BHARATHIDASAN UNIVERSITY
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Programme: M.Sc., Environmental Science

Course Title:Water, Soil Pollution and management
Course Code : CC04

Unit-I
Sources of Water and Pollution

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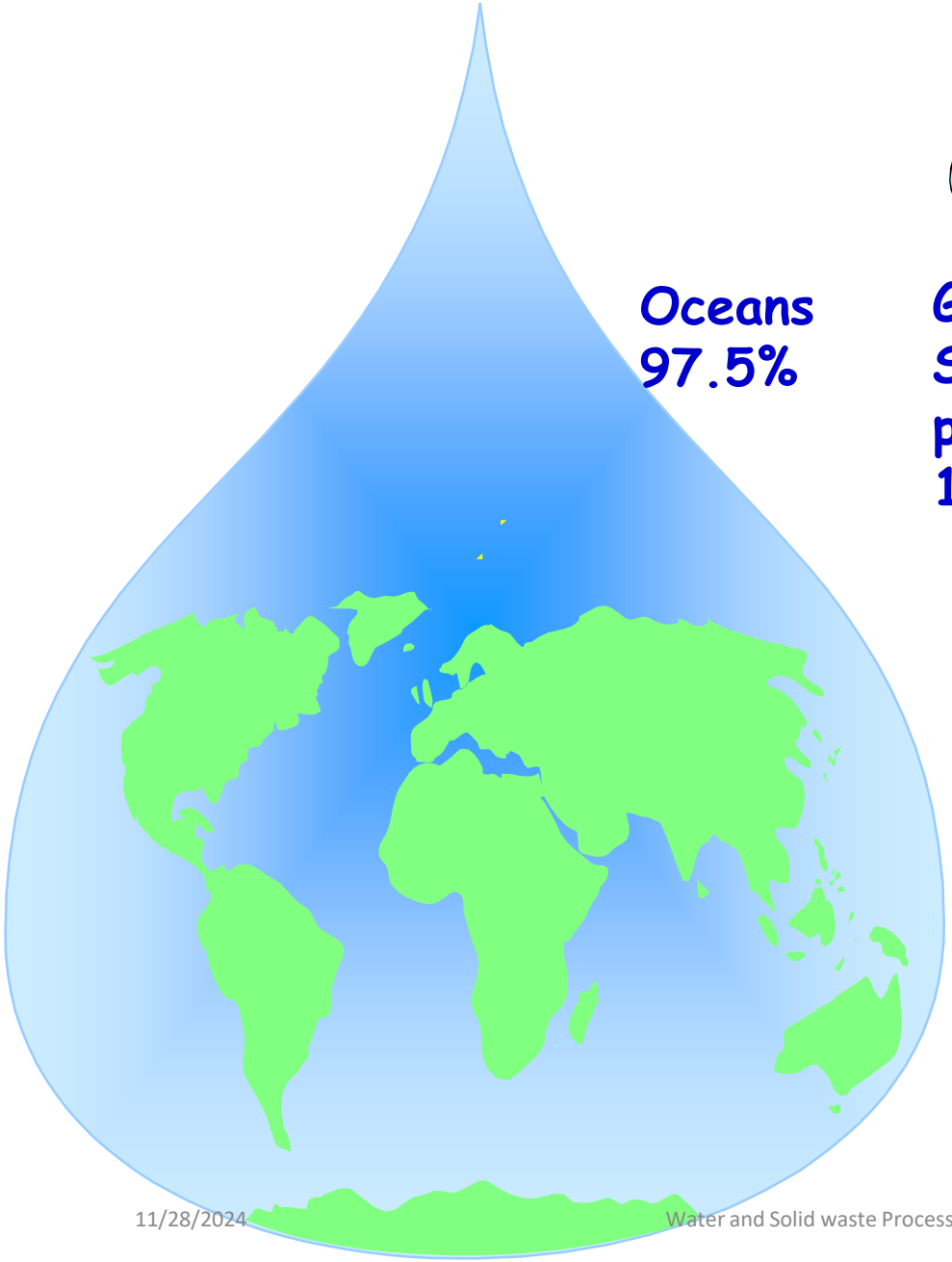
- This ppt emphasizes the importance of water and the current status of the same.
- This ppt focuses the stress on the availability of water in the current scenario.
- Hence, this ppt makes the students understand the necessity to know about the requirement of water for survival and the actual trend of using the commodity.



Oceans
97.5%

Glaciers, Snow & permafrost
1.725%

Ground water
0.075%

Lakes, swamps & rivers
0.025%

The world's water resources

Global Overview

- While 67%-70% of Earth’s surface is covered by water, only less than 2.7% of global water is freshwater.
- Most of the freshwater (2.05%) are locked in ice caps and glaciers. Only less than 0.7 – 1 % is available for human use.
- Over two thirds of the earth's surface is covered with water, 97.2% of which is contained in the five oceans (The artic, antartic, Pacific, Indian and atlantic). Atmospheric water vapor can be seen as clouds, contributing to the earth's albedo.
- Humans need water for drinking, sanitation, agriculture, and industry; and contaminated water can spread illnesses and disease vectors, so clean water is both an environmental and a public health issue.

Simplified table of water requirements for survival (per person)

Type of need	Quantity	Remarks
Survival (drinking and food)	2.5 to 3 lpd	Depends on climate and individual physiology
Basic hygiene practices	2 to 6 lpd	Depends on social and cultural norms
Basic cooking needs	3 to 6 lpd	Depends on food type, social and cultural norms
Total	7.5 to 15 lpd	

However, research indicates that 20 liters per capita per day is the minimum quantity of safe water required to realise minimum essential levels for health and hygiene

Source: Adapted from Sphere. Also see WHO, 2011. Guidelines for drinking-water quality, 4th edition. World Health Organization, Geneva. http://www.who.int/water_sanitation_health/publications/2011/dwq_chapters/en/index.html

- **Key facts as per WHO regarding drinking water-**
- In 2017, 71% of the global population (5.3 billion people) used a safely managed drinking-water service – that is, one located on premises, available when needed, and free from contamination.
- 90% of the global population (6.8 billion people) used at least a basic service. A basic service is an improved drinking-water source within a round trip of 30 minutes to collect water.
- 785 million people lack even a basic drinking-water service, including 144 million people who are dependent on surface water.
- Globally, at least 2 billion people use a drinking water source contaminated with faeces.
- Contaminated water can transmit diseases such diarrhoea, cholera, dysentery, typhoid, and polio. Contaminated drinking water is estimated to cause 485 000 diarrhoeal deaths each year.
- By 2025, half of the world's population will be living in water-stressed areas.
- In least developed countries, 22% of health care facilities have no water service, 21% no sanitation service, and 22% no waste management service.

The origin of sustainable development goals

- In 1972, governments met in Stockholm, Sweden for the United Nations Conference on the Human Environment, to consider the rights of the family to a healthy and productive environment.
- In 1983, the United Nations created the World Commission on Environment and Development (later known as the Brundtland Commission), which defined sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs".
- In 1992, the first United Nations Conference on Environment and Development (UNCED) or Earth Summit was held in Rio de Janeiro, where the first agenda for Environment and Development, also known as Agenda 21, was developed and adopted.

- In 2012, the United Nations Conference on Sustainable Development (UNCSD), also known as Rio+20, was held as a 20-year follow up to UNCED. Colombia proposed the idea of the SDGs at a preparation event for Rio+20 held in Indonesia in July 2011.
- In September 2011, this idea was picked up by the United Nations Department of Public Information 64th NGO Conference in Bonn, Germany.
- The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.
- As the lead UN development agency, UNDP is well-placed to help implement the Goals through theirwork in some 170 countries and territories. The outcome document proposed 17 sustainable development goals and associated targets.

IT'S 2015. NOW WHAT?

The new post-2015 development agenda builds on the Millennium Development Goals, eight anti-poverty targets that the world committed to achieving by 2015. Enormous progress has been made on the MDGs, showing the value of a unifying agenda underpinned by goals and targets. Yet despite this success, the indignity of poverty has not been ended for all.

The proposed framework has 17 Goals and 169 targets:

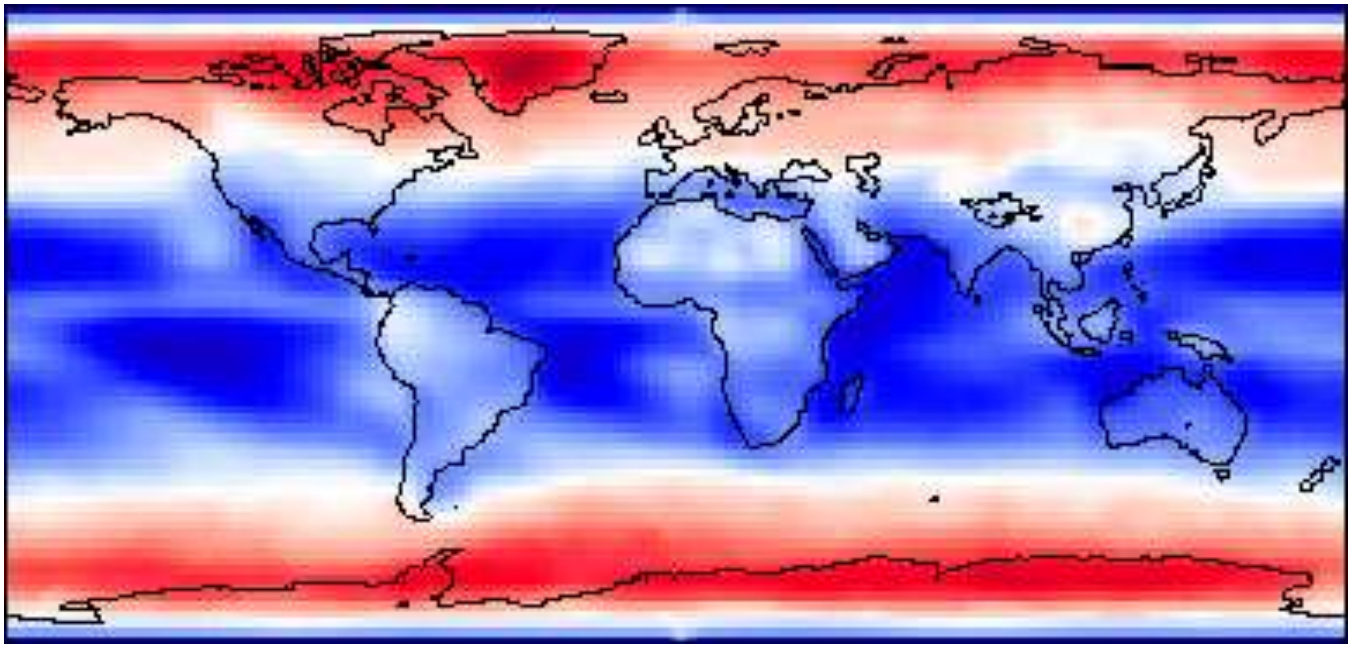
The United Nations summit for the adoption of [illegible] Sept. 25 to 27, 2015, in New York and convened as a high-level plenary meeting of the General Assembly.

SOURCE: SUSTAINABLEDEVELOPMENT.UN.ORG

17 Sustainable Development Goals (SDGs)

- In September 2015, the General Assembly adopted the 2030 Agenda for Sustainable Development that includes 17 Sustainable Development Goals (SDGs). Building on the principle of "leaving no one behind", the new Agenda emphasizes a holistic approach to achieving sustainable development for all.
- The 17 sustainable development goals (SDGs) to transform our world:
- GOAL 1: No Poverty ;GOAL 2: Zero Hunger GOAL 3: Good Health and Well-being GOAL 4: Quality Education GOAL 5: Gender Equality **GOAL 6: Clean Water and Sanitation** GOAL 7: Affordable and Clean Energy GOAL 8: Decent Work and Economic Growth GOAL 9: Industry, Innovation and Infrastructure GOAL 10: Reduced Inequality GOAL 11: Sustainable Cities and Communities GOAL 12: Responsible Consumption and Production GOAL 13: Climate Action GOAL 14: Life Below Water GOAL 15: Life on Land GOAL 16: Peace and Justice Strong Institutions GOAL 17: Partnerships to achieve the Goal

Annual (1987) reflectivity of the Earth's surface Source:PhysicalGeography.net - ebook



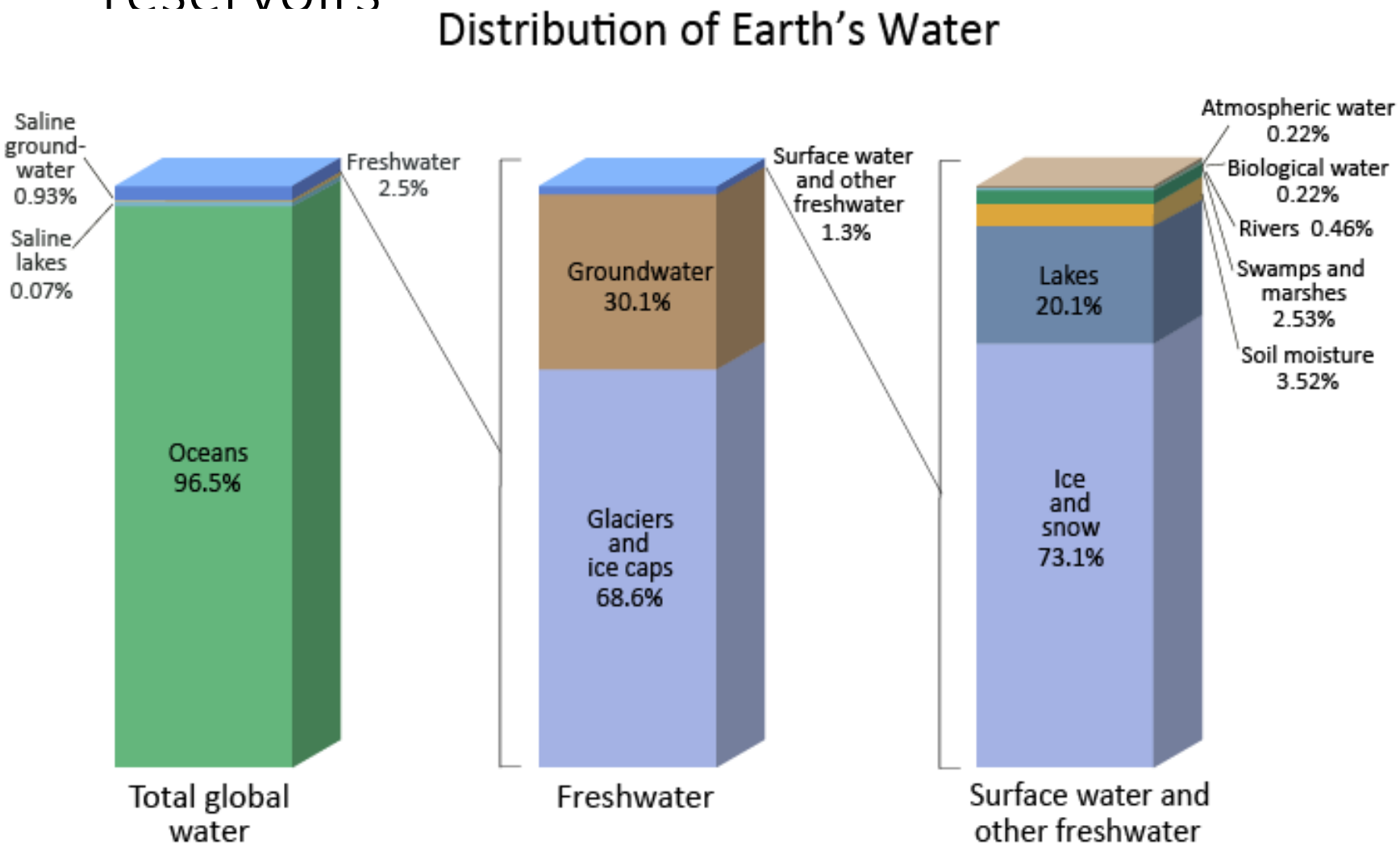
Albedo

- **The albedo or reflectivity of the Earth's surface varies with the type of material that covers it. For example, fresh snow can reflect up to 95% of the insolation that reaches it surface. Some other surface type reflectivities are as follows:**
- **Dry sand 35 to 45%**
- **Broadleaf deciduous forest 5 to 10%**
- **Needle leaf coniferous forest 10 to 20%**
- **Grass type vegetation 15 to 25%**

Introduction

- Water resources are under stress around the world. Rivers, lakes, and underground aquifers supply fresh water for irrigation, drinking, and sanitation, while the oceans provide habitat for a large share of the planet's food supply.
- Today increase of agricultural activities, over-use and pollution threaten these valuable resources in many parts of the globe.
- Providing safe drinking water for more than 1 billion people who currently lack it is one of the greatest public health challenges facing national governments today.
- In many developing countries, safe water, free of pathogens and other contaminants, is unavailable to much of the population. However water contamination remains a major concern even for the developed countries with good water supplies and advanced treatment systems.

Distribution of water in the water cycle's reservoirs



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.

- Scientists widely predict that global climate change will have profound impacts on the hydrologic cycle, and that in many cases these effects will make existing water challenges worse. "Earth's Changing Climate," rising global temperatures will alter rainfall patterns,making them stronger in some regions and weaker in others, and may make storms more frequent and severe in some areas of the world.

- Warming will also affect other aspects of the water cycle by reducing the size of glaciers, snow packs, and polar ice caps and changing rates of evaporation and transpiration. In sum, climate change is likely to make many of the water-management challenges that are outlined in this unit even more complex than they are today.

- For example, on June 22, 1969, the Cuyahoga River in Cleveland, Ohio, caught fire when sparks ignited an oily slick of industrial chemicals on its surface. Today, the United States and western European countries have reduced pollution discharges into rivers and lakes, often producing quick improvements in water quality. These gains show that when societies make water quality a priority, many polluted sources can be made usable once again. Furthermore, in the United States water consumption rates have consistently declined over the last several decades.

Scarcity of fresh water

- On a global basis, fresh water is a increasingly scarce resource. It is partially caused by increasing population coupled by change of consumption pattern and climate changes.

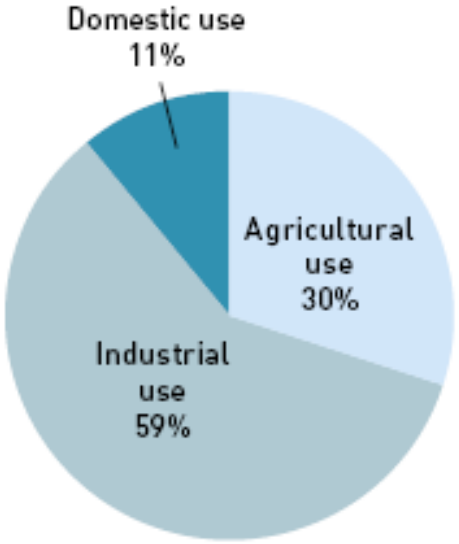
Water consumption for food production (II)

Product	Unit	Equivalent water in cubic metres
Bovine, cattle	head	4,000
Sheeps and goats	head	500
Meat bovine fresh	kilogram	15
Meat sheep fresh	kilogram	10
Meat poultry fresh	kilogram	6
Cereals	kilogram	1.5
Citrus fruit	kilogram	1
Palm oil	kilogram	2
Pulses, roots and tubers	kilogram	1

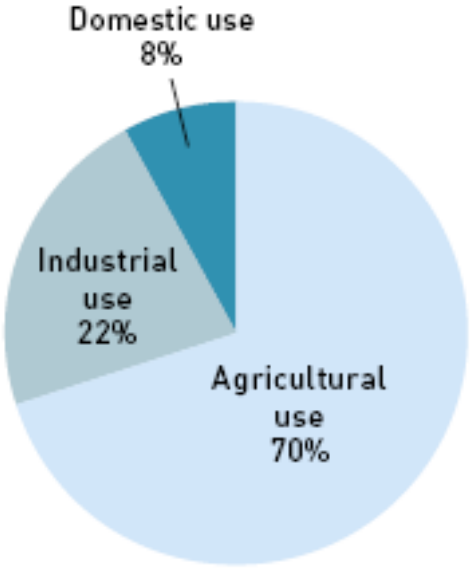
Source: FAO, 1997b.

Competing water uses -Manual on Scientific Communication for Postgraduate Students and Young Researchers in Technical, Natural, and Life Sciences. A practical guide for the preparation of theses, papers, posters, and other scientific documents

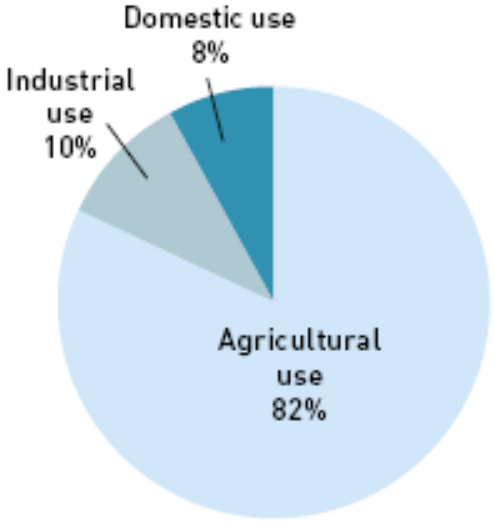
Book · August 2017 DOI 10.5772/intechopen.69870 ISBN 978-953-51-3442-8.Publisher: INTECH



Competing water uses
(high-income countries)

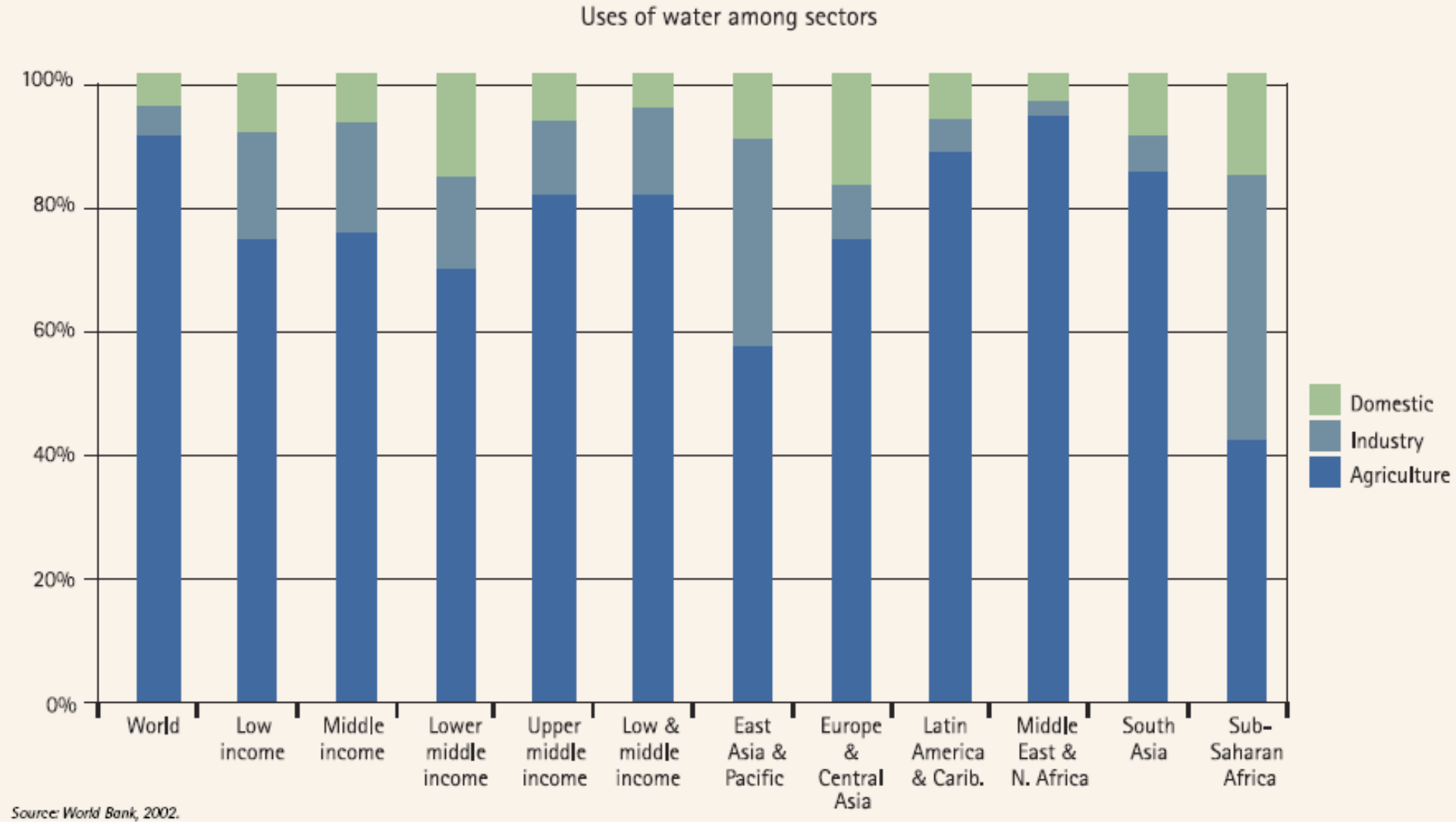


Competing water uses
(world)



Competing water uses
(low- and middle-income
countries)

Water use by industry vs. domestic use and agriculture



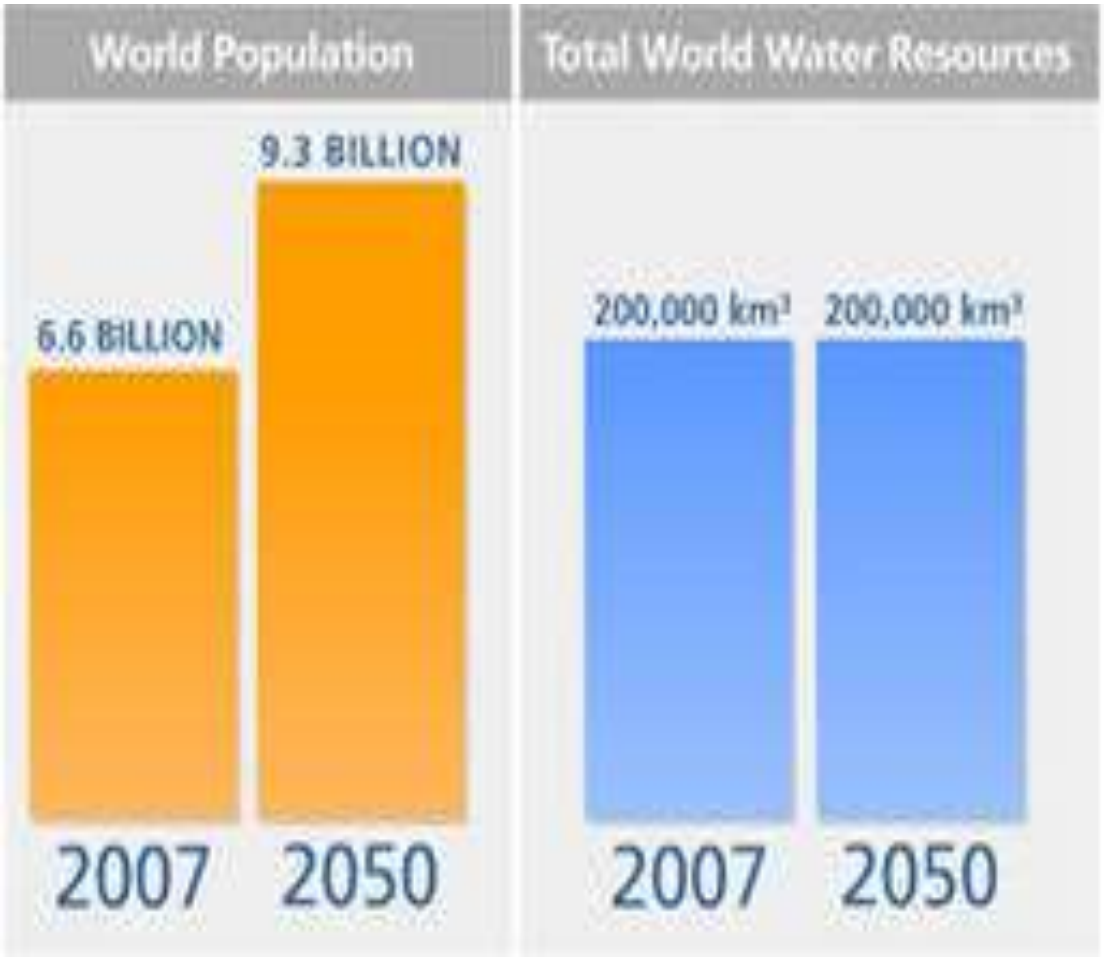
Problems related to Water crisis

- Inadequate access to safe drinking water by over 1.1 billion people
- Groundwater overdrafting leading to diminished agricultural yields
- Overuse and pollution of water resources harming biodiversity
- Regional conflicts over scarce water resources sometimes resulting in warfare.

Threats to fresh water resources

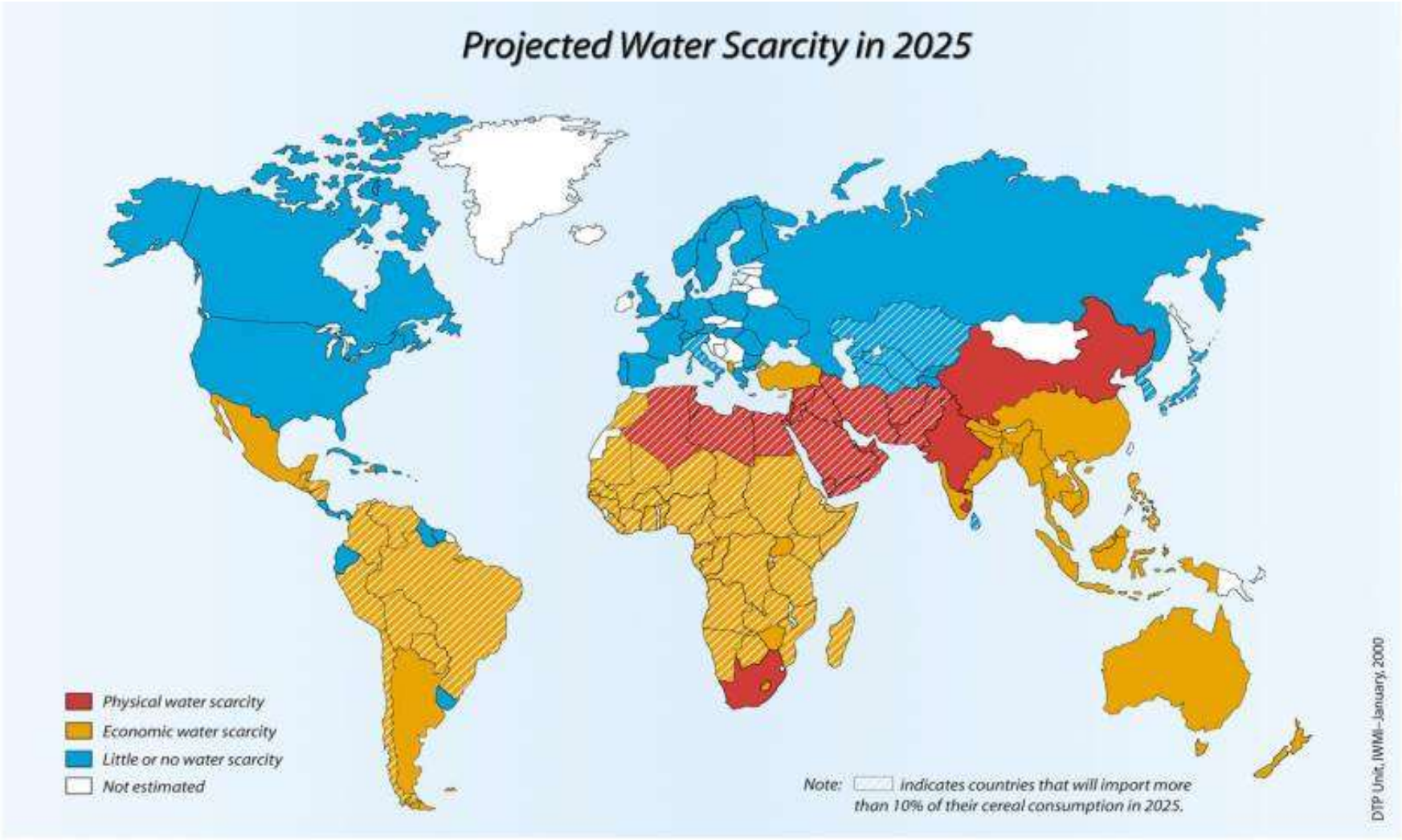
- Climate change causes change in frequencies of droughts and floods.
- Depletion of aquifers caused by over-consumption as a result of population growth.
- Pollution and contamination by sewage, agricultural and industrial runoff.

Distribution of population and water
Ref:https://www.fewresources.org/water-scarcity-issues



Fresh Water Outlook

- Estimated from existing data, some countries are going to experience serious shortage of fresh water supply in the coming 20 years time.
- China, India and South Africa and Middle East countries may among the most adversely affected countries.



IWMI
INTERNATIONAL WATER MANAGEMENT INSTITUTE

Prepared by IWMI as input for the World Water Vision, The Hague, March, 2000.

http://iwmi.org

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