Welcome

# POPULATION TRENDS AND IMPACT ON RESOURCES

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POPULATION AND IMPACT ON RESOURCES

- **Population Density:** Number of individuals per unit area

- **Carrying capacity:** Number of individuals an environment can support without significant negative impacts to the given organism and its environment.

- **Ecological foot print:** Measure of human demand on the Earth's ecosystems.

World population growth
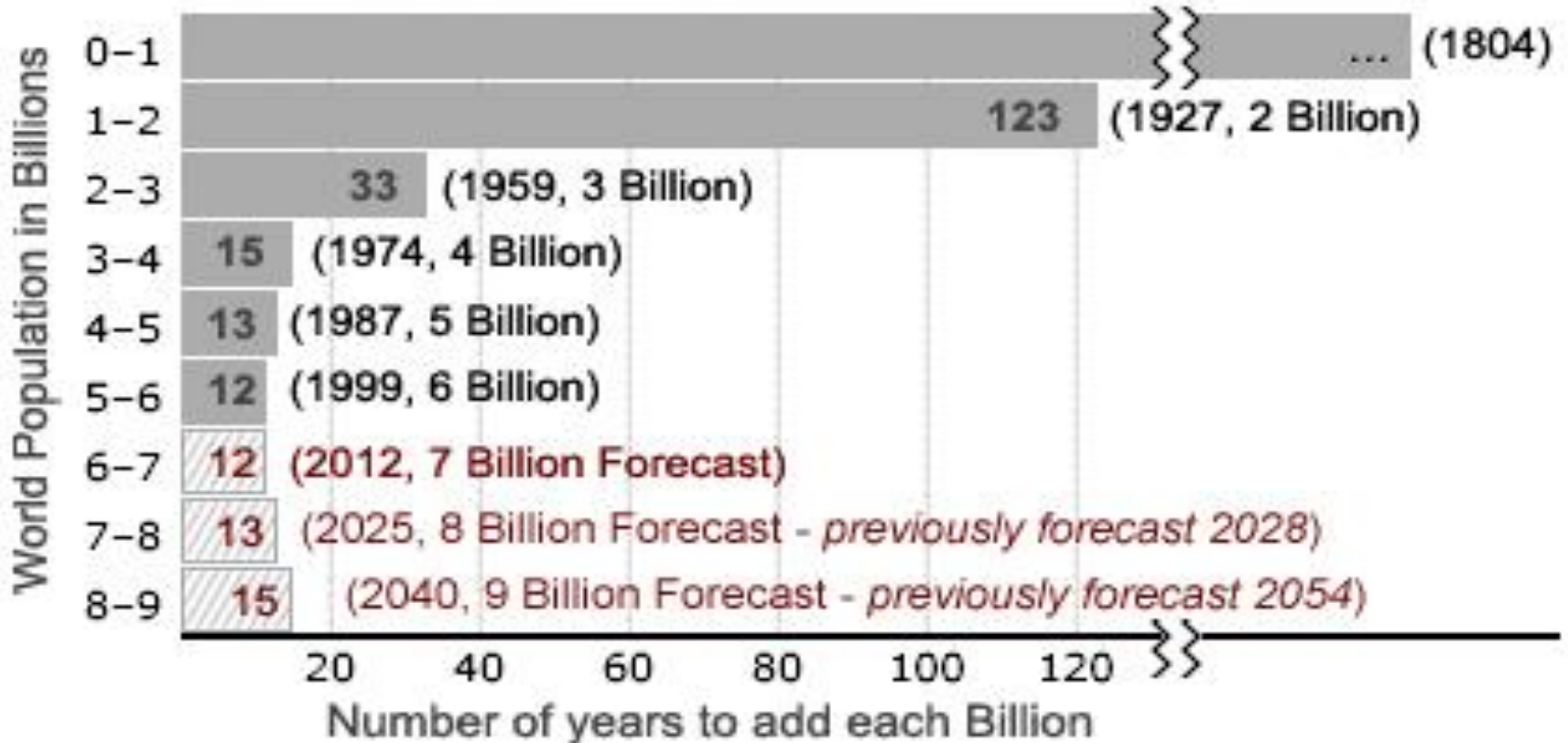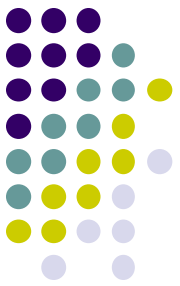
20th century started with 1.6 billion people and ended with 6.1 billion people
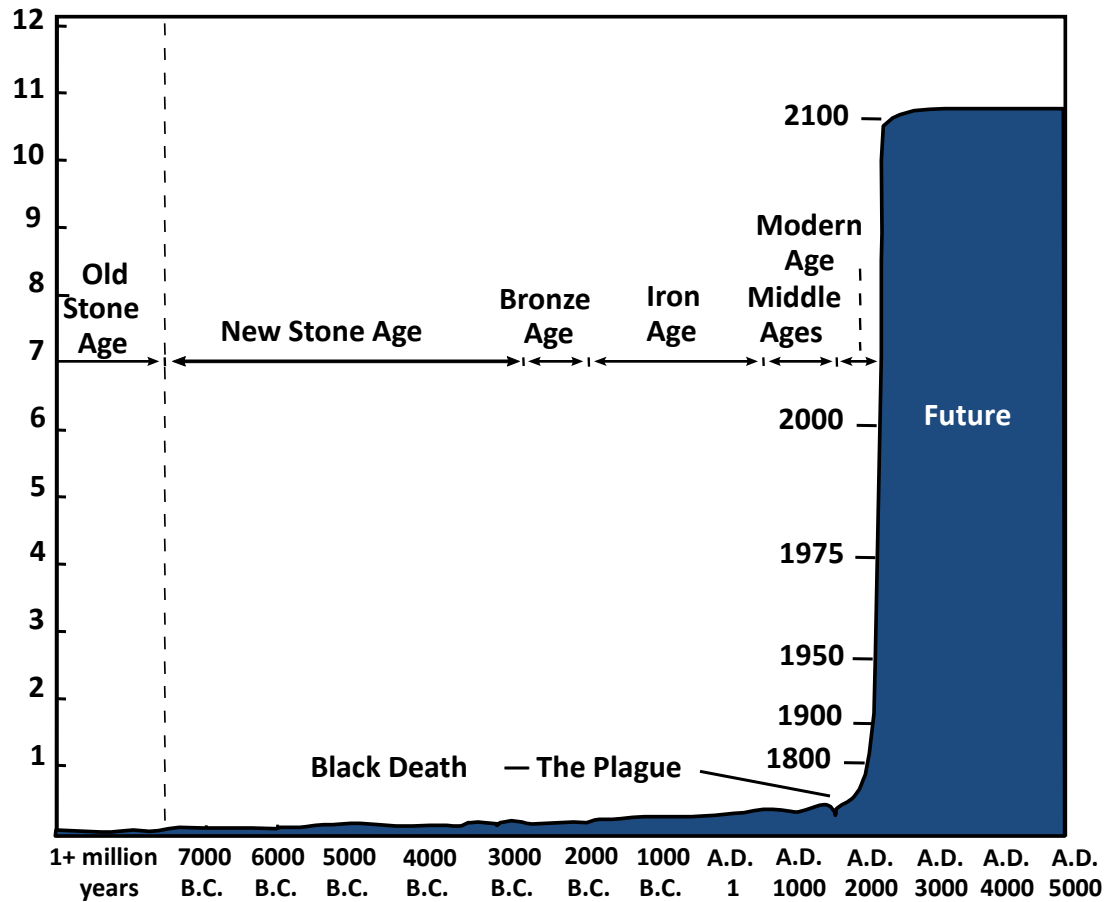
Population Projections

Earth - 5 Billion Years
Multi-cell Biota   - 600 Million Years
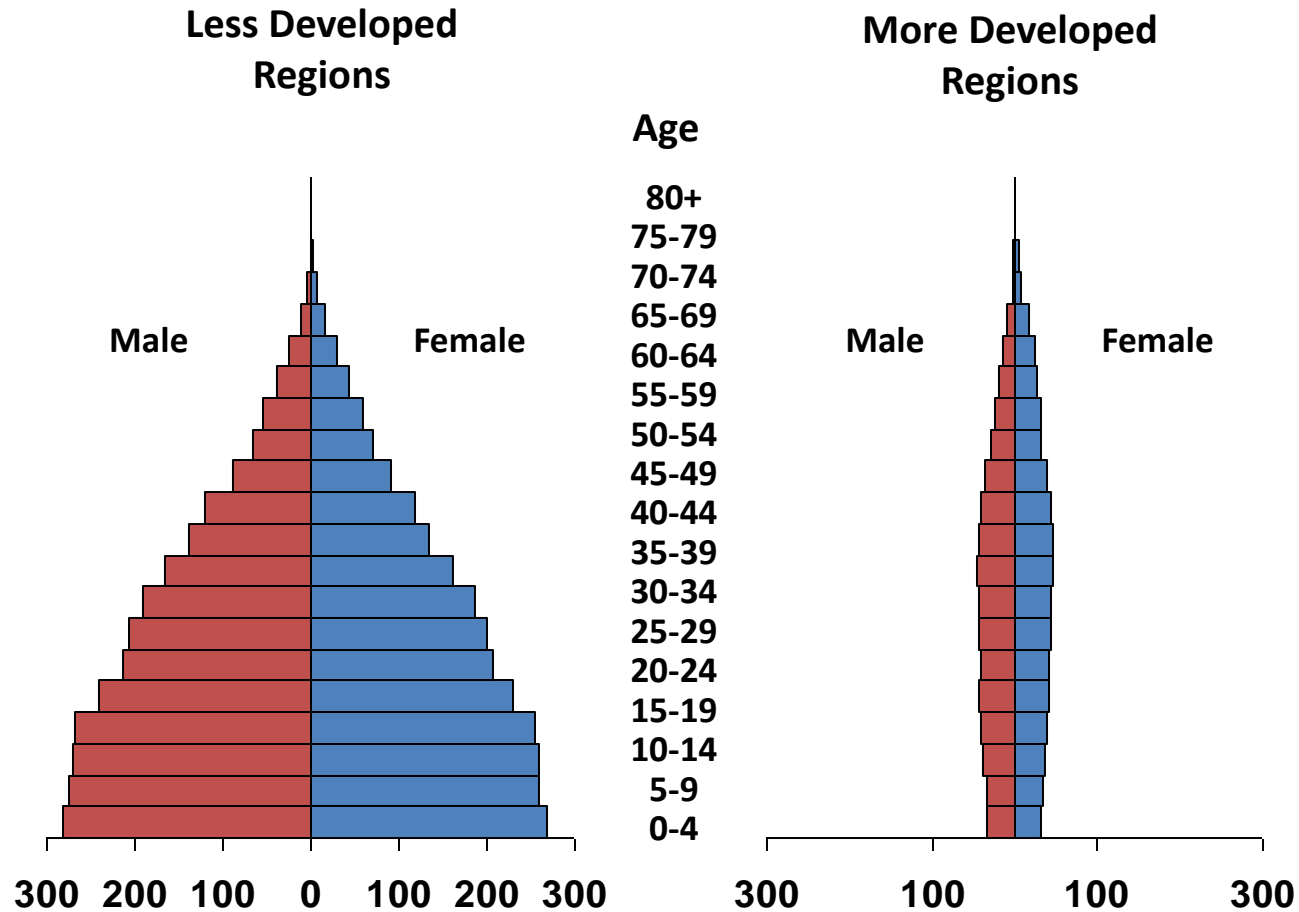### Human Beings   ~ 2 Million Years

Source: Population Reference Bureau; United Nations, *World Population Projections to 2100* (1998).

Age Distribution of the World's population

Population Structures by Age and Sex, 2005
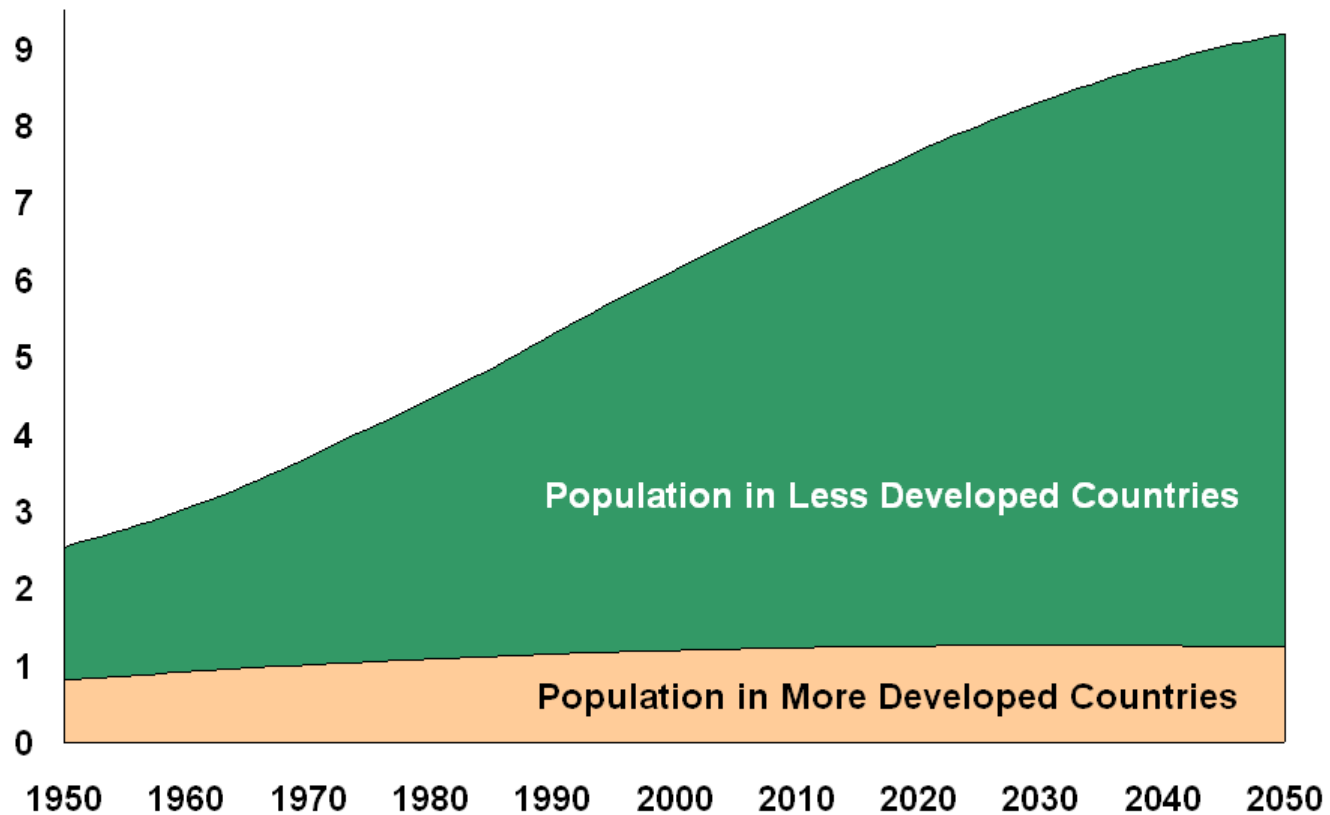Millions

Source: United Nations, *World Population Prospects: The 2004 Revision*, 2005.

# World Population (in Billions): 1950-2050

Source: United Nations Population Division, *World Population Prospects: The 2006 Revision*.

UN world population prospects report

- **Nine countries will account for half of the population increase: India, Pakistan, Congo, Bangladesh, Uganda, USA , Ethiopia and china**

- **Population of 51 countries mostly in Europe is expected to be lower in 2050 than in 2005**

- **In 1800 only 3% of population lived in urban areas and by end of 20th century 47.5% lived in urban areas**

- **By 2030 three out of five people will be in cities**

- **Population shall stabilize at 10.2 billion by 2100**
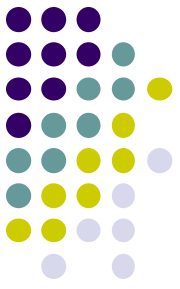
India: Demography

- While the global population increased 3 fold, India has increased its population by 5 fold during the last century

- During the last decade India has added population of 181 Million equal to Brazil the fifth most populous country in the world

- Population of India is equal to total of USA, Indonesia, Brazil, Pakistan, Bangladesh and Japan(6 of the top 10 most populated countries in the world)

- India growth rate is at 1.64% and that of China is 0.53% by 2030 India will become most populous country

- 31.16% population is in urban area

India as compared to the world
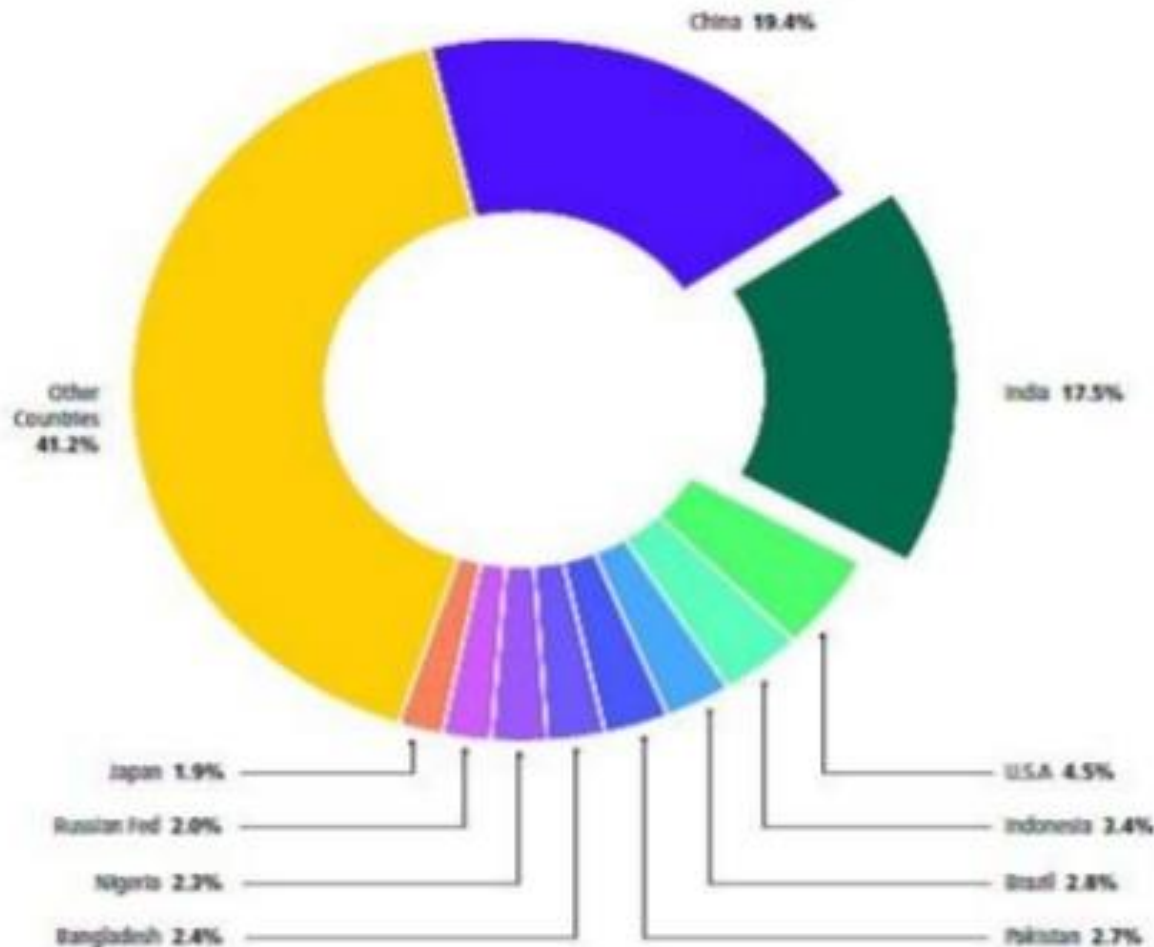
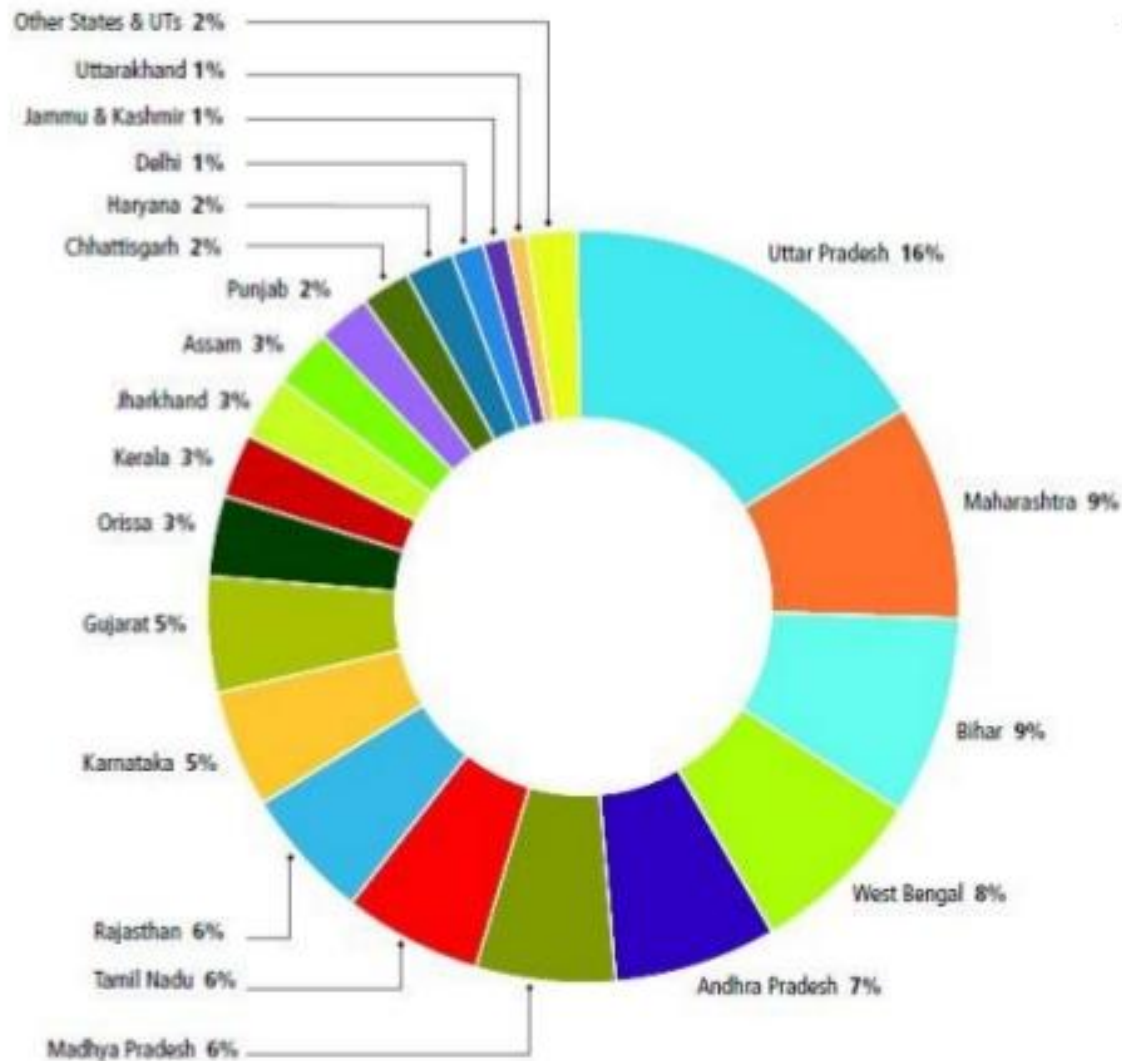The gap between India, the country with the second largest population in the world and China, the country with the largest population in the world has narrowed from **238** million in 2001 to nearly **131** million in 2011. On the other hand, the gap between India and the United States of America, which has the third largest population, has now widened to about **902** million from **741** million in 2001.
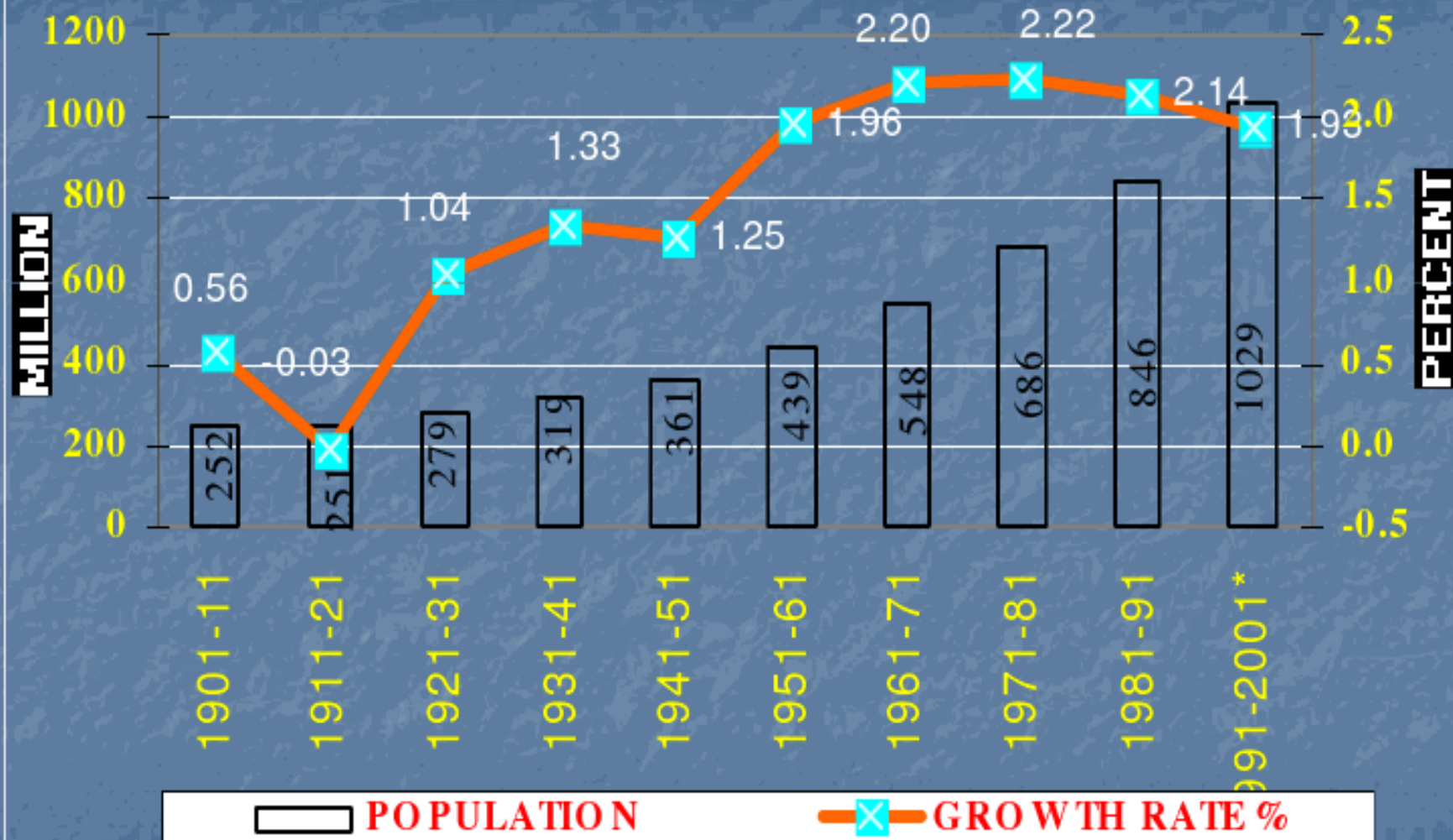
Growth Rate
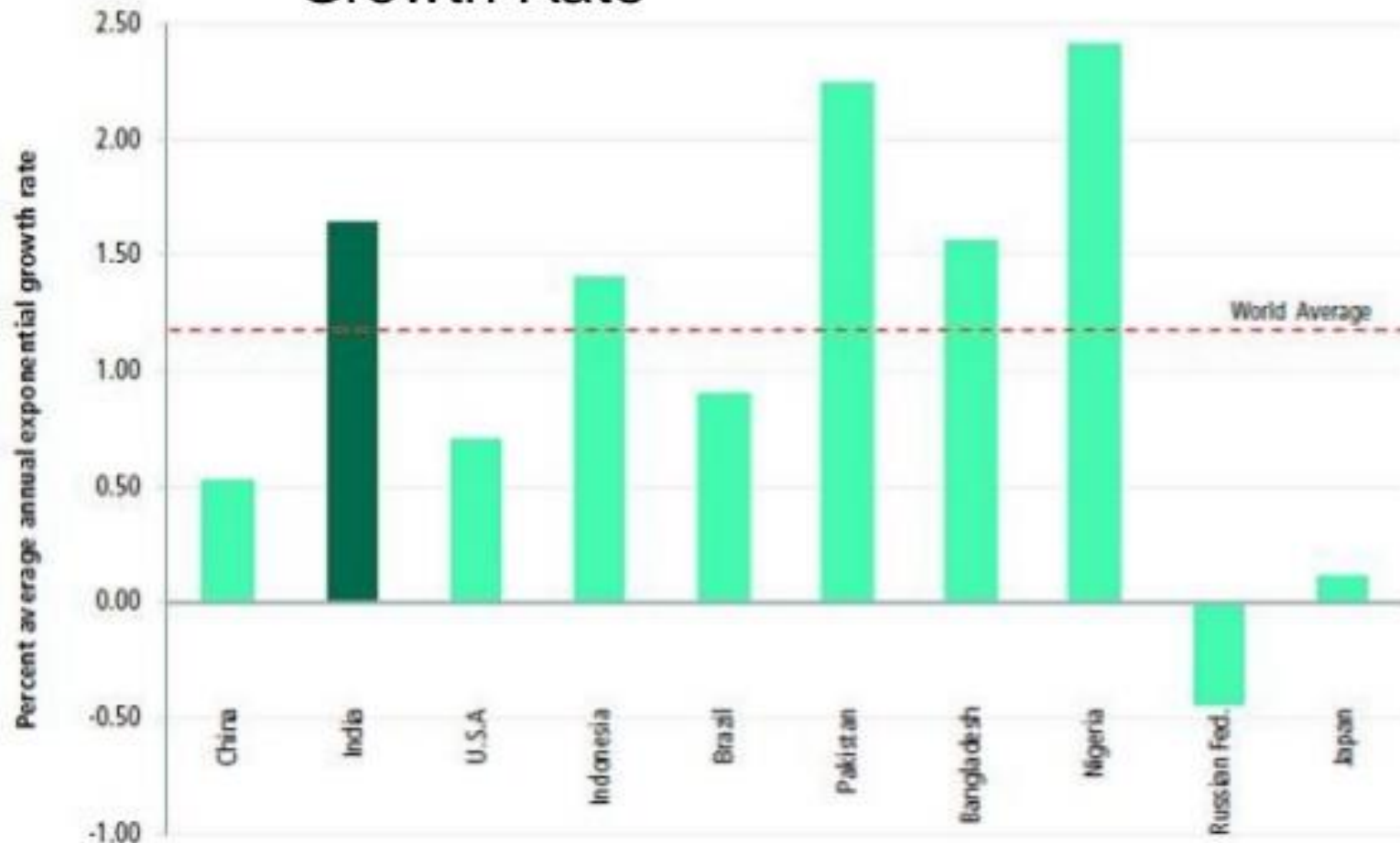
The world population grew at an annual rate of 1.23 percent during 2000-2010. China registered a much lower annual growth rate of population (0.53 percent) during 2000-2010, as compared to India (1.64 percent during 2001-2011). India will overtake china by 2030 and have 18% of the worlds population.

Other States & UTs 2%
Uttarakhand 1%
Jammu & Kashmir 1%
Delhi 1%
Haryana 2%
Chhattisgarh 2%
Punjab 2%
Assam 3%
Jharkhand 3%
Kerala 3%
Orissa 3%
Gujarat 5%
Karnataka 5%
Rajasthan 6%
Tamil Nadu 6%
Madhya Pradesh 6%

Uttar Pradesh 16%
Maharashtra 9%
Bihar 9%
West Bengal 8%
Andhra Pradesh 7%

State wise break-up

Uttar Pradesh continues to be the most populous State in the country with 200 million people , which is more than the population of Brazil, the fifth most populous country in the world. The combined population of Uttar Pradesh and Maharashtra (the second most populous State), at 312 million, is substantially greater than the population of USA, the third most populous country of the world.

2001-11 census: Population 1210 million, Growth rate 1.64%

Growth Rate

CBR-CDR= Current Annual Growth Rate

Rating	Annual GR%
Stationery	0
Slow	<0.5
Moderate	0.5-1
Rapid	1-1.5
Very rapid	1.5-2
Explosive	2-2.5>

year	Annual GR%
1951	1.25
1961	1.98
1971	2.2
1981	2.22
1991	2.14
2001	1.96
2011	1.64

Sex Ratio

The sex ratio of India is 940. The sex ratio at the National level has risen by seven points since the last Census in 2001. This is the highest since 1971.

Sl. No	Country	2001	2011
1	2	2	3
	World	986	984
1	China	944	926
2	India	933	940
3	U.S.A.	1,029	1,025
4	Indonesia	1,004	988
5	Brazil	1,025	1,042
6	Pakistan	938	943
7	Russian Fed.	1,140	1,167
8	Bangladesh	958	978
9	Japan	1,041	1,055
10	Nigeria	1,016	987

Sex Ratio Trend in India
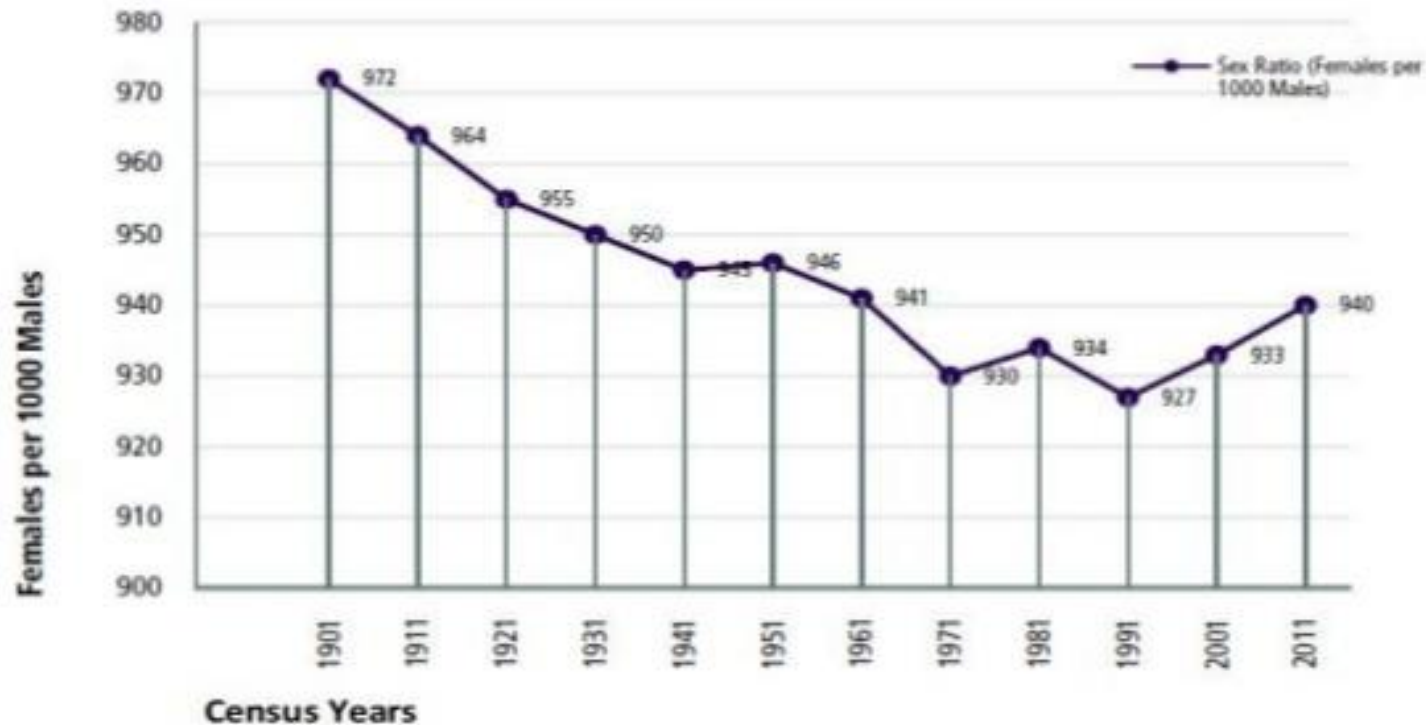
The sex ratio in India has been historically negative or in other words, unfavourable to females. Sex ratio reached its lowest in 1991 but since then has kept rising.

Demographic Transition Model

Transition from stable population with high mortality rate and high fertility rate to stable population with low mortality and low fertility

There four stages

- 1. high birth rate and high death rate
- 2. high birthrates and lower death rates
- 3. low birth rates and lower death rates but population increase is due to large reproductive age group
- 4. lower birth rates and lower death rates

Since 1800 to present

18th century: 1 billion, 19th century: 1.6 billion, 1940: 2.3 billion, 2010: 6.9 bilion
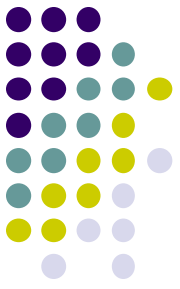
- It is the **age of industrialization**
- Advances in agriculture and transportation, which *lowered the prospects of crop failure* and *improved distribution system*, *reduced famines*.
- Medical advances conquered a number of fatal disease, *reduced infant mortality, and increased life span*.
  - **Adequate supply of food**: The yield of food has been greatly increased by improved farming techniques, better storage and distribution facilities.
  - **Green revolution**: the improved technologies also reduce the chance of crop failure and famine.
  - **Well medical care**: improved sanitation and control of infectious diseases lower the mortality sharply, especially for children. *Thus the death rate decreased.*
  - **High standard of life**: Living standards rose, widespread famines and epidemics diminished in some regions.
- **As Birth rates > death rates.** So **population** started to grow greatly

Current factors in population growth
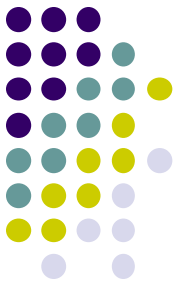
- Women in career increased, than at domestic work
- Decreased need of children in industrialized setting
- International migration
- Availability and acceptability of contraceptives
- Changes in government attitudes towards population stabilisation.
- Extension of medical services through Family welfare programme
- Marked change in marriage patterns
- Life expectancy
- Shift in attitude : Children will care in old age to preparation for Adulthood
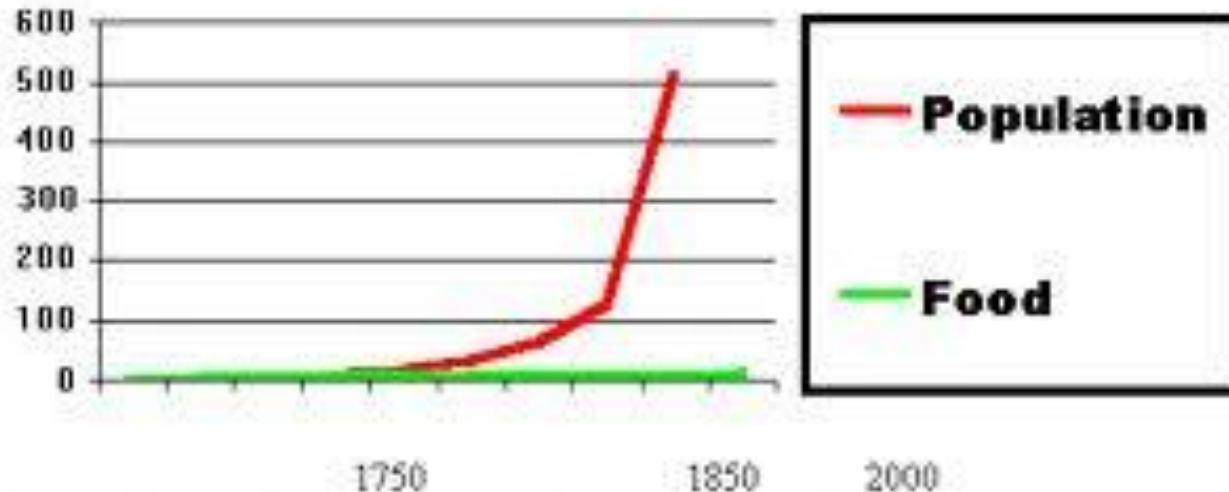- Disaster Management

Concerns
- Sex ratio
- Interstate differences
- Urbanization

Malthusian Theory on Population

According to Malthusian theory of population(1798) population increases in a geometrical ratio, whereas food supply increases in an arithmetic ratio.

Malthus' Theory of Population and Food Growth Over Time
% increase on left axis

Food

- 100 countries import wheat and 40 countries import rice.

- Egypt, Iran import 40% Algeria, Japan, South Korea import 70%, Yemen and Israel import 90% of their need

- Only 6 countries supply 90% of exports: Argentina, Australia, Canada, France, Thailand and USA
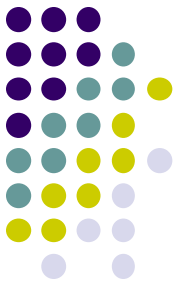
L to G

The Limits to Growth is a 1972 book modeling the consequences of a rapidly growing world population and finite resource supplies, commissioned by the Club of Rome. Its authors were Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, and William W. Behrens III.
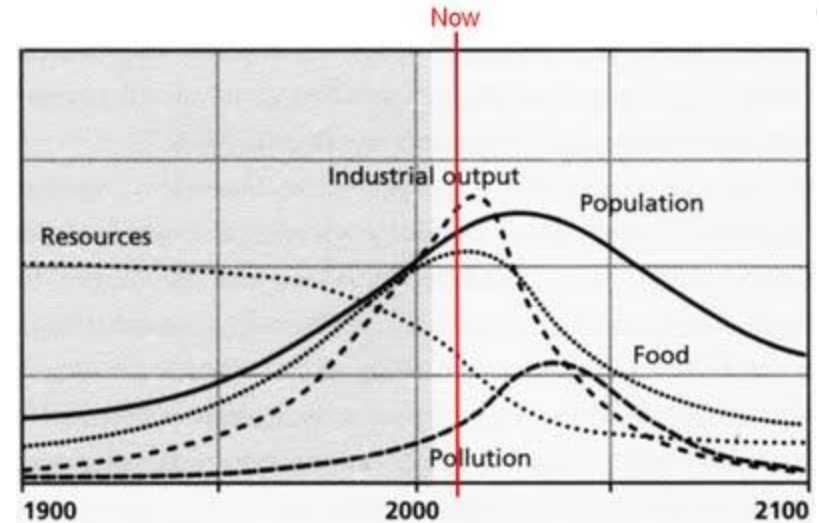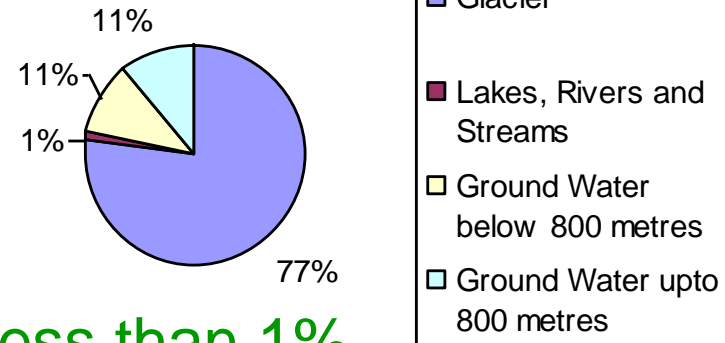

Five variables were examined in the original model, on the assumptions that the population will grow exponentially, and that the ability of technology to increase the availability of resources grows only linearly.

If the present growth trends in world population, industrialization, pollution, food production and resource depletion (physical factors) continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity."

GLOBAL WATER SITUATION

Available fresh water is 3%

11%

11%

1%

77%

Glacier

Lakes, Rivers and Streams

Ground Water below 800 metres

Ground Water upto 800 metres

Utilizable fresh water in world is less than 1%

- individual daily domestic use of fresh water in developed countries is 10 times more than that of developing countries.

- Global fresh water consumption rose more than twice the rate of population growth.

- 2.2 million people die every year from disease related to contaminated drinking water & poor sanitation.

INDIA WATER SITUATION

- 16% world's population on 2.45% of world land resource and 4% of worlds fresh water resources.

- India ranks among the top ten water rich countries in the world.

- Per capita availability of utilizable fresh water dropped from 3450 cumt. in 1951 to 1100 cumt. in 2001 and is likely to come down to 700 cumt by the year 2050.

- Highly variable rainfall in space and time

- India is having highest irrigated area in the world i.e.55.14 million hect.

Individual's water requirement
Resource limits: Water

Present per capita utilizable water 1387cumt

Present Av. Trend of per capita water use is 620cumt

Requirement is 365days *2000 liters=730cumt .We eat more water than we drink

Per capita availability of water in sabarmati and pennar basins is less than 400 cumt and in Brahmaputra basin it is more than 18000 cumt

How do we balance present situation with increasing population food security, increased demand from improved life styles
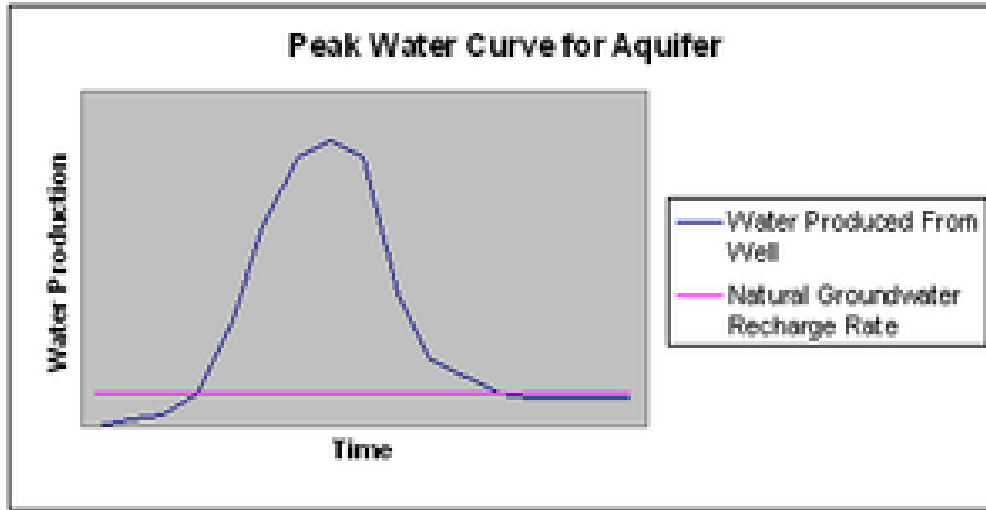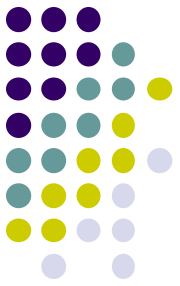
Pollution loses 33% of potential water

World wide 13,080 desalination plants produce more than 12 million gallons of water per day using energy

Ground water is getting exhausted

Peak water

concept by Peter Gleick and Meena Palaniappan 2010

Peak Water Curve for Aquifer

There is a vast amount of water on the planet but sustainably managed water is becoming scarce

peak water is not about running out of fresh water, but about reaching physical, economic, and environmental limits on meeting human demands for water and the subsequent decline of water availability and use.

Peak Oil
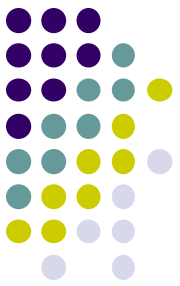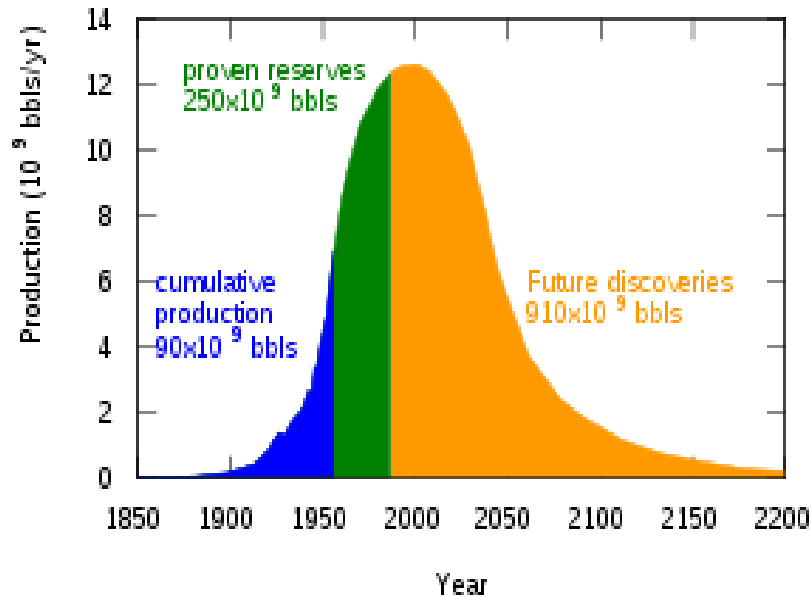
Early in the curve (pre-peak), the production rate increases because of the discovery rate and the addition of infrastructure.

Late in the curve (post-peak), production declines because of resource depletion.

The Hubbert peak theory is based on the observation that the amount of oil under the ground in any region is finite, therefore the rate of discovery which initially increases quickly must reach a maximum and decline.
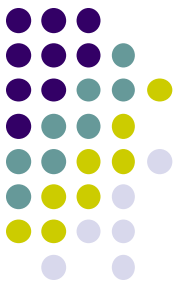
Resource Limits - Land

- India has 17.5% of global population on 2.4% land area of the world

- In addition it supports 16% world's cattle population

- In 1950 the food production was 50.8 MT for 361 million population and by 2010 the food production is 218 MT for a population of 1210 million

- Urbanization
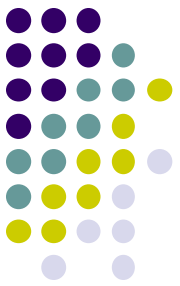
Ecological Foot Print

9.7 hectares per person in USA, whereas the planet has a capacity of only 1.8 hectares per person?

Impact = P*A*T

For everyone to live at today's US footprint would require 5 planet Earths
Increasing affluence and population is damaging Earth's essential ecology

Changing Life Style

Interesting facts- Telecom

- "More phones than toilets" Census 2011 sheds light on changing India.
- 63.2 per cent households in India now have a telephone/mobile facility(82 per cent in urban and 54 per cent in rural area.)
- The penetration of mobile phone is 59 per cent and landline is 10 per cent.
- More than half of Indian households (some 53.1 per cent) do not have access to something as basic as a toilet.
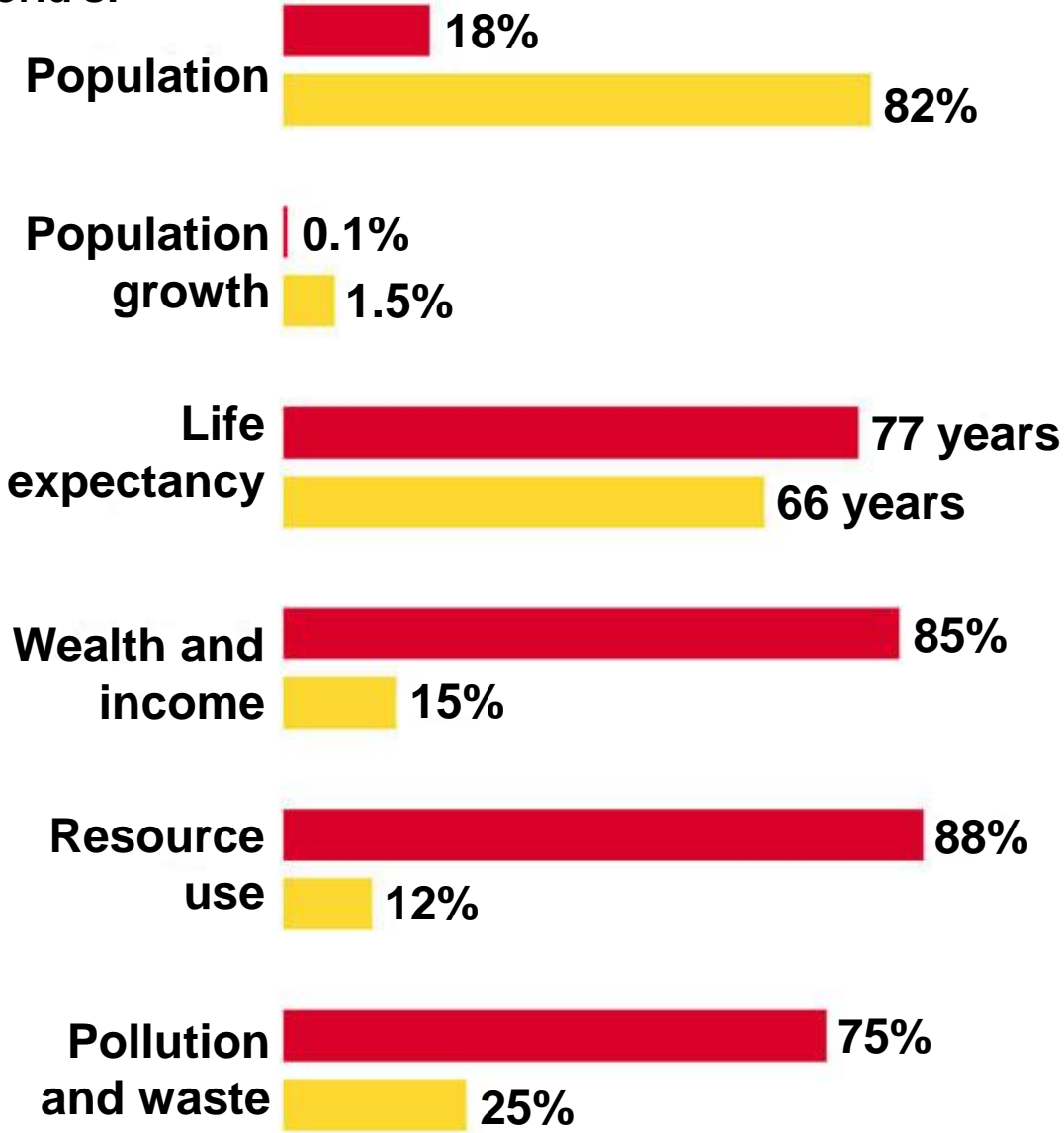
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47.1% Indians have Television sets

Our 'Commons' are in Danger
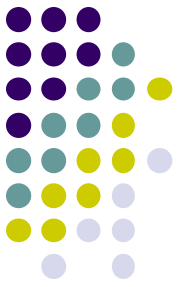
- Atmospheric pollution and climate change
- Water pollution, including ground aquifers
- Deforestation and loss of oxygenation
- Non-renewable natural resource depletion
- Traffic and congestion
- The increase in frequency and intensity of disasters
- Land degradation

Percentage of World's:

Population
- 18%
- 82%

Population growth
- 0.1%
- 1.5%

Life expectancy
- 77 years
- 66 years

Wealth and income
- 85%
- 15%

Resource use
- 88%
- 12%

Pollution and waste
- 75%
- 25%

Developed countries   Developing countries

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What is the Answer
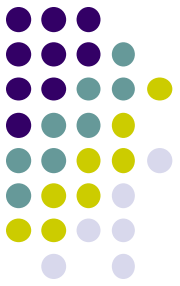
Sustainable Development

Environmental sustainability

Economic viability

Social acceptability

1. Resource use efficiency

2. Correction of negative externalities

3. Environmental regulation from compliance to competitive advantage

4. Conservation

5. Greening the planet

6. Balanced regional development

7. Change in life styles

8. Greening the Business

Learning to Live More Sustainably

Current Emphasis		Sustainability Emphasis
Pollution cleanup	→	Pollution prevention
Waste disposal (bury or burn)	→	Waste prevention
Protecting species	→	Protecting habitat
Environmental degradation	→	Environmental restoration
Increasing resource use	→	Less resource waste
Population growth	→	Population stabilization
Depleting and degrading natural capital	→	Protecting natural capital

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Thank you