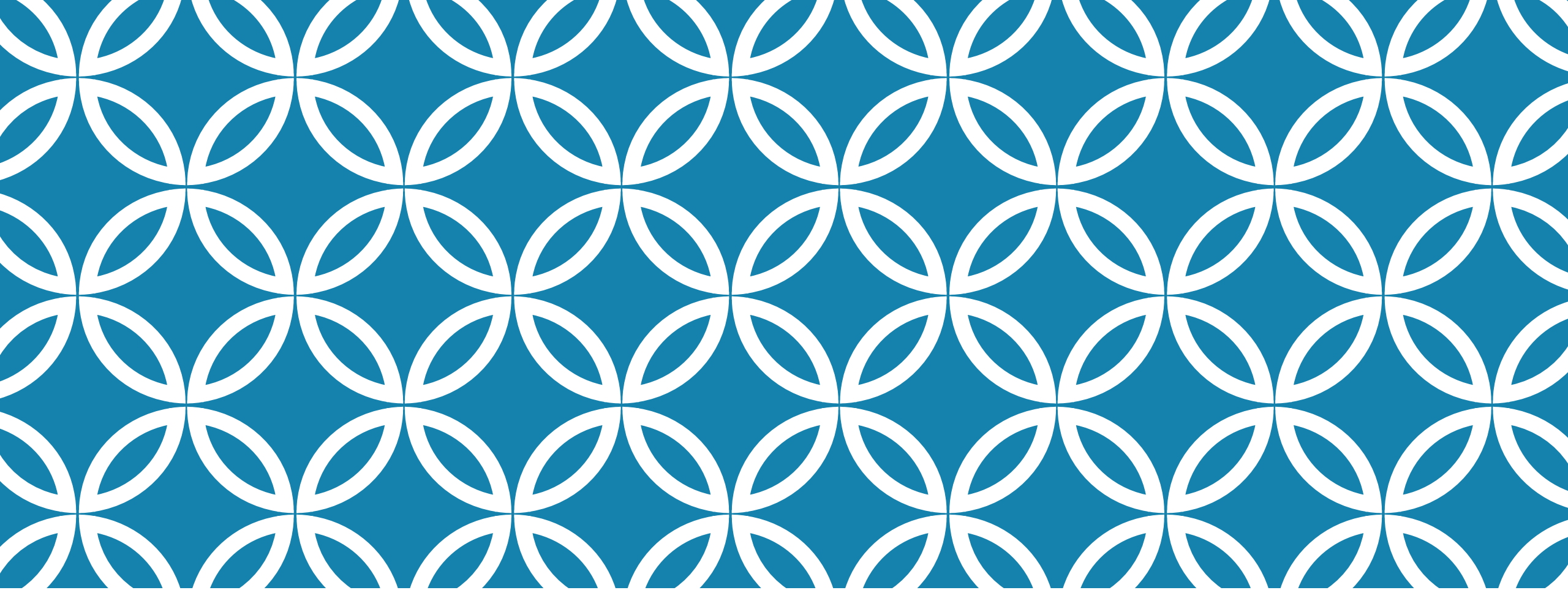


UNIT -5

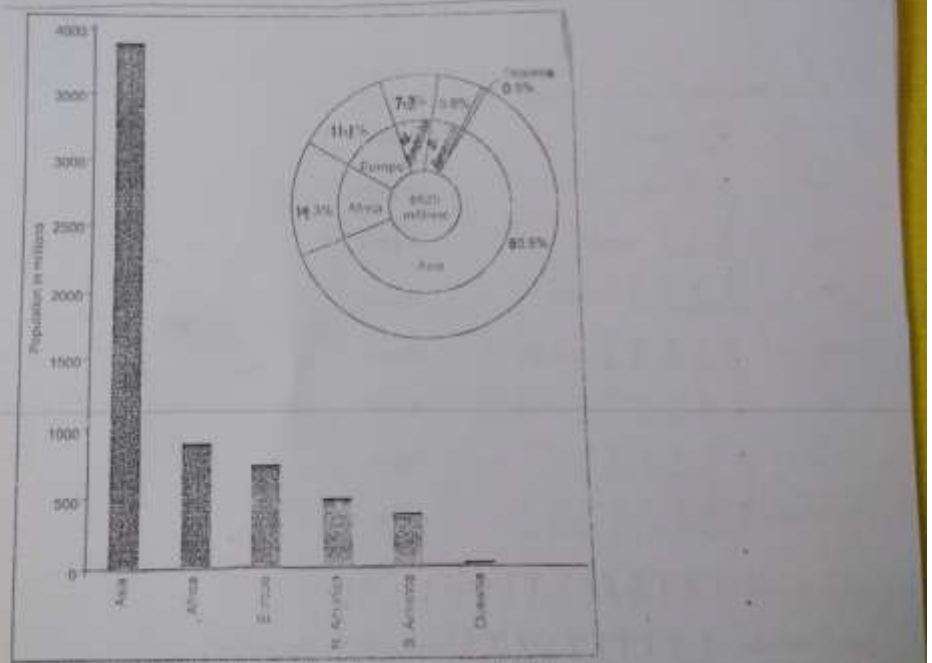
WORKSHEET I

Population Growth

World : Population, Historical Perspective (1810–2025)

		Time Taken
1810	Billion (1)	
1930	Billion (2)	120 years
1960	Billion (3)	30 years
1975	Billion (4)	15 years
1988	Billion (5)	13 years
1999	Billion (6)	11 years
2011	Billion (7)	12 years
2025 Estimated	Billion (8)	14 years

II



WORKSHEET - III

WORLD POPULATION GROWTH 1650 - 2015

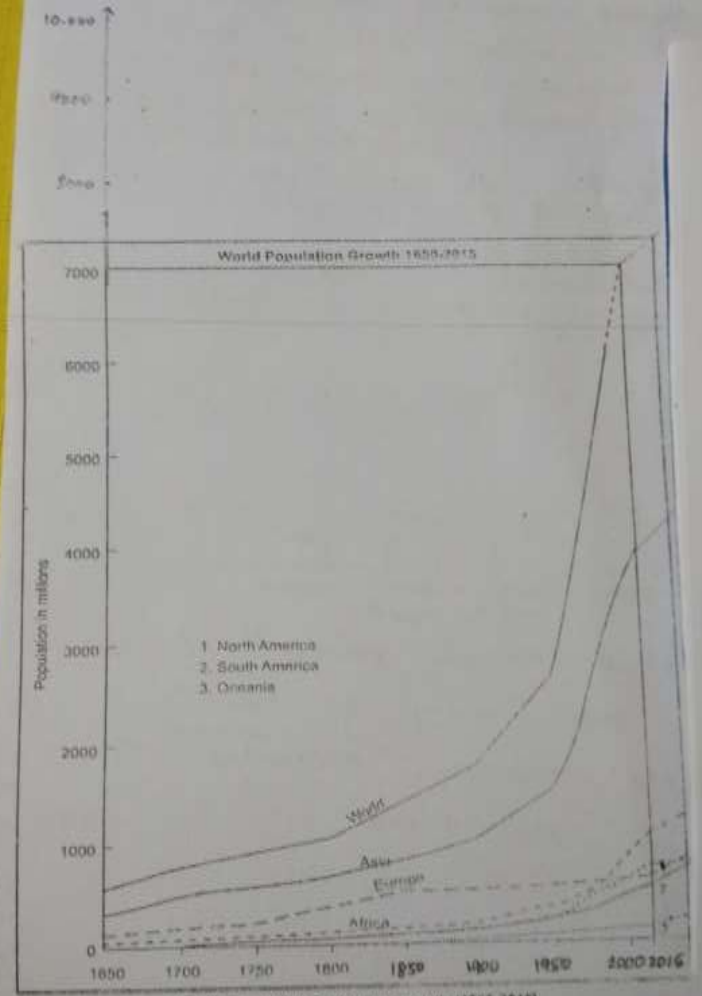


Figure 5.2 : World Population growth (1650-2015)

IV WORKSHEET

PREPARE FOR 2020 and 2050 → 9

Add - Germany, Brazil

MODEL

Table : Some Demographic Characteristics Of Population In Selected Countries 1997

COUNTRIES	POPULATION (million)	BIRTH RATE	DEATH RATE	NATURAL INCREASE IN ANNUAL %	INFANT MORTALITY RATE (per 1000)	TOTAL FERTILITY RATE
U.S.A	267.7	15	9	0.6	7.3	2.0
Brazil	160.3	22	6	2.1	48	2.5
Mexico	95.7	27	5	2.2	34	3.1
India	969.7	29	10	1.9	75	3.5
China	1236.77	17	7	1.0	31	1.9
Japan	126.1	10	7	0.2	4.6	1.5
Russia	147.3	9	14	-0.5	16	1.3
Germany	50.7	10	15	-0.6	14	1.4
Ukraine	57.4	9	9	0.0	5.8	1.2

Source : World population data sheet Population Reference Bureau, 1997

WORKSHEET-3

Table 3.1 : Estimated world and regional population at various dates (in millions)

update

Region/year	10,000BC	1 AD	1750	1850	1950	2000	2010
Africa			106	111	221	796	1022
Asia			502	809	1398	3680	4252
Europe			163	276	547	728	732
Latin America			16	38	167	520	580
North America			02	26	172	316	351
Oceania			02	02	12.8	31.0	35.6
WORLD	01	200	791	1262	2519	6070	6972

Source : U.N Population Estimates and Projections

Model.

WORKSHEET - 6 (UPDATE)

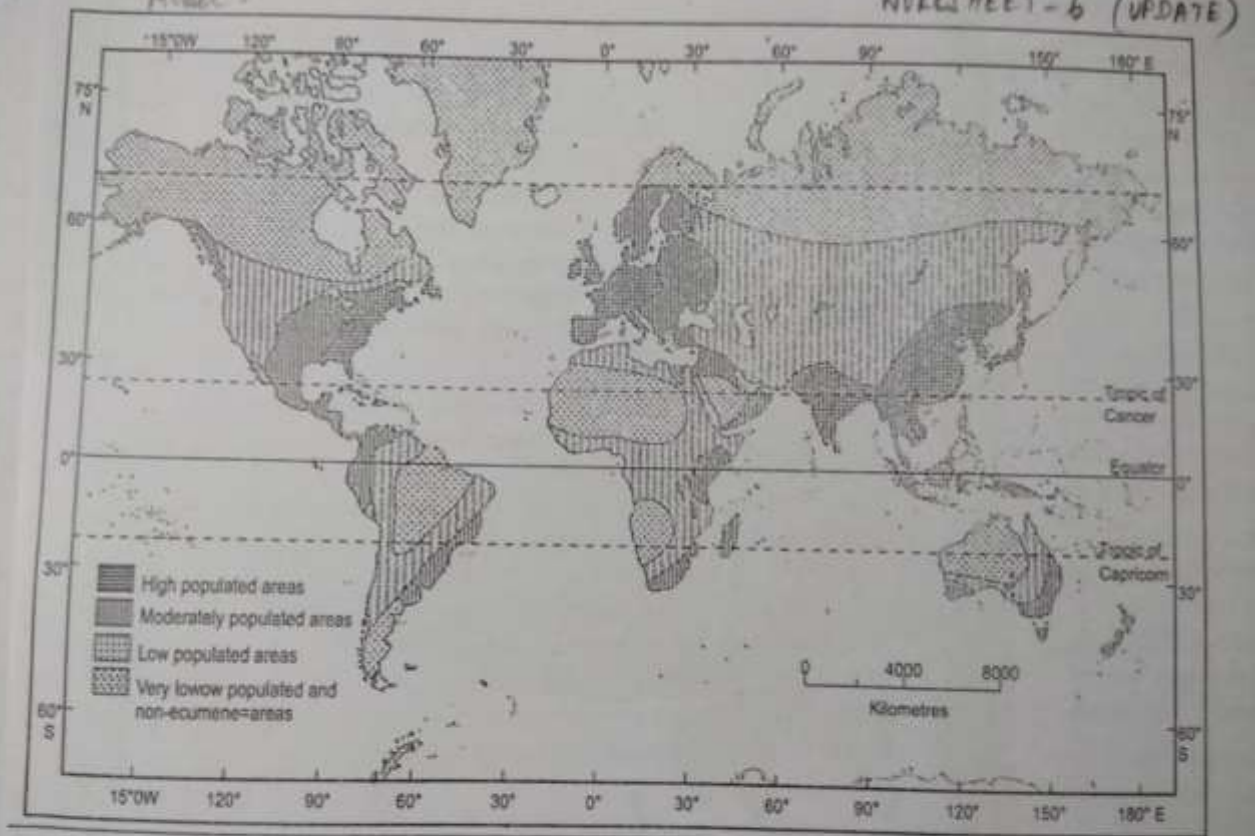
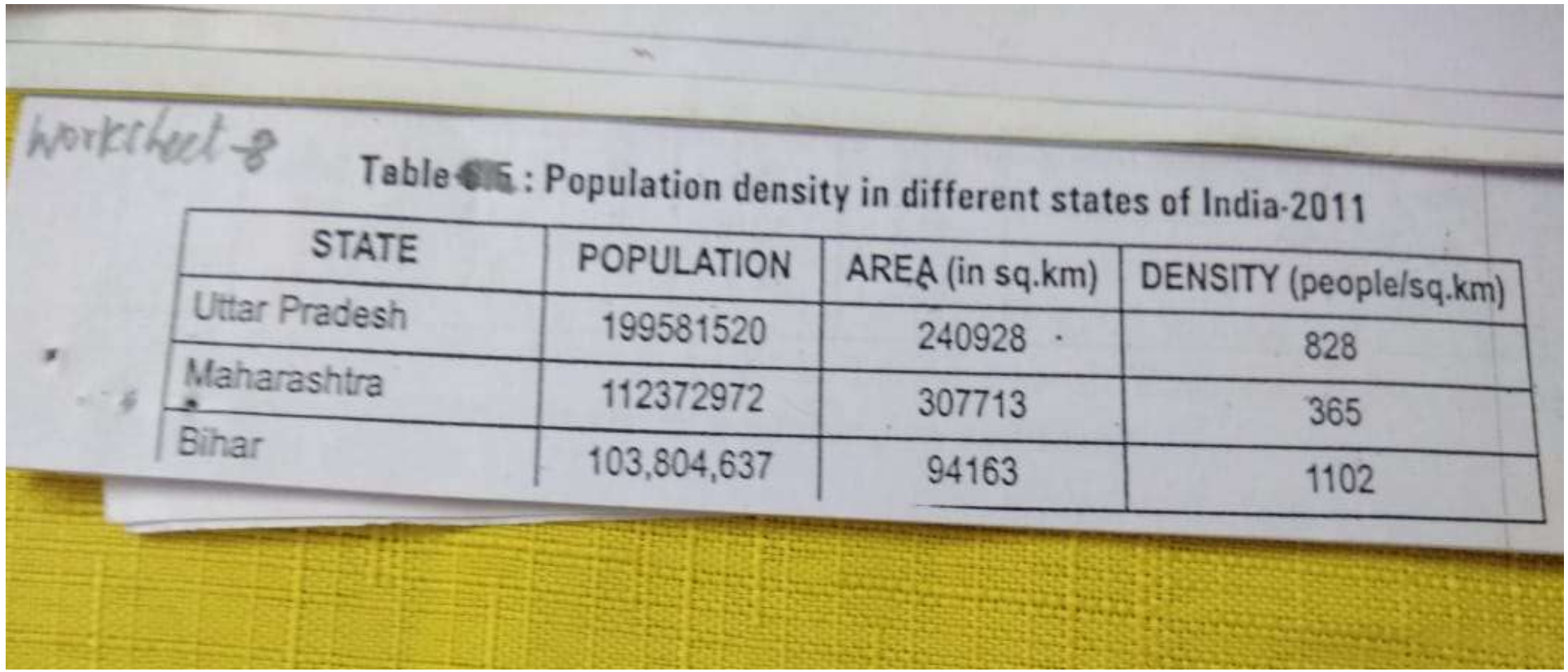


Figure 6.2 : Pattern of Population Distribution in the World

Find for world and India



worksheet-8

Table 1.5 : Population density in different states of India-2011

STATE	POPULATION	AREA (in sq.km)	DENSITY (people/sq.km)
Uttar Pradesh	199581520	240928	828
Maharashtra	112372972	307713	365
Bihar	103,804,637	94163	1102

Worksheet-8

Table 8.2 : Top ten most populous countries 2007

update for 2020 2050

COUNTRY	POPULATION (in million)
China	1318
India	1312
U.S.A	302
Indonesia	232
Brazil	189
Pakistan	169
Bangladesh	149
Nigeria	144
Russia	142
Japan	128

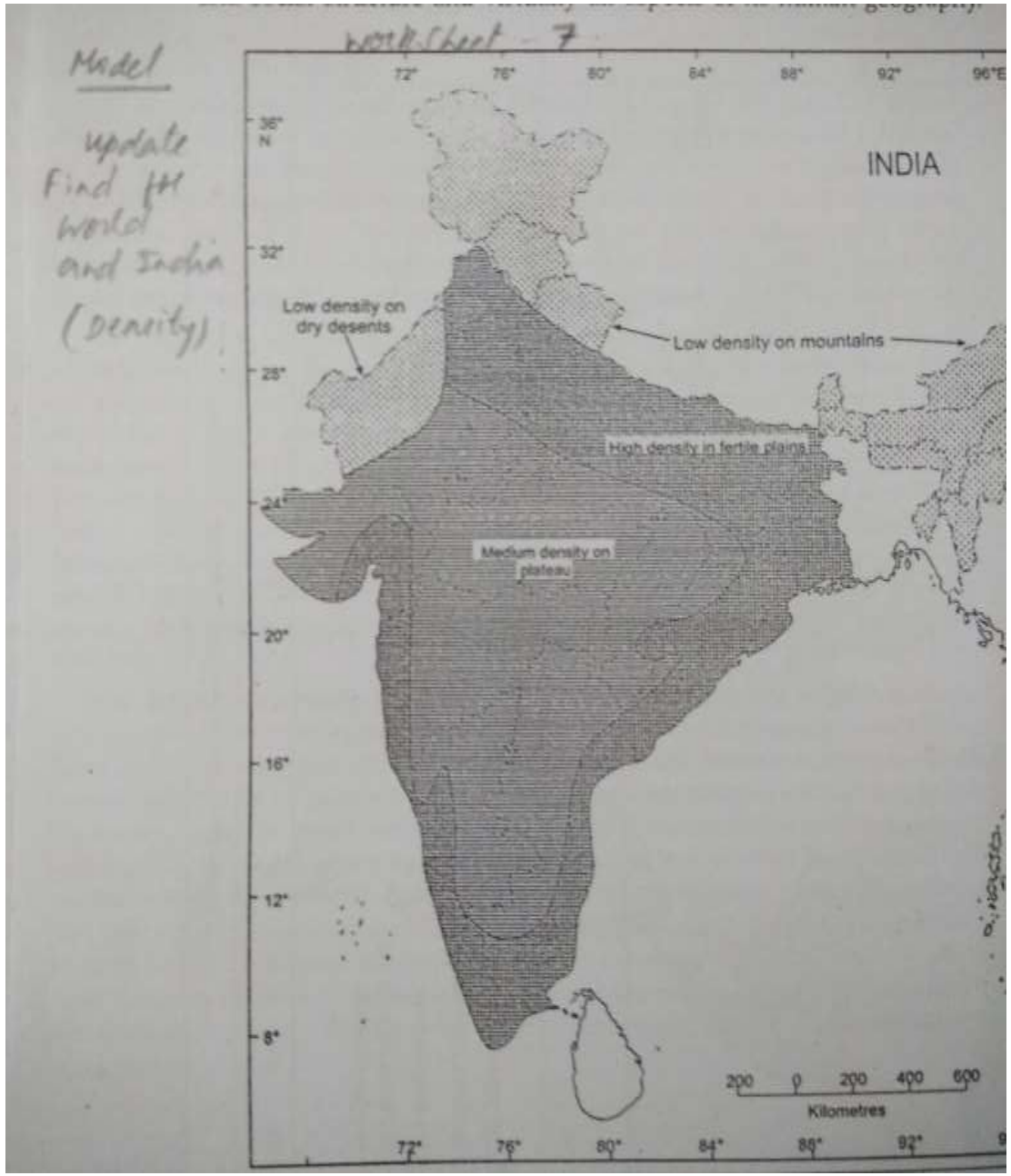
Source : World Population Data Sheet 2007, Popula

In terms of density of population,

Worksheet - 7

Model

update Find the world and India (Density)



Worksheet - 9

Area	Crude Birth Rate			Total Fertility Rate		
	1970-75	1990-95	2004	1970-75	1990-95	2004
North and Central America	**22.8**	**20.2**	**14 & 16**	**3.1**	**2.5**	**2.0 & 2.6**
U.S.A	15.7	15.9	14	2.0	2.1	2.0
Mexico	42.4	27.7	25	6.4	3.2	2.8
Canada	16.0	15.1	11	2.0	1.9	1.5
Trinidad & Tobago	27.0	20.9	13	3.5	2.4	1.6
Nicaragua	47.2	40.5	32	6.8	5.0	3.8
South America	**32.9**	**24.8**	**21**	**4.6**	**3.0**	**2.5**
Brazil	33.6	24.6	20	4.7	2.9	2.2
Colombia	32.6	24.0	23	4.7	2.7	2.6
Argentina	23.4	20.4	19	3.2	2.8	2.4
Surinarne	34.6	25.3	23	5.3	2.7	2.5
Paraguay	36.6	33.0	30	5.7	4.3	3.8
Asia	**33.9**	**25.2**	**20**	**5.1**	**3.0**	**2.6**
China	28.3	18.5	12	4.8	2.0	1.7
India	38.2	29.1	25	5.4	3.4	3.1
Indonesia	38.2	24.7	22	5.1	2.9	2.6
Pakistan	47.5	40.9	34	7.0	6.2	4.8
Bangladesh	48.5	36.5	30	7.0	4.4	3.3
Japan	19.2	10.1	9	2.1	1.5	1.3
Afghanistan	51.6	50.2	48	7.1	6.9	6.8
Yemen Republic	53.2	49.4	43	7.6	7.6	7.0
Georgia Republic	18.7	15.9	11	2.6	2.1	1.4
Israel	27.4	21.2	22	3.8	2.9	2.9
Jordon	50.0	38.9	29	7.8	5.6	3.7
Sri Lanka	28.9	20.7	19	4.0	2.5	2.0
U.A.E.	33.0	23.2	16	6.4	4.2	2.5
Oceania	**23.9**	**19.2**	**17**	**3.2**	**2.5**	**2.1**
Australia	19.6	14.8	13	2.5	1.9	1.7
New Zealand	20.8	17.3	14	2.8	2.2	2.0
Fiji	32.5	23.7	25	4.2	3.0	3.3

Source : UNDP, UNEP, WRI & WR (1966) *World Resources*, 1996-97, (Oxford University Press, Oxford, pp. 192-193; *Human Development Report 1997*, pp. 148-195 and *Human Development Report*, 1998, pp. 198-200 and *World Population Data Sheet 2004*.

Table 6.7 : World : Mortality Indicators, 1970-2004 Worksheet - 10

Area	CDR		Infant Fertility Rate		
	2004	1990-95	1970-75	1990-95	2004
World	**09**	**9.2**	**93**	**64**	**56**
Less Developed Countries	08	9.0	—	64	62
More Developed Countries	09	10.0	—	14	7
Africa	**14**	**—**	**131**	**93**	**90**
Nigereia	13	15.4	111	84	100
Egypt	6	7.2	150	67	38
Ethiopia	18	18.1	154	119	105
South Africa	13	8.8	76	53	48
Angola	24	19.1	173	124	145
Kenya	15	11.8	98	69	78
Europe	**12**	**—**	**25**	**12**	**07**
Russia	17	14.9	28	21	13
Germany	10	10.8	21	06	04
U.K.	10	10.9	17	07	05
France	09	9.2	16	07	04
Italy	10	9.6	26	08	05
Ukraine	16	15.2	22	16	10
Czech Republic	11	10.9	20	09	04
Sweden	10	10.6	10	05	03
South America	**06**	**—**	**84**	**48**	**29**
Brazil	07	7.3	91	58	33
Colombia	06	5.8	73	37	26
Argentina	08	7.7	48	24	16
Suriname	07	6.4	49	28	27
Paraguay	05	6.0	55	38	37

worksheet -10

Table 4.3 : India : Change in Density of Population, 1901-2011

update

Year	Density/km²	Increase
1901	77	—
1911	82	5
1921	81	–1
1931	90	9
1941	103	13
1951	117	14
1961	142	25
1971	177	35
1981	216	39
1991	267	51
2001	325	58
2011	382	57

INDIA

worksheet -11

Table 4.1 : Growth of Population 1901-2001

update

Year	Popn.(in million)	%±growth
1901	236	—
1911	249	+5.7%
1921	248	-0.3%
1931	276	+11.0%
1941	315	+14.2%
1951	361	+13.3%
1961	439	+21.6%
1971	548	+24.8%
1981	683	+24.7%
1991	847	+23.9%
2001	1,028	+21.5%
2011	1,210	+17.6%

Source: Census of India 1961,'71,'81,'91,'01 and Provisional Census 2011

Worksheet-11 India - update

Table 4.4 : Ranking the states and union territories of India by population size 2001-2011

Rank in 2011	States/UT	% to TP(2011)	% to TP(2001)	Rank in 2001
1	Uttar Pradesh	16.49	16.17	1
2	Maharashtra	9.29	9.42	2
3	Bihar	8.58	8.07	3
4	West Bengal	7.55	7.81	4
5	Andhra Pradesh	7.00	7.37	5
6	MadhyaPradesh	6.00	5.88	7
7	TamilNadu	5.96	6.05	6
8	Rajasthan	5.67	5.50	8
9	Karnataka	5.05	5.14	9
10	Gujarat	4.99	4.93	10
11	Orissa	3.47	3.57	11
12	Kerala	2.76	3.10	12
13	Jharkhand	2.72	2.62	13
14	Assam	2.58	2.59	14
15	Punjab	2.29	2.37	15
16	Chhattisgarh	2.11	2.03	17
17	Haryana	2.09	2.05	16
18	JammuKashmir	1.04	0.98	18
19	Uttrakhand	0.84	0.83	19
20	HimachalPradesh	0.57	0.59	20
21	Tripura	0.30	0.31	21
22	Meghalaya	0.24	0.22	23
23	Manipur	0.22	0.23	22
24	Nagaland	0.16	0.19	24
25	Goa	0.12	0.13	25
26	ArunachalPradesh	0.11	0.11	26
27	Mizoram	0.09	0.09	27
28	Sikkim	0.05	0.05	28
UT 1	Delhi	1.38	1.34	1
UT 2	Puducherry	0.10	0.09	2
UT 3	Chandigarh	0.09	0.09	3
UT 4	Andaman&Nicobar	0.03	0.03	4
UT 5	Dadra&NagarHaveli	0.03	0.02	5

Worksheet - 12 (update)

Average Annual rate of growth between developed and developing regions

Period	Developed Regions	Developing regions
1650-1750	0.33	0.3[illegible]
1750-1800	0.62	0.47
1800-1850	0.83	0.[illegible]
1850-1900	1.05	0.5[illegible]
1900-1920	0.92	0.52
1920-1930	0.91	1.11
1930-1940	0.85	1.28
1940-1950	0.35	1.44
1990-2000	0.45	2.03

Source : Donald J.Bogue (1969) *Principles of Demography* John Wiley and Sons, New York
United Nations(1990) *The Age and Sex Distribution of Population in the 1[illegible] Revision* 1991

The Effects of Overpopulation on Water Resources and Water Security

Daniel Altieri

Water is one of the most integral and important aspects of daily life for every human being, for example, food, clothing, and almost everything else humans interact with involves water. Therefore, water and water security is going to be a crucial focus for governments in the next few decades, especially since the population is expected to reach approximately 9.7 billion by the year 2050, and 11.2 billion by 2100 (United Nations DESA). Similar to oil and other fossil fuels, water is a finite resource, and the knowledge for world leaders to be able to manage a limited resource with a growing population will be critical for to have in order to maintain or grow their nations' prosperity. On the other hand, if current water resources are not properly regulated, an eventual increase in world population will become problematic for many regions and countries. Overpopulation will strain current water resources to their limits, cause an increase in water pollution, and lead to an increase in civil and international conflicts over existing water supplies.

One of the consequences of overpopulation is the pressure that is put on available water resources in order to serve a growing population. Approximately fifty percent of the worlds' population will be living in regions around the globe that are considered "water stressed", a term defined as when the demand for water exceeds the amount that is available, either due to lack of it, or poor quality, by the year 2030 (compared to fifteen percent currently).

Since 1990, the global population increased by an average of eighty million people, which heightens the world demand for freshwater by about sixty four billion cubic meters of water per year (United Nations World Report). This increasingly high demand for water will also affect food production in water stressed areas such as the Middle East, India, China, and the southwestern United States. Water intensive crops in California, such as almonds, use approximately eight percent of all available freshwater, and one ton of grain requires one thousand tons of water. Worldwide grain and staple crop production uses between seventy five to ninety percent of accessible freshwater. Places in the Middle East, India, and China are going to experience at least and additional fifty million people of each of their populations without adequate food by 2050 (Population Institute). The connections between a growing population that needs a higher demand for drinking water and water for agriculture shows that the shortages of water that are expected to affect many regions of the world will have severe consequences on the lives of millions of people, and that world leaders will need to find solutions in order to conserve and protect water resources for their countries, or find alternative methods to find new sources of water, such as desalination.

Growths in regional and global population will also lead to increased cases of water pollution. As of 2013, there are an estimated seven hundred and eighty million people who don’t have access to safe drinking water, while about two billion people don’t have proper water sanitation (WHO). About half of these statistics are for people living in cites. From the projected population size of around ten billion by 2050, the number of people who will live in urban areas is expected to increase almost two and a half billion people by that same year, on top of almost four billion people currently, putting the global urban population at about sixty five percent in 2050 (Bogardi).

Urban areas have a high risk of water pollution. Runoff from streets can carry oils, heavy metals, and other containments, while sewage water can leak into ground water, bringing bacteria, nitrates, phosphorus and other chemicals. Waste dumping also can pollute existing sources of freshwater with hazardous materials and toxic chemicals. It is estimated that between forty to fifty percent of all available freshwater sources on earth are polluted (Living Lakes Partnership). The combination of the expected substantial increase of people residing in urban areas and the preexisting dangers of water pollution in urban settings, will lead to a rise in the amount of water that is not potable due to pollution. It is imperative that infrastructure to limit freshwater pollution is invested in in the future, by both developed and underdeveloped nations.

Finally, the pressures that are put on water resources by overpopulation will lead to civil and international conflict over control of available quantities. Accounts of battles and fights over water resources dates back to 600 BC, when Assyrians would poison, divert, and destroy water supplies in order to put their enemies under siege (Pacific Institute). Since the year 2000, there have been at least over one hundred and ten major conflicts over water resources either between nations or within one. Middle Eastern countries, such as Iraq, Iran, Afghanistan, Yemen, and Syria, countries in Africa like Darfur, Sudan, and Somalia, and the South American countries of Peru and Brazil have all experienced armed struggles involving scarce water supplies.

These armed conflicts are due to multiple countries relying on a single water source, such as the Shatt al-Arab river between Iran and Iraq. A dispute over water withdrawal from the river was an important factor that caused the Iran-Iraq war in 1980 (Pacific Institute). The United States has listed water scarcity, and other consequences of overpopulation and climate change, as a threat to national security, realizing the important social and political chaos that limited water access can cause (Department of Defense). To help dissuade countries from engaging in armed conflict over water resources, government leaders need to recognize how water is a finite resource, and the consequences that can happen when a finite resource is abused.

There has to be agreements and contracts between nations who are in water stressed regions and who share the same water source that outline distribution amounts according to population size and or agricultural needs.

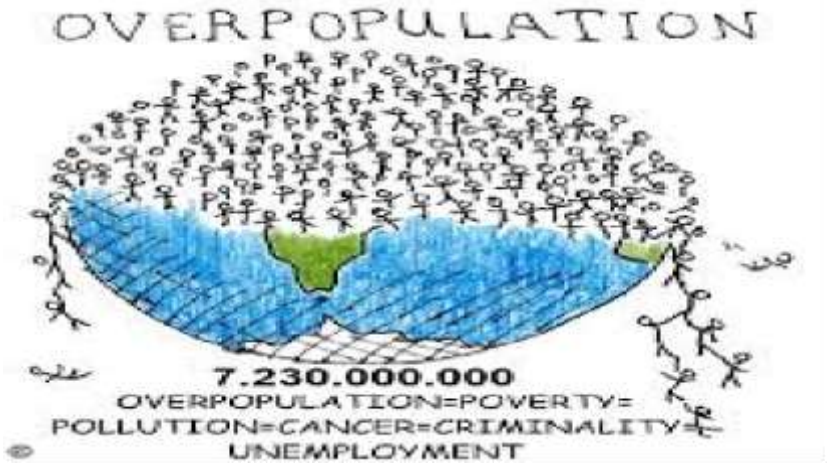
As the global population is expected to keep growing in the coming decades, the negative impact that humans will have on earths finite resources, especially water, will become increasingly apparent as areas of the world will start to experience drastic shortages of water, leading to instability in food production, industry, social order, and political and military control. In order to limit the amount of chaos and conflict that will ensue over limited water resources, there needs to be compromise and cooperation between all countries, not just the nations that are water stressed, to provide water management techniques, newer and more efficient technology to conserve as much water as possible, and strict security and enforcement of all regulations to prevent groups and individuals using water to gain power.

ENVIRONMENTAL PROBLEMS DUE TO POPULATION GROWTH

INTRODUCTION:

More people require more resources, which means that as the population increases, the Earth's resources deplete more rapidly.

The result of this depletion is deforestation and loss of biodiversity as humans strip the Earth of resources to accommodate rising population numbers.



The Biggest Impacts:

The use of resources and the impact of environmental issues are not equal around the globe.

People in developed countries require substantially more resources to maintain their lifestyles compared with people in developing countries.

For example, the United States, which contains 5 percent of the world's population, currently produces a full 25 percent of CO_2 emissions.

Land Degradation:

There are many examples of human failure to use land resources sustainably.

Deforestation occurs when humans clear forests to use the land either for agriculture or for habitation.

Consequently, forest cover dwindles significantly, leading to soil erosion and extinction of plant species.

AIR POLLUTION:

One of the biggest environmental impacts of human activities is air quality.

The transportation sector contributes heavily to air pollution because most forms of transportation, including cars, planes and ocean vessels, use fossil fuels.

When burned, fossil fuels release carbon dioxide and other greenhouse gases into the environment.

CORONA VIRUS AND AIR POLLUTION,A DANGEROUS LIAISON

Water Contamination:

Human intervention in the environment also jeopardizes the supply and flow of clean drinking water.

Activities like waste disposal from residential, commercial and industrial areas, oil spills and runoff from agriculture all contaminate bodies of water.

The direct deposit of pollutants into lakes, rivers, seas and streams and indirect runoff of hazardous substances during the rainy seasons both impact water sources.

Climate Change:

Human activities in the environment interfere with the planet's natural balance, making the Earth's climate less stable and predictable.

Climate change brings abnormal occurrences such as unprecedented flooding; increased numbers of storms, hurricanes and typhoons; fiercer brush fires; and most notably tsunamis, which are uncommon in the Earth's recent history.

Arid Environment:

Lack of water prevents a desert from supporting much plant and animal life, although some species thrive in this environment

Human populations on the edges of the desert strain the water supply, which affects the already sparse flora and fauna.

Desertification:

Desertification is the process in which once usable land becomes inhospitable and loses its ability to sustain life, essentially becoming unusable.

Desertification is growing due to misuse of land resources, such as over-farming and over-grazing.

Human Activity:

Though droughts trigger desertification, human activity is the largest cause, reports the United Nations.

Over-cultivation, poorly drained irrigation systems, mismanagement of available water, digging for fossil fuels and introduction of invasive species are only some of the environmental problems in desert biomes created by humans.

Impact of Human Population on Natural Resources

What are the consequences of the overexploitation of natural resources?

Natural resources are those that the planet offers without the need for human intervention. They are essential our survival, but if they are consumed at a faster rate than their natural regeneration, as is currently the case, they can be exhausted. Then, we review the consequences and possible solutions to this problem.

WHAT ARE NATURAL RESOURCES ?

There are two types of natural resources: renewable and non-renewable. The former are inexhaustible, like solar radiation, or their renewal is relatively rapid, as is the case with biomass. Non-renewable resources are those that exist in nature in a limited way because **their regeneration involves the passage of many years,** such as minerals and fossil fuels — oil, natural gas and coal —.

Human beings are depleting the planet's natural resources and standards of living will begin to decline by 2030 unless immediate action is taken. The World Wide Fund for Nature (WWF) warns that the current overexploitation of natural resources is generating an enormous deficit, as 20% more than can be regenerated is consumed each year and this percentage is growing steadily.

Thus, if we continue at this rate, **we would need 2.5 planets to supply ourselves in 2050, according to the WWF itself.** In turn, this organization shows that the world's population of fish, birds, mammals, amphibians and reptiles declined by 58 % between 1970 and 2012 due to human activities and predicts that by 2020 this percentage will soar to 67%.

CONSEQUENCES OF THE OVEREXPLOITATION OF NATURAL RESOURCES

The uncontrolled consumption of natural resources has significant effects:

Environmental

The disappearance of habitats essential for flora and fauna and, therefore, the extinction of species. There are some 30 million different animal and plant species in the world, and of these, the International Union for Conservation of Nature (IUCN) says that, **currently, more than 31,000 species are threatened with extinction.**

Economic

33% of the world's soils are moderately to highly degraded, according to a United Nations Food and Agriculture Organization (FAO). If the erosion of fertile soil continues at the same rate, agricultural commodity prices will inevitably soar.

For Health

If we do not take care of the forests there will be fewer CO_2Nota sinks and therefore more air pollution. According to the World Health Organization (WHO), nine out of ten people worldwide breathe air with high levels of pollutants and seven million people die each year air pollution.

SOLUTIONS TO THE OVEREXPLOITATION OF NATURAL RESOURCES

The future, as stated in the United Nations Agenda 2030 for Sustainable Development, poses a double challenge to human beings: **conserving the many forms and functions of nature and creating an equitable home for people on a finite planet.** If we want to reverse this situation, we need, among other things, to:

Conserve natural capital

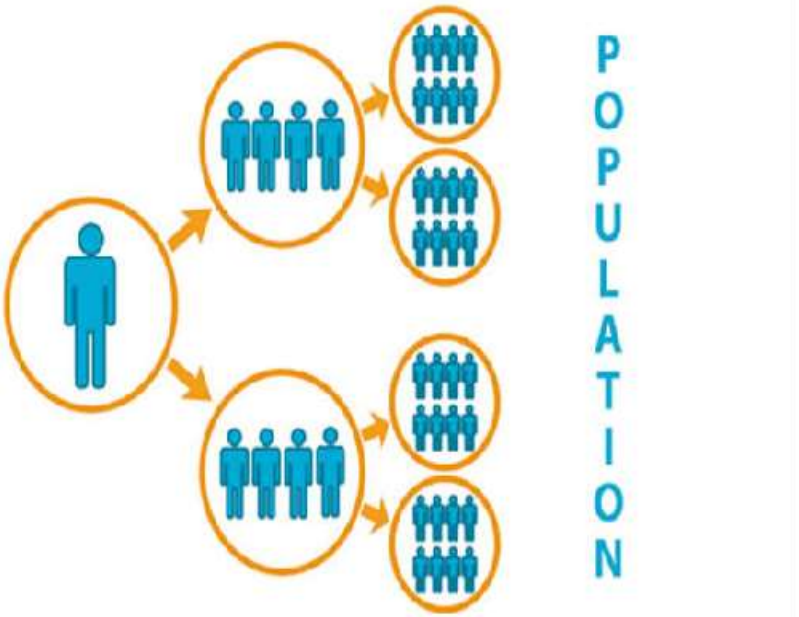
- Restore degraded ecosystems and their services.
- Halt the loss of priority habitats.
- Significantly expand the global network of protected areas.

Improve production systems

- Significantly reduce the objects, materials and resources used in the development of human life and the volume of waste in production systems.
- Manage resources in a sustainable manner.
- Promote the production of renewable energy.

Impact of population growth on lithosphere

The current population of the earth is over 7.6 billion people and growing.it could reach 8 billion by 2025,9 billion by 2040, and a whopping 11 billion by 2100.population is growing rapidly , far outpacing the ability of our planet to support it , given current practices.



Deforestation:

The cleaning of trees, transforming a forest into cleared land.

It impacts the environment by removing a lot of trees, destroying animals homes and environments.

We do it to make useful products for everyday life like paper, burning wood and other useful products made from wood.

Overgrazing:

The vegetation is damaged and the ground becomes liable or at risk to get erosion.

It impacts the environment by destroying the soil and damages plants, trees and increases the chances of getting erosion. We do it so we can let livestock to graze to use later as food supply.

Agricultural problems:

If farmers uses fertilizers , chemical fertilizers and pesticides and insecticides then it may contaminate the soil and could also loose its soil fertility.

It may also lead to soil erosion.

Planting the same crop over and over can strip vital minerals out of the soil.

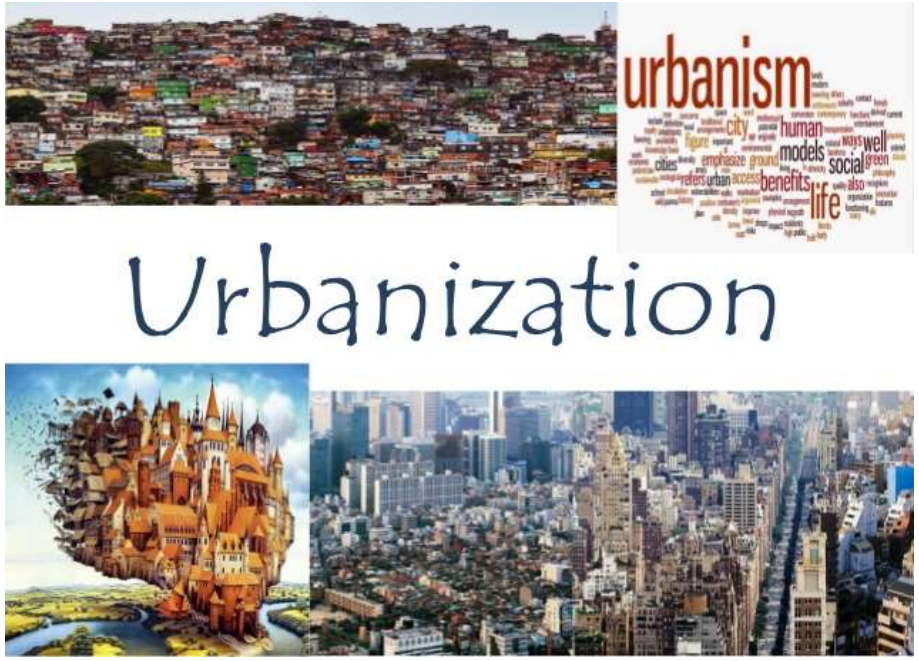
Mining risk:

•It is the process of obtaining coal.

• Underground mining requires digging out large areas, increasing the risk for sinkholes and caverns.
It contaminates the water, the soil, increases erosion, massive sinkholes and deforestation.

URBANIZATION PROBLEM:

- IT CAN REDUCE THE BEAUTY OF NATURE.
- RAPID DEVELOPMENT CAN ALSO LEAD TO VERY HIGH LEVELS OF EROSION AND SEDIMENTATION IN RIVER CHANNELS.



FARMING IMPACT:

- AS THE GLOBAL POPULATION INCREASES MORE FOOD IS NEEDED.
- SUCH MEASURE MAY BE MET THROUGH MORE INTENSIVE FARMING OR THROUGH DEFORESTATION TO CREATE NEW FARM LANDS.
- AGRICULTURE IS RESPONSIBLE FOR ABOUT 80 PERCENT OF DEFORESTATION WORLDWIDE.
- THE AGRICULTURAL RUNOFF OF EXCESS FERTILIZER IS ONE OF THE MAIN CAUSES OF EUTROPHICATION , WHICH DEPLETES WATER FROM OXYGEN AND RESULT IN SIGNIFICANT NEGATIVE IMPACTS FOR MARINE LIFE.

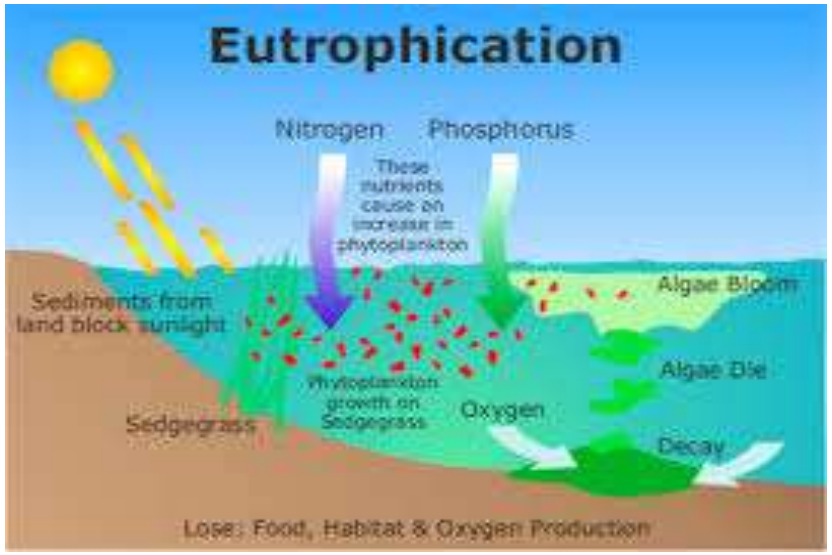
Eutrophication:

It is caused due to the agricultural runoff.

The presence of excessive nutrients in the bodies of water , such as large pockets like the dead zone of the gulf of mexico.

Eutrophication causes the dense growth of plant life that consumes oxygen resulting in the death o the aquatic animals.

Other major source of eutrophication are industry and sewage disposal both are related to population growth.



LOSS OF FRESH WATER:

Only 2.5 % of the water resources are fresh water , and just a small fraction of that is available as unpolluted drinking water.

one of the byproducts of population growth has been stress on freshwater supplies.

according to one report around 15 percent of the world's population lived in water stressed regions in 2016 the amount has been projected to reach 50 percent by 2030.

Impacts of atmosphere

Global warming:

Human population growth and climate change have grown hand and hand as the use of fossil fuels haves exploded to support industrialized societies.

More people means more demand for oil , gas , coal and other fuel mined or drilled below the earth's surface when burned , spew enough carbon dioxide co2 into the atmosphere to trap warm air inside like a greenhouse.

Most of the fossil fuel consumption comes from developed countries.

Air pollution:

Air pollution includes greenhouse gases. One of these is carbon dioxide, a common part of the exhaust from cars and trucks.

Greenhouse gases cause global warming by trapping heat from the Sun in the Earth's **atmosphere.**

Scientists predict that much more warming will likely happen during the next century.

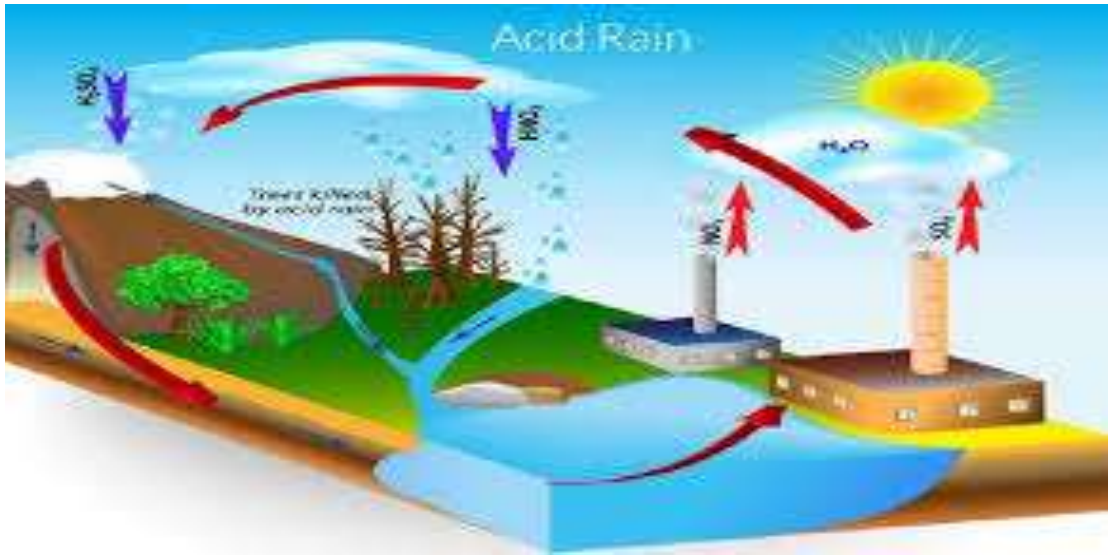
Burning fossil fuels releases gases and chemicals into the **air.**" And in an especially destructive feedback loop, **air pollution** not only contributes to climate change but is also exacerbated by it.

WATER POLLUTION:

- IN THE **ATMOSPHERE, WATER** PARTICLES MIX WITH CARBON DIOXIDE SULPHUR DIOXIDE AND NITROGEN OXIDES, THIS FORMS A WEAK ACID.
- WHEN IT RAINS THE **WATER** IS **POLLUTED** WITH THESE GASES, THIS IS CALLED ACID RAIN.
- WHEN ACID RAIN POLLUTES MARINE HABITATS SUCH AS RIVERS AND LAKES, **AQUATIC** LIFE IS HARMED
- THE RESULT IS THAT **WATER** BODIES ALSO GET CONTAMINATED AND THIS AFFECTS ANIMALS AND **WATER** ORGANISMS.

ACID RAIN:

- THE ECOLOGICAL **EFFECTS OF ACID RAIN** ARE MOST CLEARLY SEEN IN AQUATIC ENVIRONMENTS, SUCH AS STREAMS, LAKES, AND MARSHES WHERE IT CAN BE HARMFUL TO FISH AND OTHER WILDLIFE.
- AS IT FLOWS THROUGH THE SOIL, **ACIDIC RAIN** WATER CAN LEACH ALUMINUM FROM SOIL CLAY PARTICLES AND THEN FLOW INTO STREAMS AND LAKES.
- THE POLLUTANTS THAT CAUSE **ACID RAIN**—SULFUR DIOXIDE (SO_2) AND NITROGEN OXIDES (NO_x)—**DO** DAMAGE **HUMAN** HEALTH.
- THESE GASES INTERACT IN THE ATMOSPHERE TO FORM FINE SULFATE AND NITRATE PARTICLES THAT CAN BE TRANSPORTED LONG DISTANCES BY WINDS AND INHALED DEEP INTO PEOPLE'S LUNGS.



RELEASE OF (CO2)CARBON DIOXIDE:

- EXTRA **CARBON DIOXIDE** IN THE **ATMOSPHERE** INCREASES THE GREENHOUSE EFFECT. MORE THERMAL ENERGY IS TRAPPED BY THE **ATMOSPHERE,** CAUSING THE PLANET TO BECOME WARMER THAN IT WOULD BE NATURALLY.
- THIS **INCREASE** IN THE EARTH'S TEMPERATURE IS CALLED GLOBAL WARMING .

CLIMATE CHANGE:

- IMPACTS FROM CLIMATE CHANGE ARE HAPPENING NOW. THESE IMPACTS EXTEND WELL BEYOND AN INCREASE IN TEMPERATURE, AFFECTING ECOSYSTEMS AND COMMUNITIES IN THE UNITED STATES AND AROUND THE WORLD.
- THINGS THAT WE DEPEND UPON AND VALUE — WATER, ENERGY, TRANSPORTATION, WILDLIFE, AGRICULTURE, ECOSYSTEMS, AND HUMAN HEALTH — ARE EXPERIENCING THE EFFECTS OF A CHANGING CLIMATE.

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