

A polar bear is shown standing on a small, isolated piece of white ice that is melting in a dark blue, choppy sea. The bear is looking towards the left of the frame. The overall scene conveys a sense of isolation and the impact of climate change on Arctic wildlife.

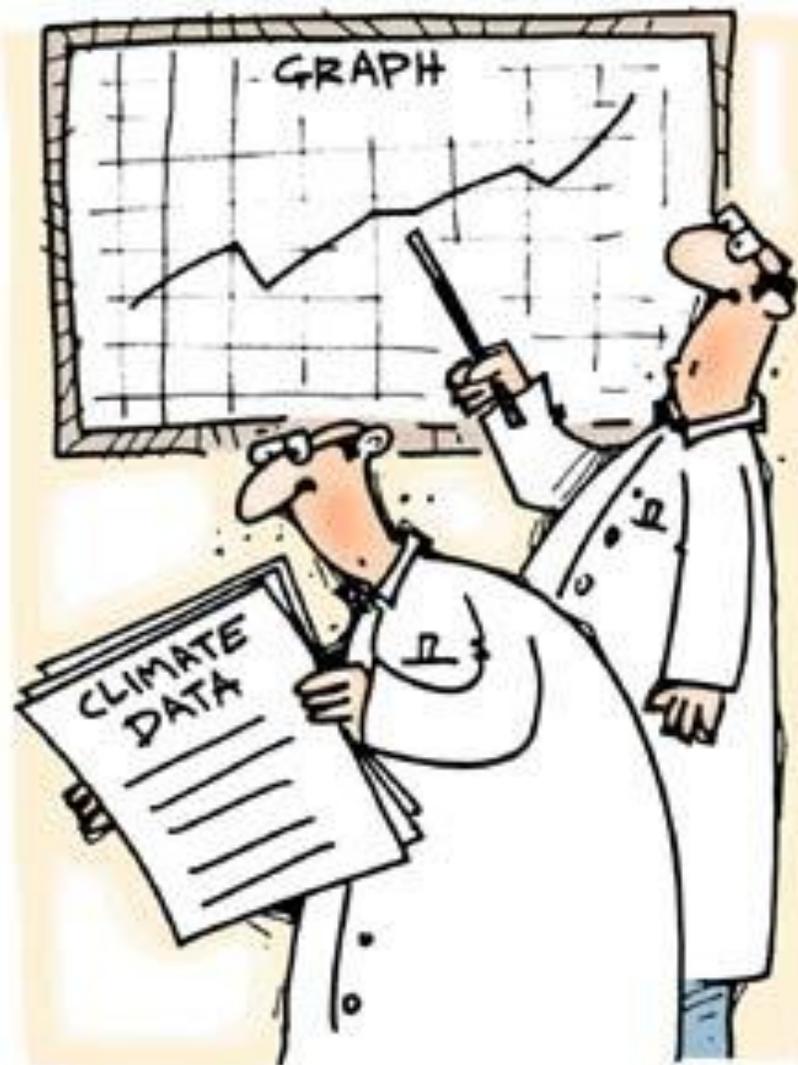
**CLIMATE CHANGE &
NEED FOR SYSTEMS
THINKING PERSPECTIVE**

Outline

- What Is Climate Change?
- Simultaneous Water Scarcity
- Need for Systems Theory Perspective



ASSESSING THE IMPACT OF CLIMATE CHANGE ...



THE SCIENTISTS

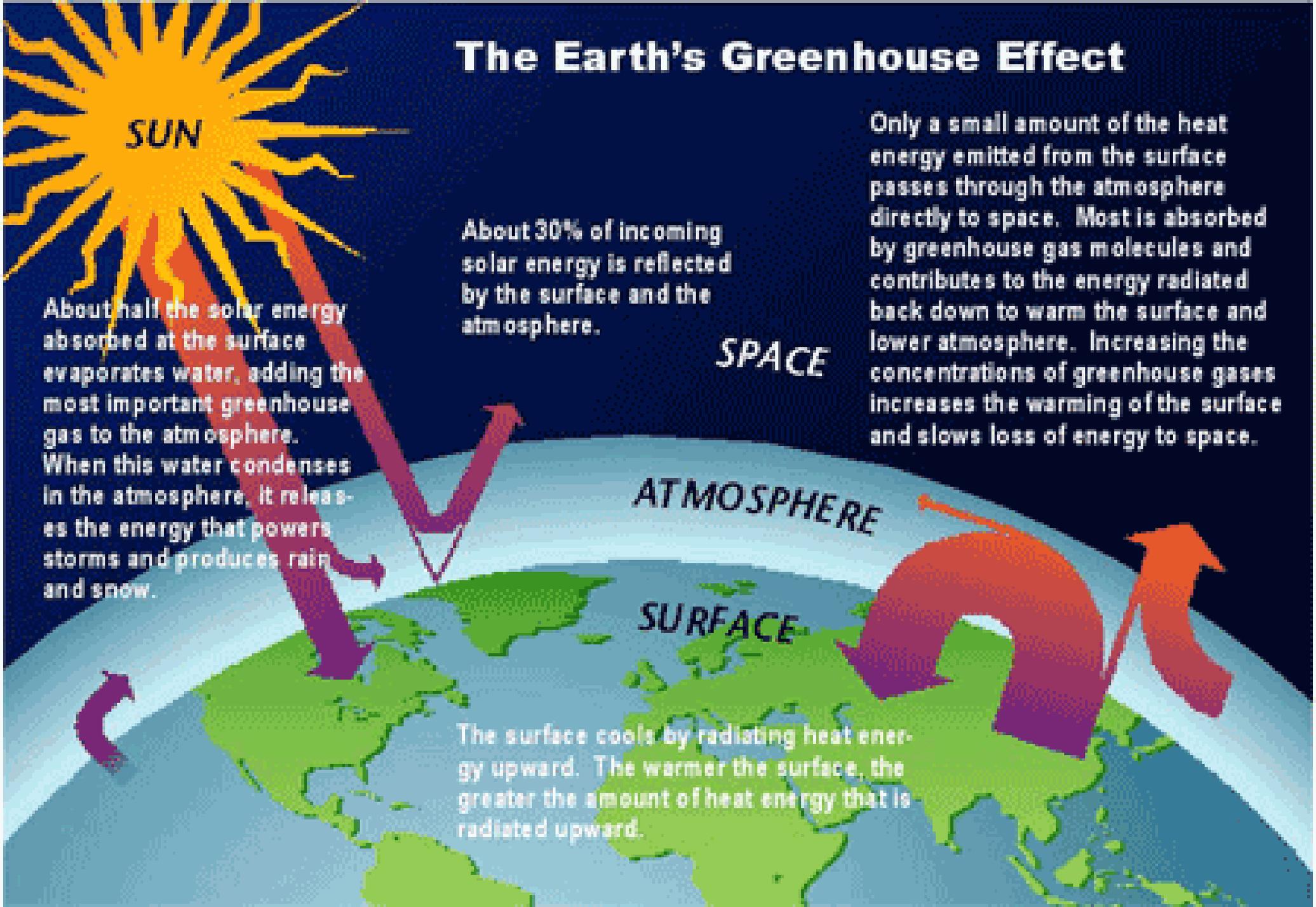


THE POLITICIANS

A photograph of a polar bear and two cubs on a melting ice floe. The bear is standing on the right, looking towards the camera. Two cubs are on the left, one sitting and one standing. The ice is white and blue, with dark water visible in the background and foreground. The text "What Is Climate Change?" is overlaid in the center.

What Is Climate Change?

The Earth's Greenhouse Effect



About half the solar energy absorbed at the surface evaporates water, adding the most important greenhouse gas to the atmosphere. When this water condenses in the atmosphere, it releases the energy that powers storms and produces rain and snow.

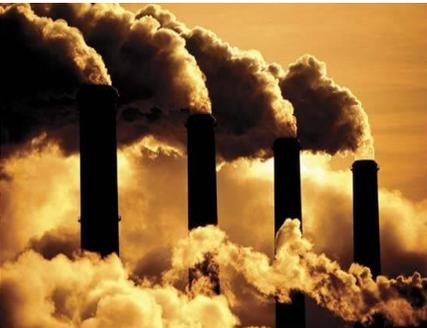
About 30% of incoming solar energy is reflected by the surface and the atmosphere.

Only a small amount of the heat energy emitted from the surface passes through the atmosphere directly to space. Most is absorbed by greenhouse gas molecules and contributes to the energy radiated back down to warm the surface and lower atmosphere. Increasing the concentrations of greenhouse gases increases the warming of the surface and slows loss of energy to space.

The surface cools by radiating heat energy upward. The warmer the surface, the greater the amount of heat energy that is radiated upward.

Why do we need to be concerned

- Sea level rise inundates low level areas – Bangladesh – human migration
- Disrupts migration of birds, fish and animals
- That impacts our cropping cycles – pollination
- Temperature variations too disrupt cropping cycles
- Human food supply gets impacted



This has happened before hasn't it?

- Scale and speed of the warming is different
- Doesn't give a chance for species to adapt
- There are no escape routes
- Desertification for example in the past had escape routes

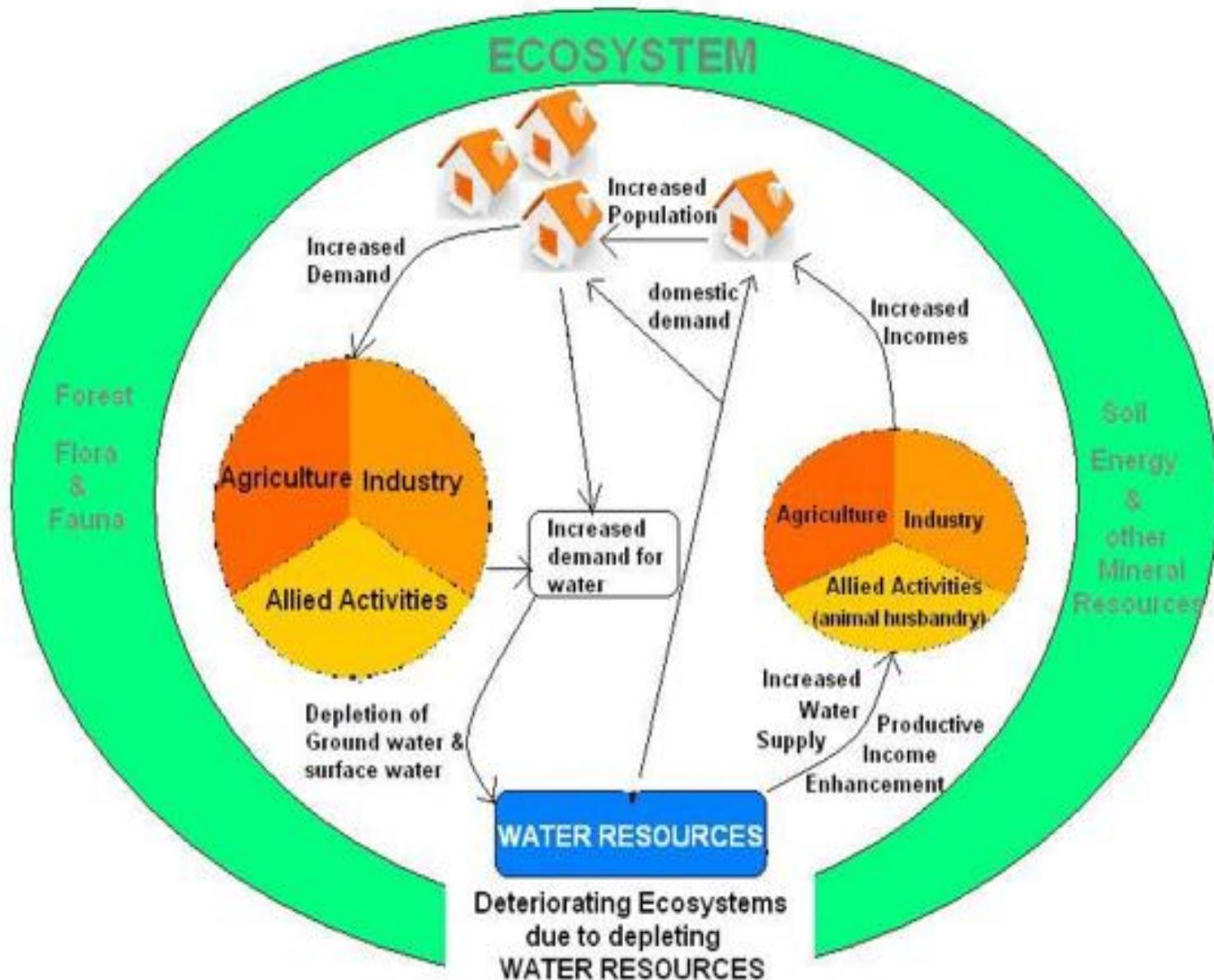


Unforeseen Feedback Loops

- Ice reflects heat water doesn't
- Pine beetle - Rotting trees release methane
- Permafrost melt releases methane
- Ice in the arctic releases methane
- Oceans release methane – Methane Hydrate
- What amplifying forces lie ahead?

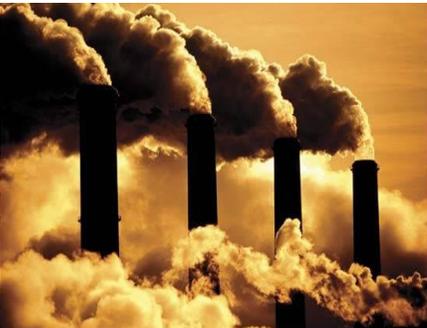


A Simple Causal Loop Diagram



A Local Example

- Hyderabad until 1970 managed with water from Himayat Sagar, Osman Sagar and Manjira.
- Today all the above plus from Krishna River 220 Km away.
- Plans are on to get water from Godavari also about 200 + Km away.



The water footprint:
making a link between consumption in one place and
impacts on water systems elsewhere

Shrinking Aral Sea

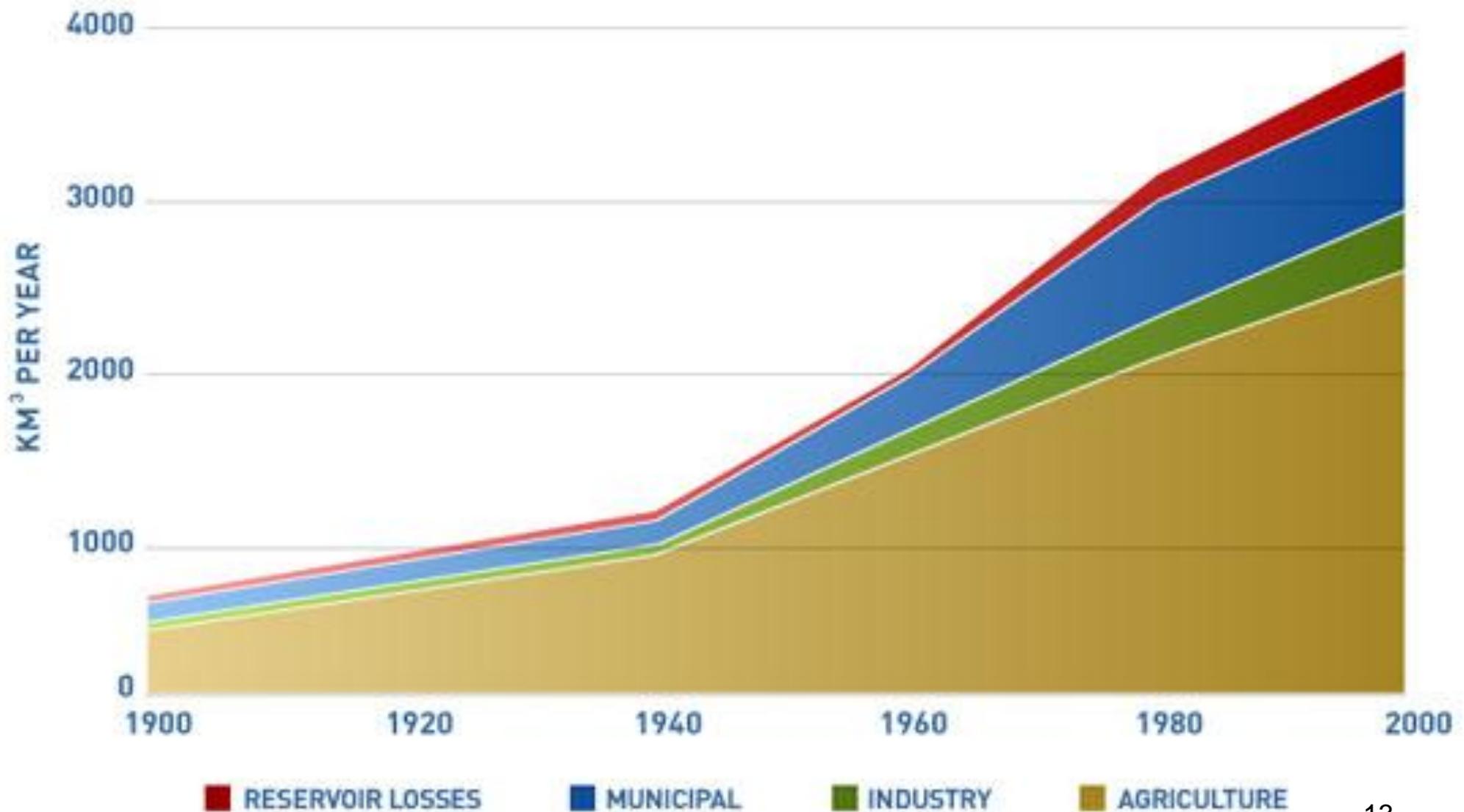
An aerial photograph showing the dramatic reduction of the Aral Sea. The water has receded, leaving a vast, flat expanse of light-colored sand and silt. Several large, rusted fishing vessels are stranded on the seabed, their hulls and masts clearly visible. The scene illustrates the severe environmental impact of water diversion and consumption in the region.

Virtual or Embedded Water

- **VIRTUAL WATER** is a term that links water, food, and trade. It is the amount of water that is embedded in food and products needed for its production.



ESTIMATED WORLD WATER USE



Did you Know?

- The volume of the Earth's water resource is the same as it was 2,000 years ago.
- 2,000 years ago, Earth's population was 3% of the current population of 6 billion.
- Earth's population could approach 9 billion by the year 2050.
- We all need to reduce our water footprint.



Water Requirement



This is a **global average** and **aggregate** number. Policy decisions should be taken on the basis of:

1. Actual water footprint of certain coffee at the precise production location.
2. Ratio green/blue/grey water footprint.
3. Local impacts of the water footprint based on local vulnerability and scarcity.

Water Requirement



Water Requirement



VIRTUAL WATER

HOW MUCH

Water is part of any production process.

We need it to grow apples, as well as produce a packet of crisps.

The amount of water needed in this process depends where we are because climate and agricultural practices will be the most important players.

1 cup of tea



35
litres

1 cup of coffee



140
litres

1 glass of wine



120
litres

1 glass of beer



75
litres

1 glass of apple juice



190
litres

WATER IS NEEDED

1 glass of orange juice



170

litres

1 apple



70

litres

1 egg



135

litres

1 glass of milk



200

litres

1 orange



50

litres

1 potato



25

litres

TO PRODUCE...?

1 tomato



13

litres

1 slice of bread



40

litres

1 slice of bread with cheese



90

litres

1 bag of potato crisps



185

litres

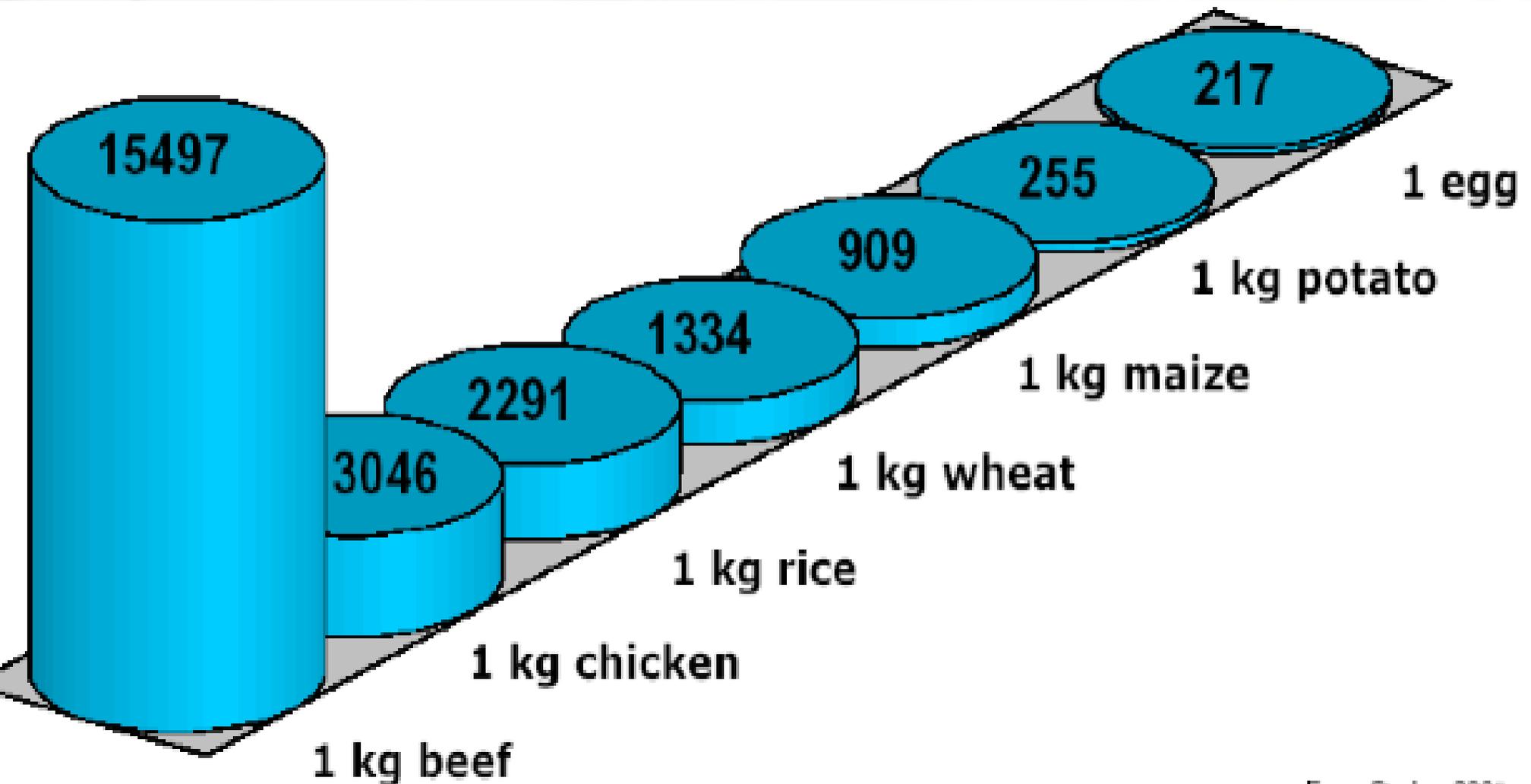
1 hamburger



2400

litres

Food & Water for Thought

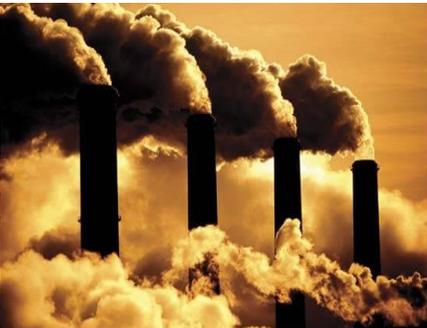


Climate Change & Water

- Less stable climate – more extreme events
- Increased frequency of droughts and floods
- More evaporation losses from surface water bodies
- Subtropics and mid-latitudes, where much of the world's poorest populations live, expected to become substantially drier, leading to water scarcity.
- Glacial melt variations and consequent river flow changes
- Reduced precipitation in some arid regions could trigger exponentially larger drops in groundwater tables.

Climate change and Food

- Implications for agricultural production -
 - Changes in crop yield – soil moisture levels
 - Variations in plant tolerance to pests
 - Prevalence of crop disease, weeds, and insect & pests.
- Freshwater fisheries, many of which supply food to the world's poorest populations



Other Related Hotspots



WHAT CAN WE DO?

CHOOSING ENERGY-EFFICIENT INDUSTRIES

How do we contribute to global warming? In most parts of the world, when we use energy, we produce CO₂ emissions

Lowering emissions curb climate change

Complexity, Reductionism and a Quest for Simplicity

- **“Complex problems have simple, easy to understand, wrong answers.” - *Henry Louis Mencken***





Now That We Know...
Let's Save Ourselves!



Difference Between Past And Present

- Problems of past societies were isolated – not global
- Now we have a market that we worship – Obsessed with economic growth
- We look to it for solutions
- Finance rules our responses / reactions
- Short attention spans
- Specialization vs generalization
- Focused vs big picture
- Not my problem – there are other experts looking into it
- In 'Pursuit of (Material) Happiness' – is THE way to live
- Positive thinking
- Whistle blowers are labeled pessimists
- Media
- Distractive symptoms – will make us fight the wrong war
- We will focus on the battles and lose the war
- We may just continue blaming each other rather than recognizing that this is a species problem



How can we Act

- Government can help by using the market to provide signals – eg. Making fossil fuels costlier
- Public transportation
- Provide ourselves continuous feedback – eg. Elec. meters
- Institutional level steps – leads to group involvement
- Become aware
- Water is energy intensive – conserve water
- Paper – removes green cover and is energy intensive
- Eat local, not Chinese apples
- Give time – Younger generation is more prone to the damage



We are in Denial

- **“It is difficult to get a man to understand something when his salary depends on his not understanding it”. -**

Upton Sinclair

