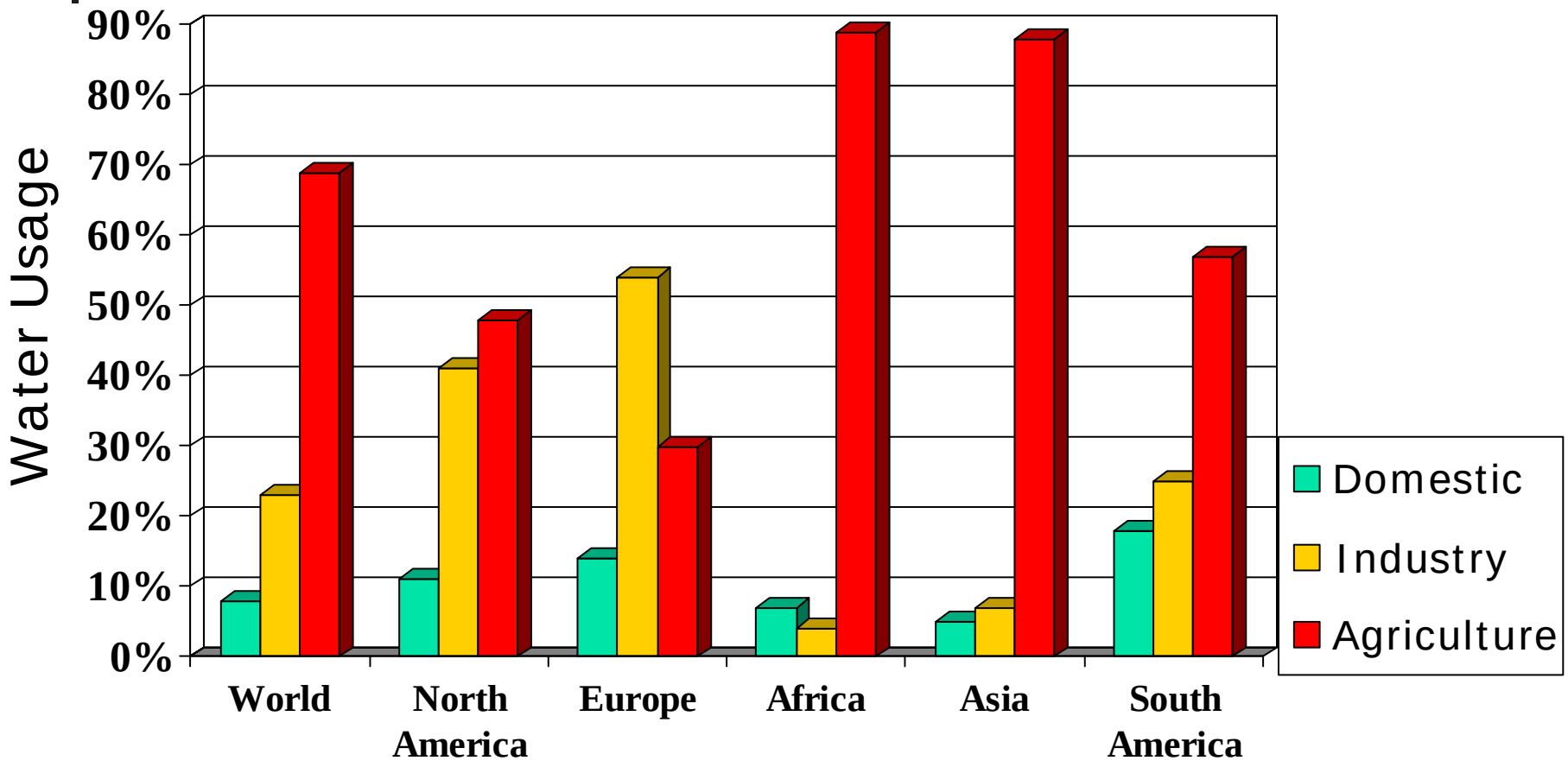
WATER POLLUTION

WATER

- 71% from earth surface.
  - 97% salt water (sea)
  - 3% fresh water
    - 87% ice and glaciers, underground, air.
    - 13% surface water (0.4% total water).
- Function
  - Domestic.
  - Industry.
  - Agriculture.
  - Recreation.
  - Safety and security.

WATER

- 70% total human body wt.
- 30 – 40% bone mass.
- Body functions:
  - Absorption of oxygen at alveoli.
  - Control of body temperature.
  - Blood component.
  - Digestion in kidneys and intestine.
- Alteration of 10% body content – health problem.
- Alteration of 20% body content – death.


Water Usage
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
World
North America
Europe
Africa
Asia
South America
Domestic
Industry
Agriculture

WATER POLLUTION

- Water pollution occurs when harmful substances are released into the water in large quantities which cause damage to people, wildlife, or habitat or indirectly into water bodies without proper treatment to remove harmful compounds.

WATER POLLUTION

- Ideal water supply
  - Quality.
  - Quantity.
- Water quality parameter
  - Physical.
    - Suspended solid (SS), color, taste, smell, temp.
  - Chemical.
    - Dissolved substances, alkalinity, hardness, fluoride, heavy metal, organic compound, nutrient (nitrogen & phosphorus), pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD).
  - Biology.
    - Bacteria, virus, protozoa, helminthes.

SOURCES OF WATER POLLUTION

- Uncontrolled land development since colonial era (end 19th century).
  - Agriculture (logging, estate, farms).
  - Mining (tin, gold, cuprum).
  - Industrialization.
  - Housing development.
  - Hydro dam.

SOURCES OF WATER POLLUTION

- Pollution of clean water resources
  - Erosion at water catchments areas.
  - Erosion of rivers.
  - Effluent from rubber and palm oil factories.
  - Effluent from mining site.
  - Effluent from industry area.
  - Effluent from farming area.
  - Effluent from domestic area.

SOURCES OF WATER POLLUTION

SOURCES	YEAR			
	1978	1979	1985	1990
Palm Oil factory	1	1	4	6
Rubber factory	2	2	5	5
Mining	3	3	3	3
Industry	4	5	1	1
Farming	5	6	2	2

Mohamad Ismail Yaziz 1993

SOURCES OF WATER POLLUTION

- Puncak Niaga, 2001
  - Effluent from factories and agricultural activities.
  - Land and forest clearance activities.
  - Mining.
  - Solid waste.
  - Wastewater.

SOURCES OF WATER POLLUTION

- DOE, 1998
  - River cleanliness
    - 25% clean (68.2% - 1989)
    - 65% moderately polluted (29.3% - 1989)
    - 10% polluted (2.5% - 1989)
  - Source of pollution
    - 43% from farming and domestic.
    - 34% from forest clearance and development.
    - 21% from industries.

SOURCES OF WATER POLLUTION

- DOE, 1998
  - Marin pollution
    - 94.5% by oil and grease.
    - 73.7% by suspended solids.
    - 28.7% by *E.coli*
  - Underground water pollution
    - 3% contents mercury, cadmium and lead.
    - 23% contents phenolic.
    - 40% contents arsenic.

TYPE OF POLLUTION

- pH (expressing the acidity or alkalinity of a solution).
- Organic content (BOD).
- Suspended solids.
- Ammonium-nitrogen.
- Micro bacteria.
- Heavy metals
  - lead, cuprum, cadmium.
- Pesticides

WATER POLLUTION

- Will cause
  - Soil contamination.
  - Air contamination.
  - Food chain contamination.
  - Esthetic.
- Lack of clean water supply for
  - Domestic demand.
  - Industry use.
  - Agriculture use.

WATER POLLUTION

- Will also cause
  - Breeding of diseases vector.
  - Spreading of water borne diseases.
  - Food poisoning.
  - Skin problem.

WATER POLLUTION

- PBB (Polybrominated biphenyl)
  - 80% of diseases in developing countries are due to water supply contamination.
  - 4 – 5 million child died every year due to water supply contamination.
  - More than 1 million died after severe diarrhea.

WATER POLLUTION

- Including chemical, physical and biological content.
- Following standards and guidelines.
- Using measurement of
  - pH, color, cloudiness, conductivity.
  - Heavy metals, nutrient, pesticide, microbe.
- Good water quality is where it free from disease organism, dangerous chemical substances, radioactive, accepted taste and smell.