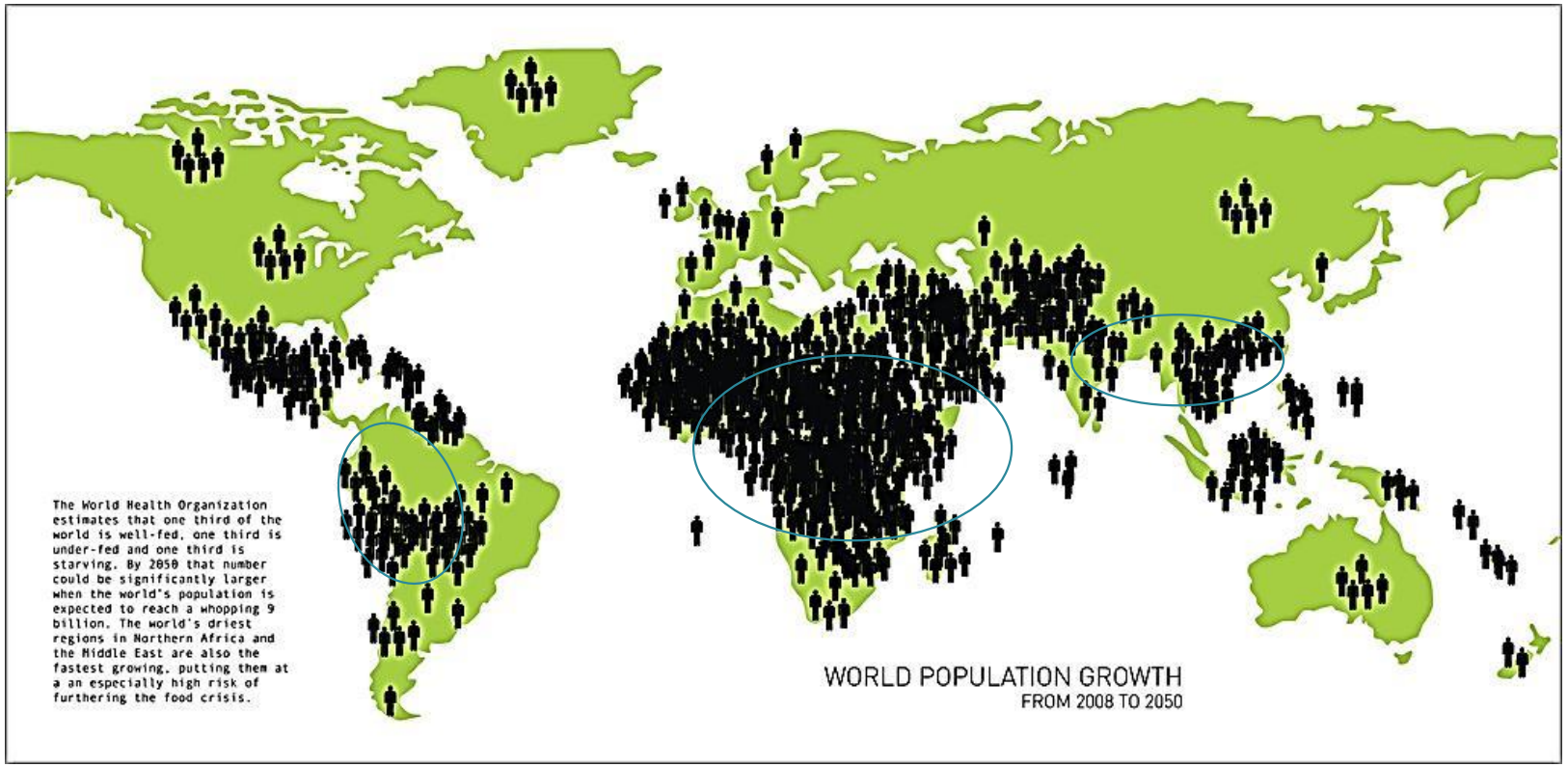
Historically, nature disasters such as draught follwoed By מהומות and change of regime

Water Scarcity Causes Difficult Hydrology Legacy

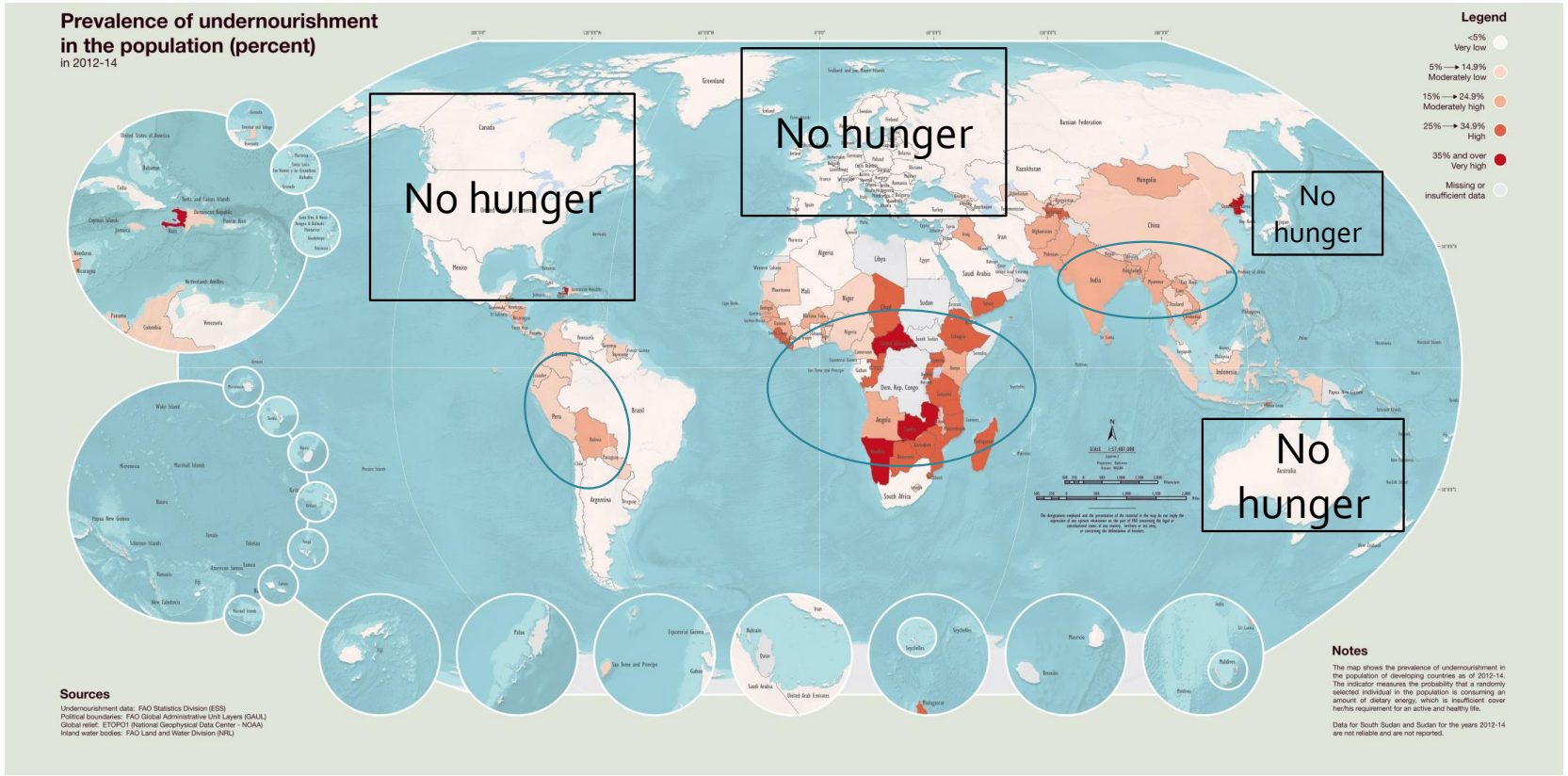
- Most of the world's industrial nations have an "easy hydrology legacy" and were therefore capable of providing sufficient water that in turn enabled rapid economic growth, while many of the world's poorest countries today are characterized by "difficult hydrology legacy"



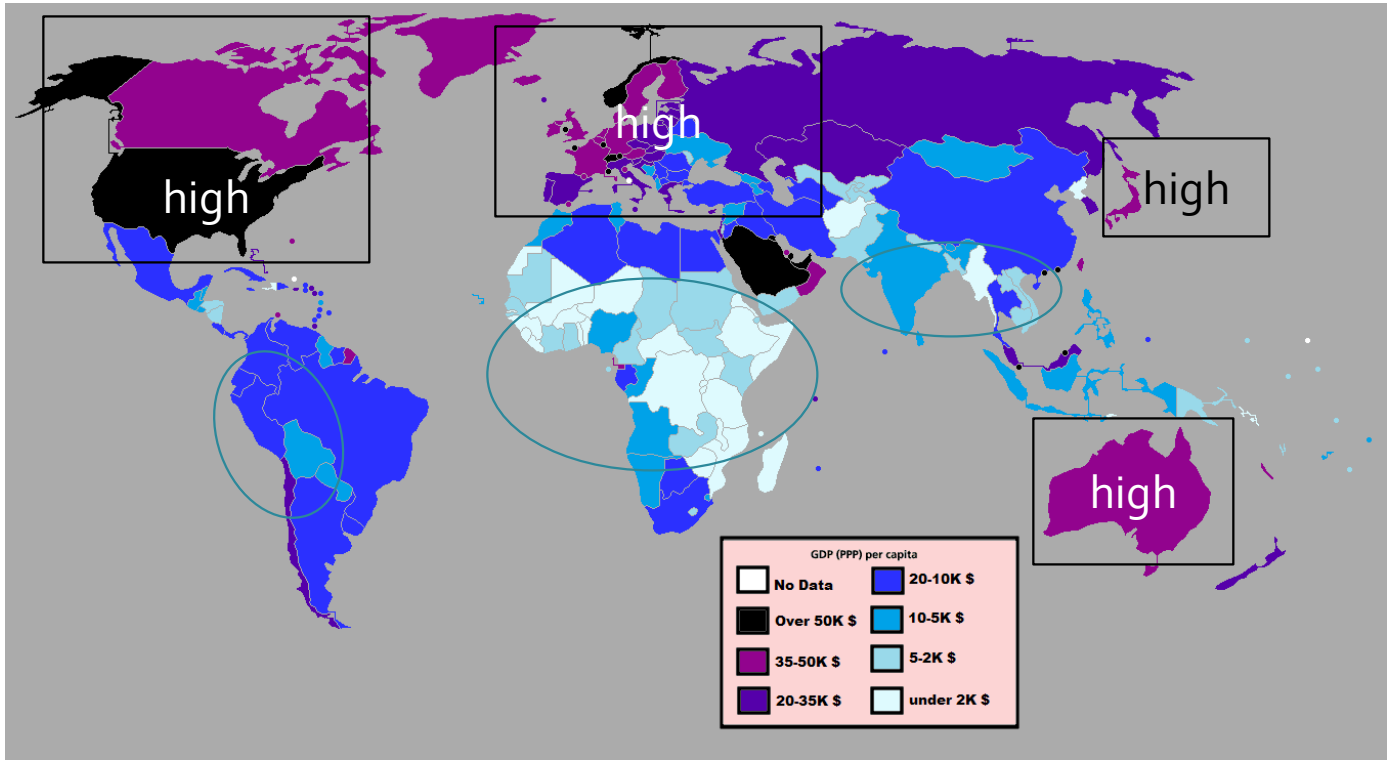
World Population growth 2008-2050



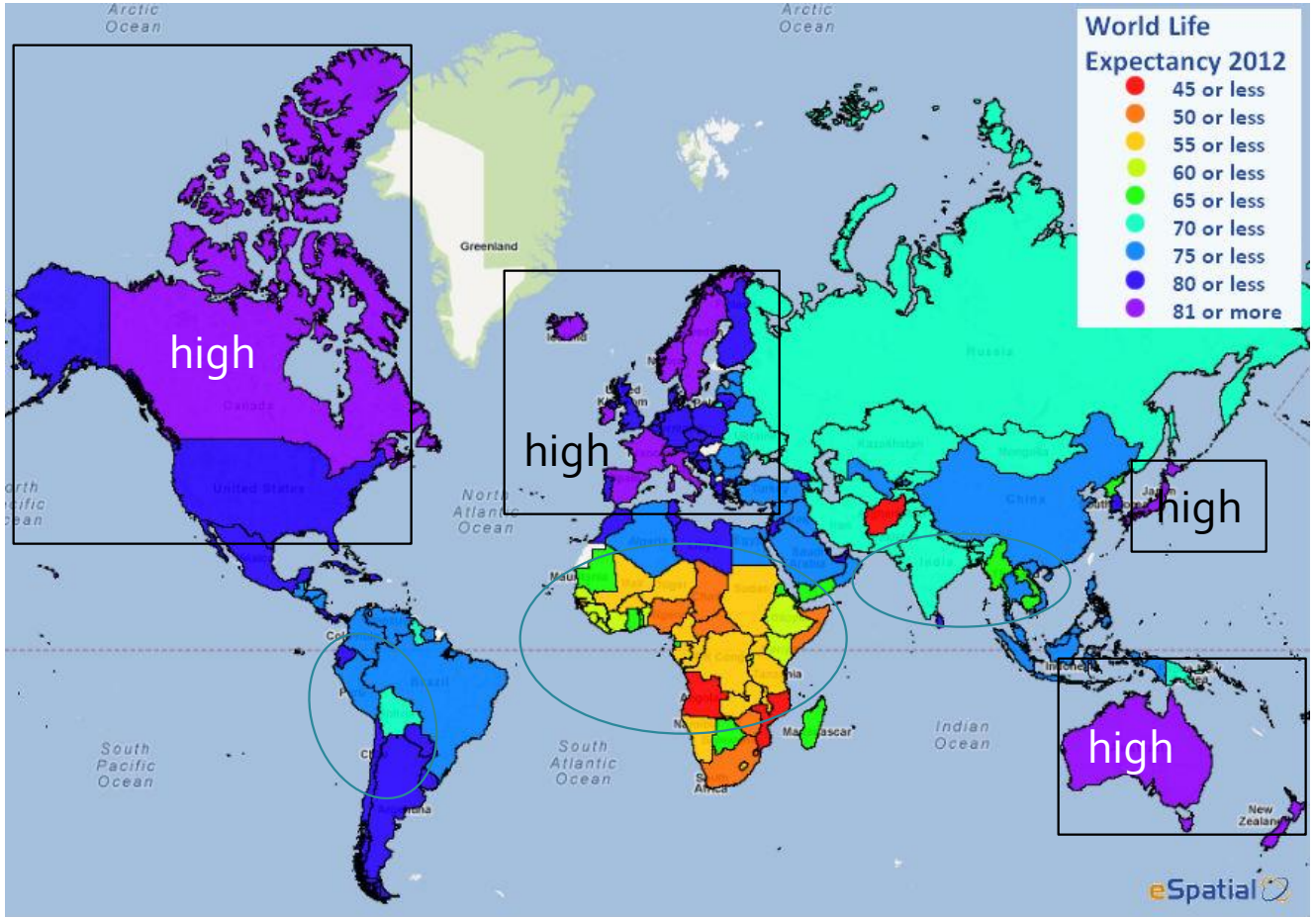
FAO – Hunger Map



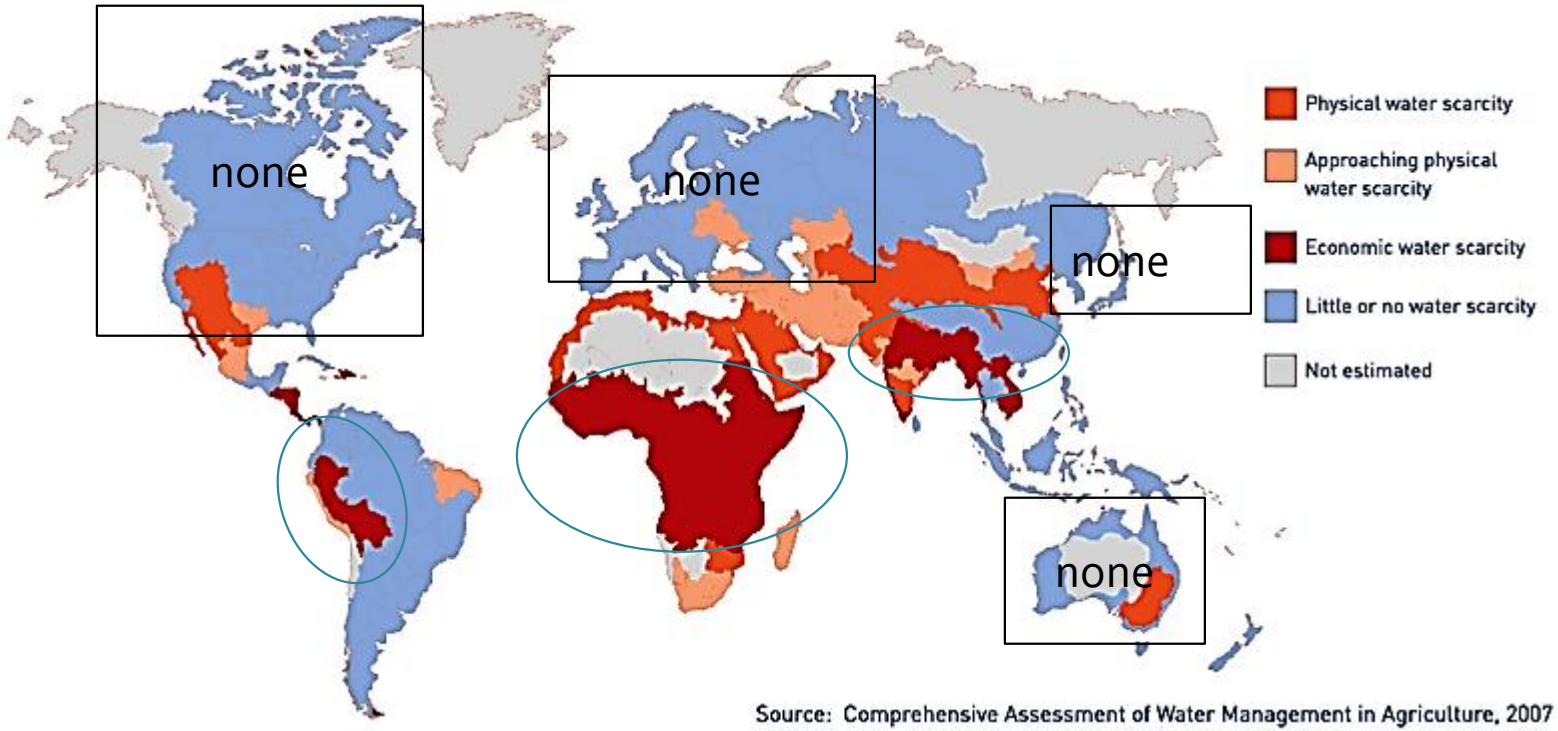
Gross domestic product



Life expectancy

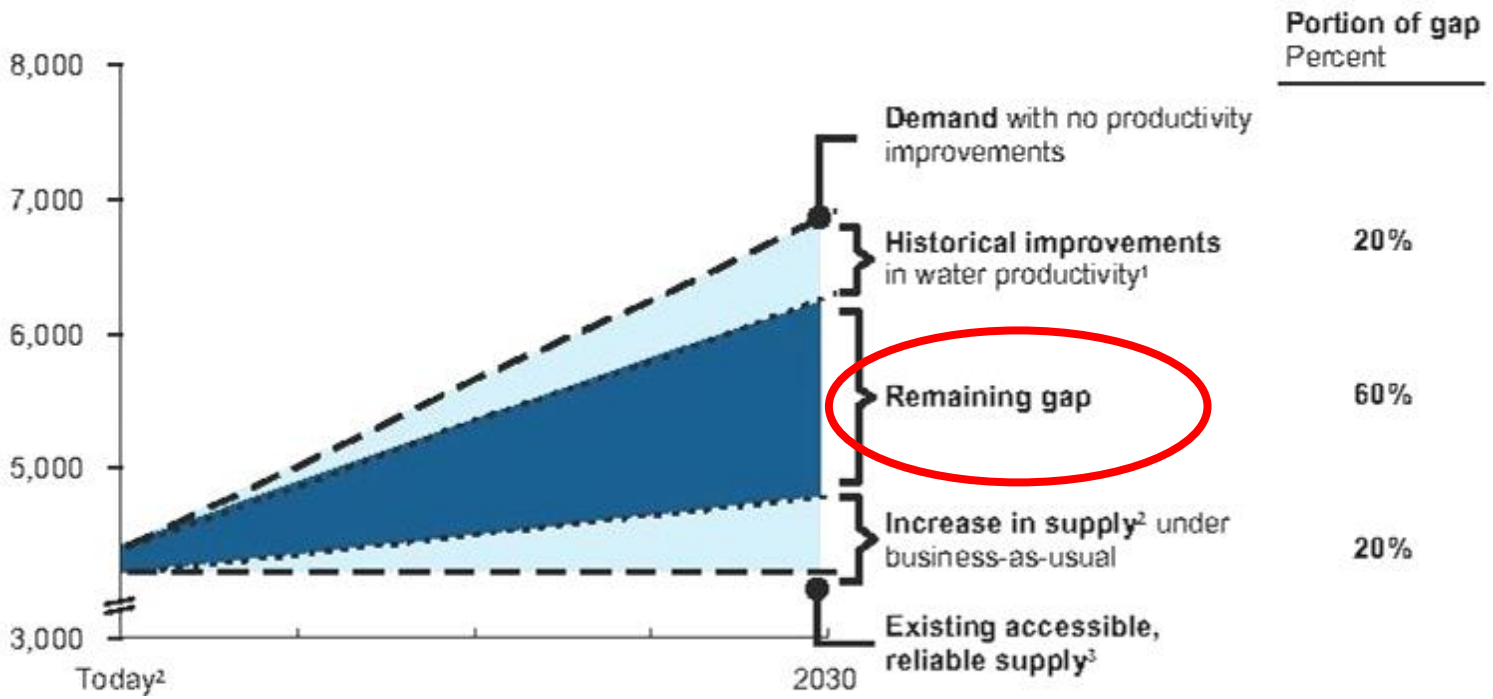


Water Scarcity



Source: Comprehensive Assessment of Water Management in Agriculture, 2007

Water Demand Forecasts are Unsustainable



Source: 2030 Water Resources Group

One of the solution for increasing water needs

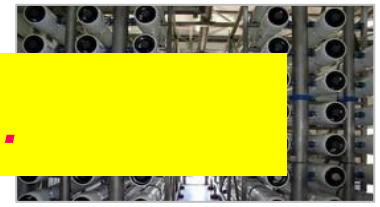
Artificial acceleration of the water cycle

Flood catchment

Drillings

But There is No Free Lunch….

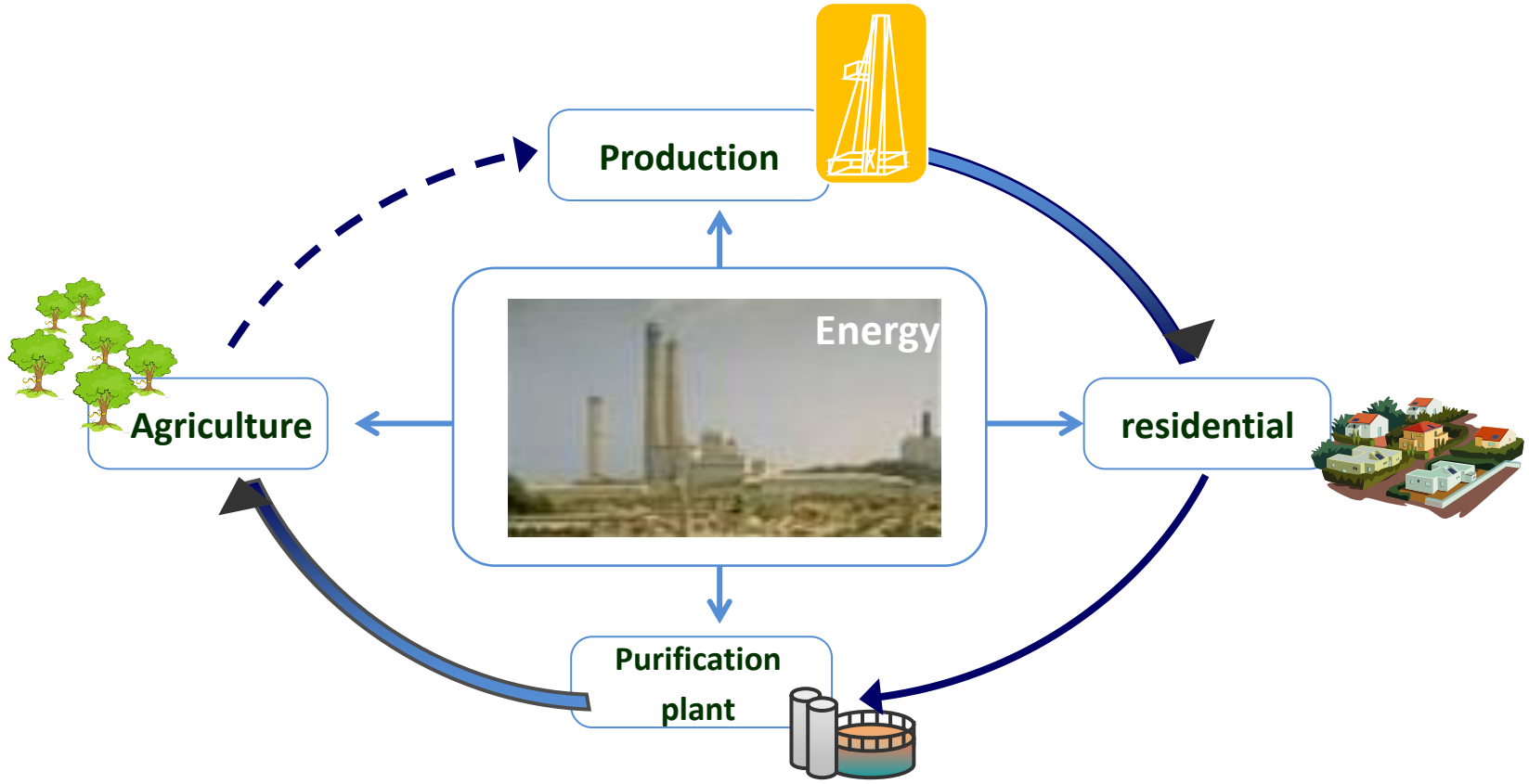
Desalination



Sewage purification

Cloud seeding

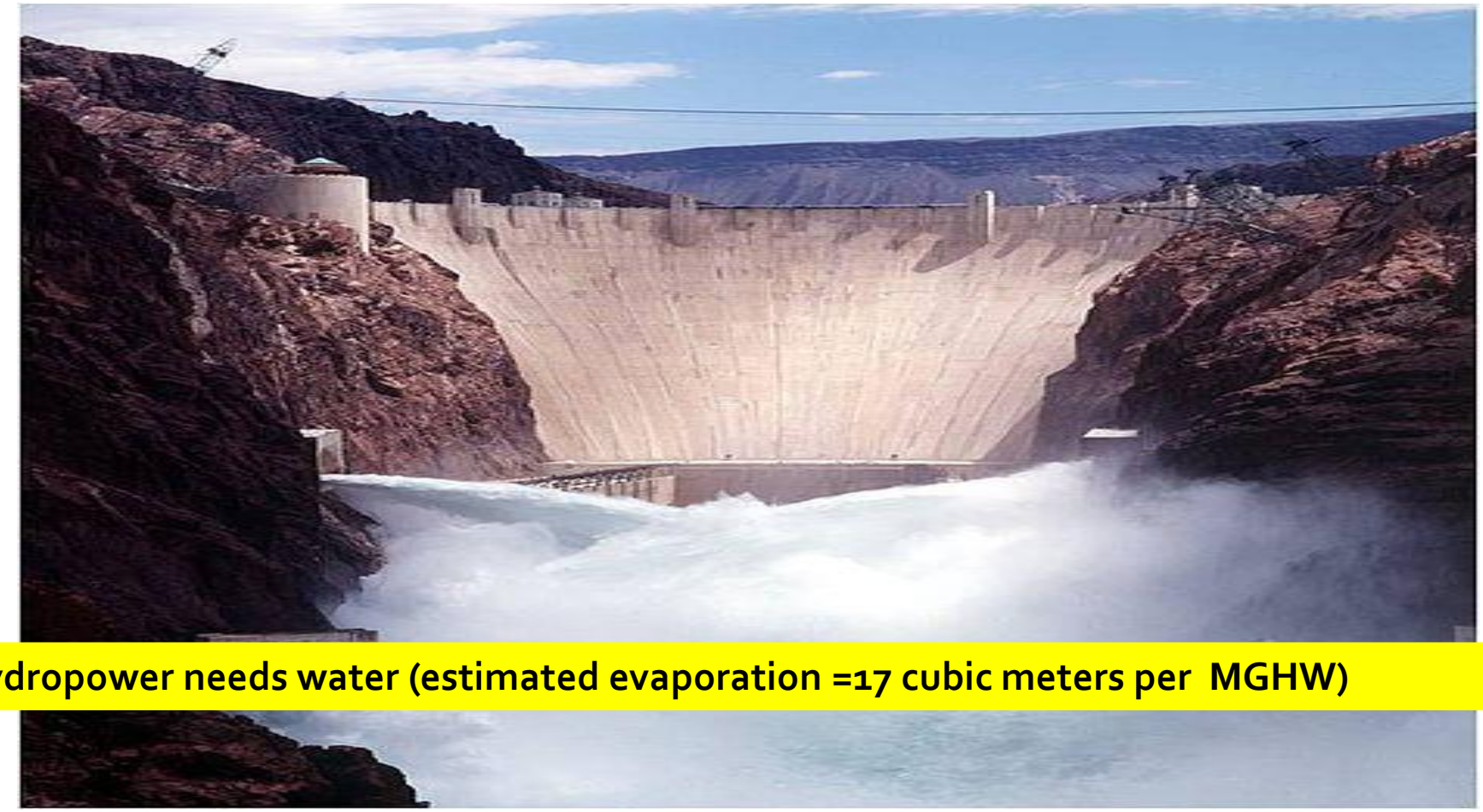
Energy=Water



30%-40% of the water expenditures are for energy costs

Energy=Water

Energy production is the largest industrial user of water



Hydropower needs water (estimated evaporation =17 cubic meters per MGHW)

Energy=Water

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It takes, 4 barrels of water to produce just one barrel of oil. This could be water used for well-injection, cooling or a variety of other applications

Energy=Water

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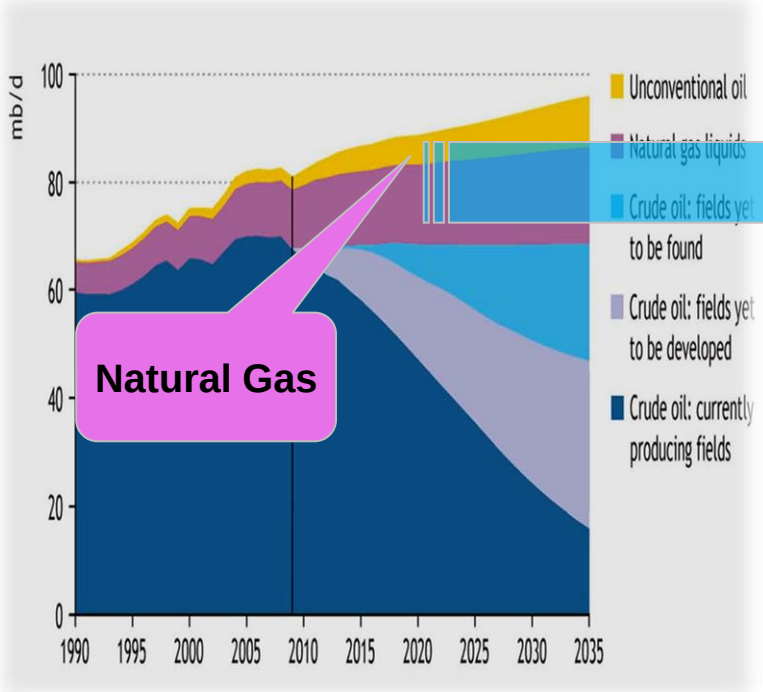
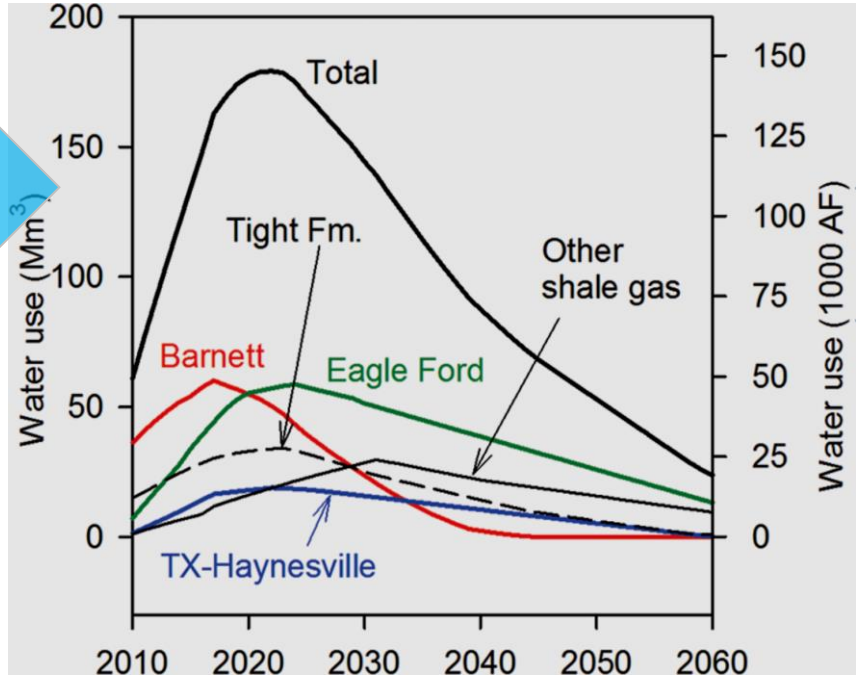
The Shale gas Story

Decline of conventional oil production



Water consumption by shale gas production



Energy=Water

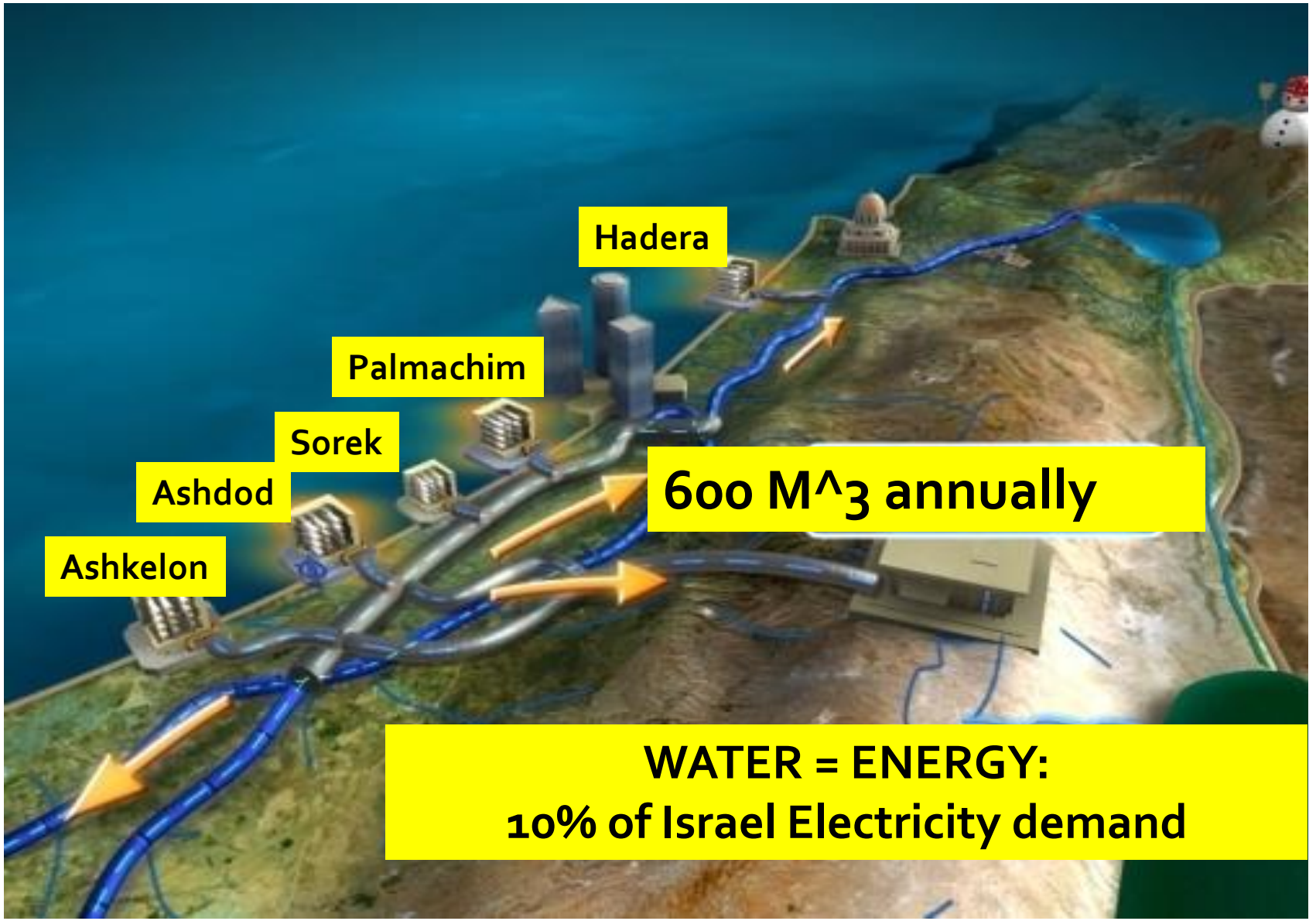
Energy production is the largest industrial user of water

Biofeul technology, diverting land and water supplies to energy production at the expense of food production.

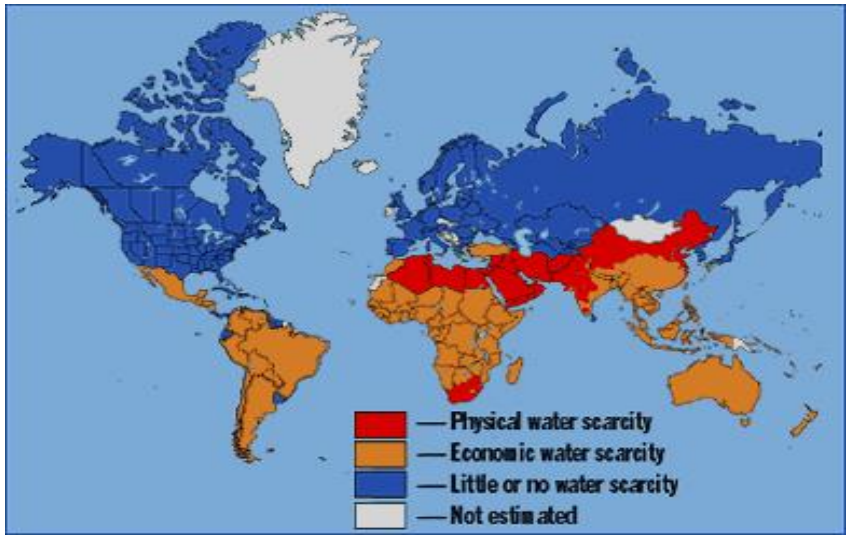
Water use for liquid fuels

Technology	Water use/gal of fuel
Conventional oil refining	1.5
Conventional gas extraction and processing	1.5
Grain ethanol processing	4
Corn irrigation	980 Green Energy
Bio-diesel processing	1
Soy irrigation for bio-diesel	6500 Green Energy
Oil shale	2-3
Oil sands	4-6
Coal to liquid	4-6

The Water Revolution in Israel from Natural Water to Water Production

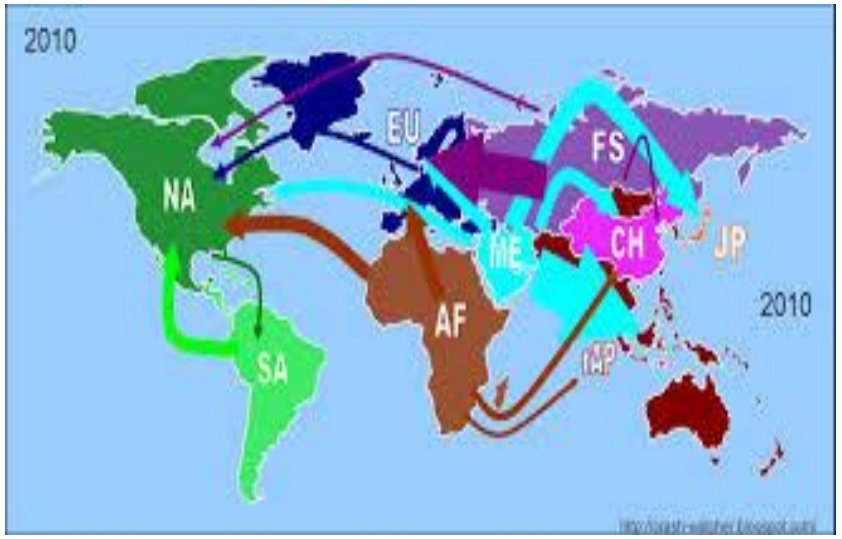


Global Water Scarcity and Energy Flows



Global Water Scarcity

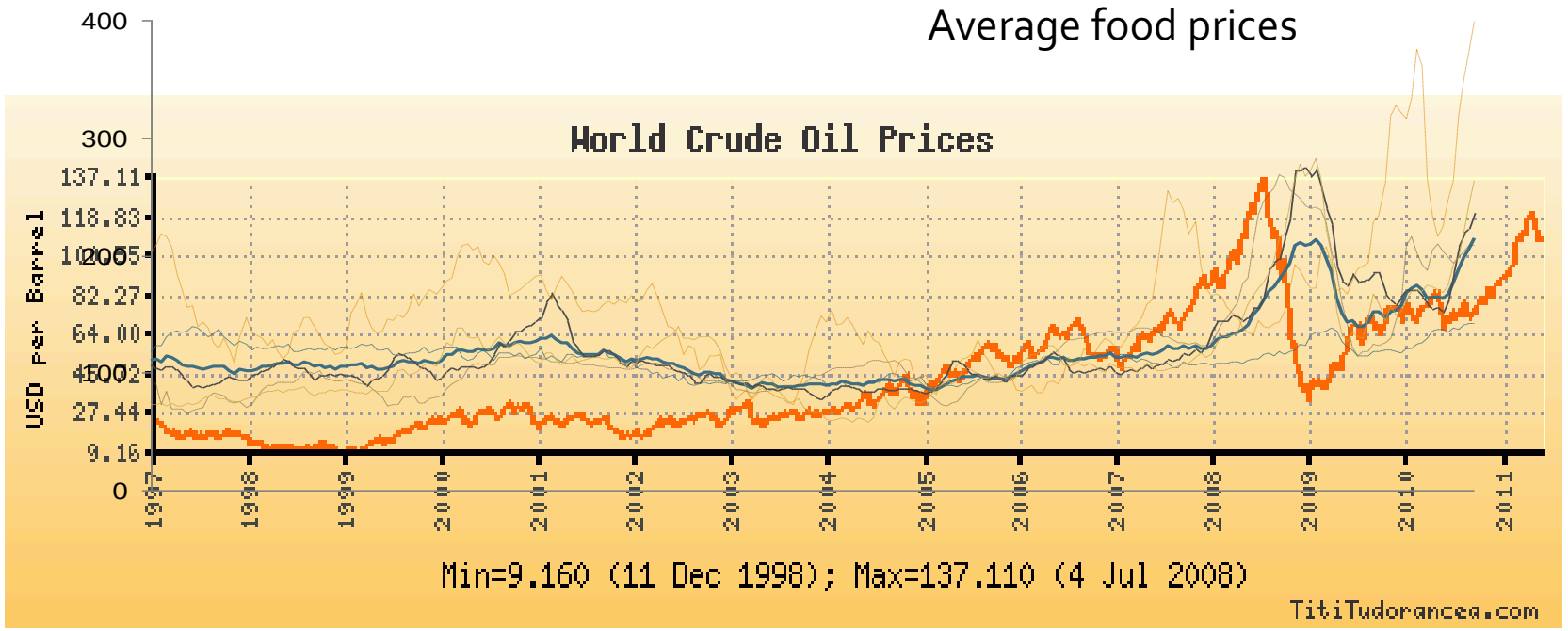
Countries suffering Economic Water Scarcity –needs Energy



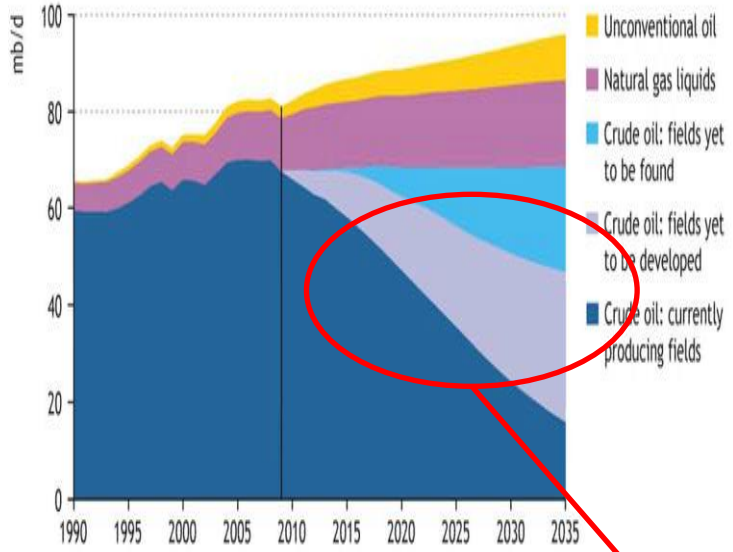
Global crude oil movement

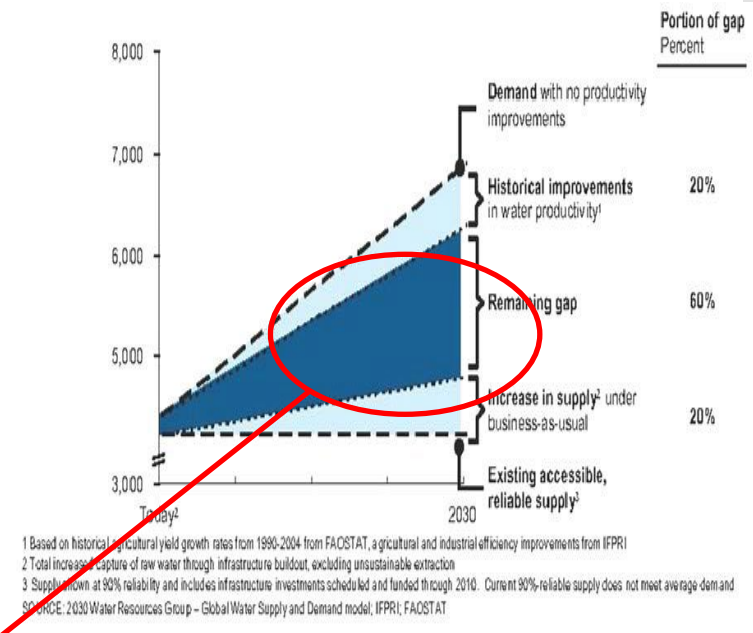
- China – needs Water (Energy): Huge Energy Importer
- Africa – needs Water (Energy): Huge Energy (Water) Exporter

Prices Correlation Between Food and Energy



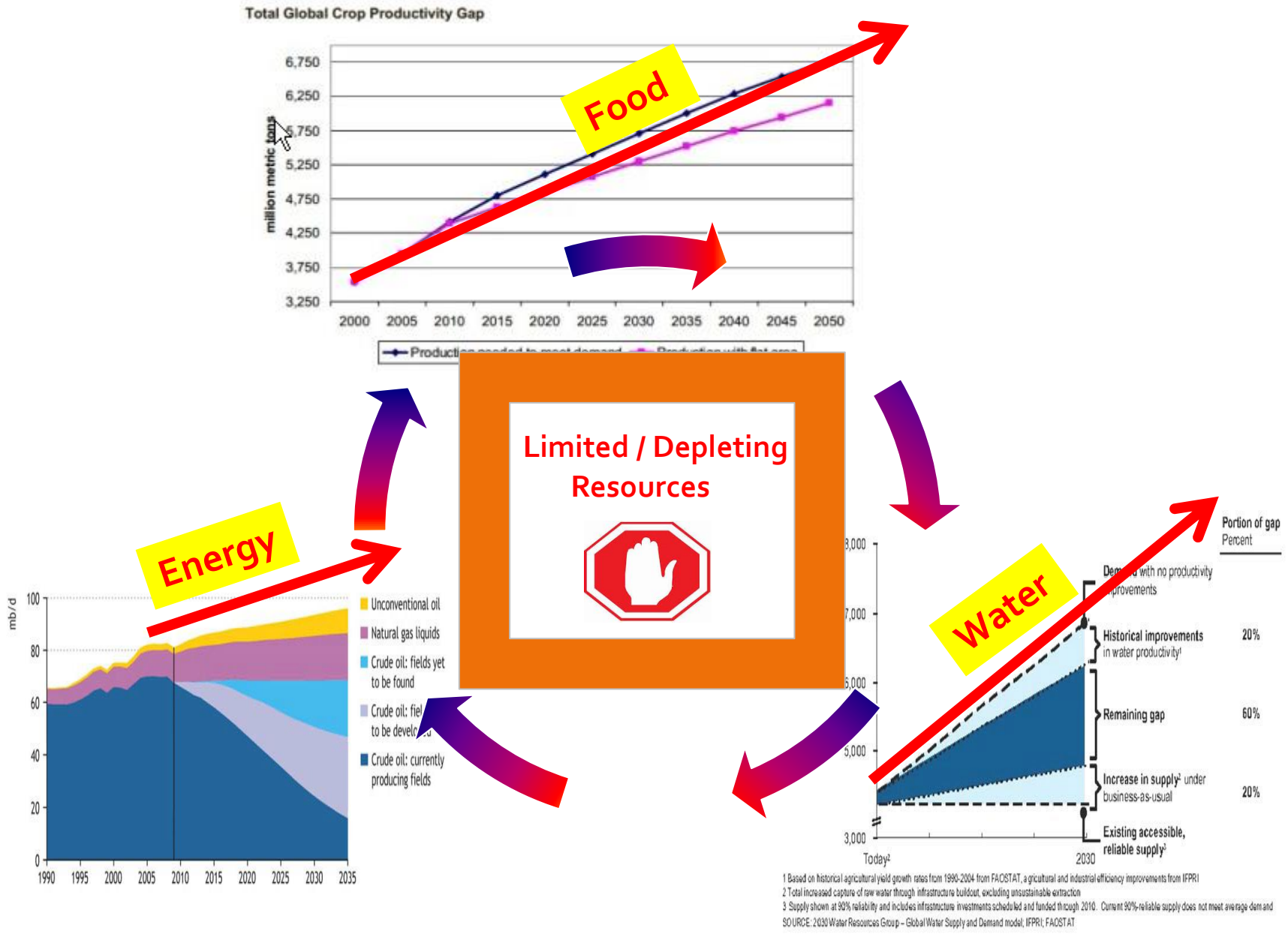
Final Thought: *Resources are a common problem*





Resource Gap: End of cheap, easy to reach and relatively clean resources. In investment terms this is on short term/overnight

Constant Trend of Simultaneously Consumption Growth for Basics Resources



Concluding Points

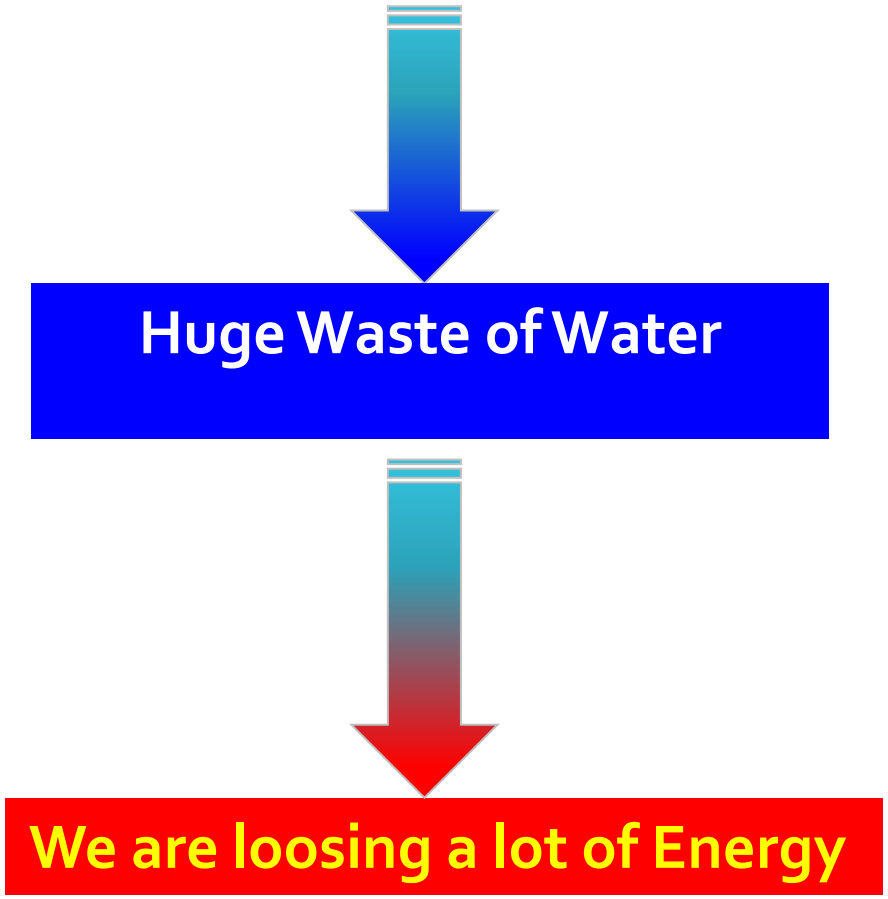
- Forecasts for energy and water are individually not sustainable and probably not achievable
- Movement towards less conventional energy and water sources lead to greater resource use (water, minerals) and often environmental impacts
- The scramble for resources Is and Will generate geopolitical dynamics, potentially coalescing around national interests and alliances,
- Increasingly constraints on water will affect energy choice (in China CTL abandoned because of water use) and visa versa
- Other impacts particularly climate change and food, create further uncertainty for both energy and water availability

Road Map for Sustainable World

- The solution to the depletion of resources as global population increases, must be recognized as a top priority by the global community!
- Only early, cooperative, international actions can avoid catastrophic
- Education!
- New technologies for Energy and Water production
- Energy and Water conservation and Modern agriculture which use less Water Drops for more Crops
- Population growth control and Sustainable development
- New approach for holistic Water and Energy Management

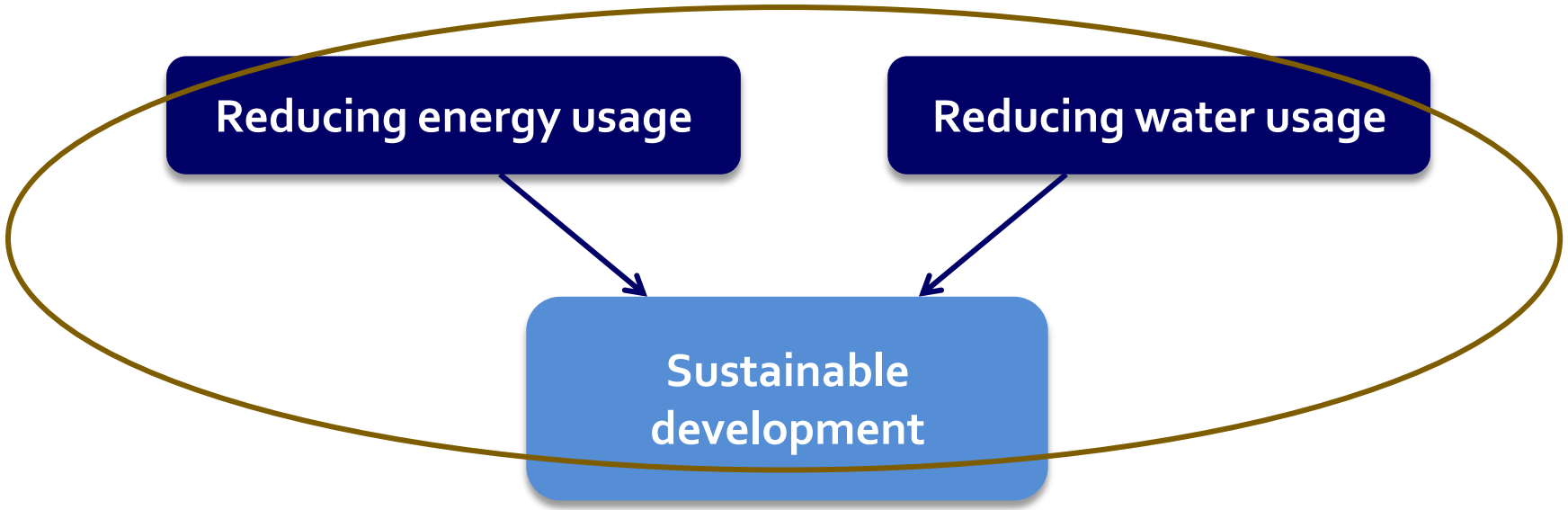
"Simple" Partial Solution = Save food!

In round figures globally, we waste 50% of the food we grow



There is NO Simple Solution!!

The new approach



Current practice – actions to minimize usage and increase production

The new approach:
Holistic view of the energy sector and water sector as a whole,
Advanced operation models and renewable energy

None of this will happen without changing the perception of stakeholders

Promote brainstorming of the main stakeholders - water companies, regulators, consumer organizations and environmental organizations

Synergy of food, energy and water management

and renewable energy Incentive to R&D of advanced operation models, new control technology, irrigation

The Political Dimension

The challenges of natural resource scarcity-food, water, and energy-are closely
interlinked.

Policy and other attempted solutions must take this into account.

But, taking an integrated view of such issues is highly challenging to most
institutions, given the complexity and cross-sector approach required.

The political commitment necessary to take bold action is often hard to muster.

Thank You