

The Environment -
Fate of the Earth

May 1992

William Arendshorst, M.D., Ph.D.

The Environment--Fate of the Earth

To the ancient writers of human history, nature existed for humans to use and conquer. From the Old Testament, "And God said, let us make man in our own image, after our likeness, and let him have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the Earth, and over every creeping thing that creepeth upon the Earth." (Genesis 1,26) And a little later, "God gave direction to the newly created Adam and Eve "Be fruitful and multiply, and replenish the Earth and subdue it." (Genesis 1, 28.)

This sense of man as master of the Earth may seem to have been present from the beginning of mankind but we are learning that some 1.5-2.0 million years ago, as modern man began to evolve, he was hardly master of the Earth. First, he ate foliage, fruits and tubers; then he was a gatherer and scavenger; as a member of a small social group and eventually a social hunter-gatherer for small groups. We are still in transition from the notion of man as a master of the Earth, to the notion of man as a part of it. We are dependent on the Earth and have responsibilities to it. The primitive people recognized this in what they called the interconnectidness of land, man, and creatures--the web of life. Their philosophy was that they could live on the land but use only what they needed. They did not own the land.

When our planet was young (in modern time phase), with a bounty of plants and animals, there was no need to think of limits or of worries about destroying parts of nature that made up the wilderness. The first people needed it and revered it. But as outsiders came in to live in this pristine setting, it appeared to be one vast unlimited wild area populataed with wild men and wild beasts. These newcomers wanted to possess and master it. The struggle to survive, and to subdue, occupied the energy of the first generation or two wherein settlements were formed.

But there are limits to what man can due to his environment. It took the people in our country until 1864, when George P. Marsh published Man and Nature and other puablications for us to realize this. By 1870 deforestationn was going on in our country; it had been taking place in Europe for a long time just as it is occuring in the tropical forests in our generation.

2.

Our first national park, Yellowstone, came about in 1872 as a result of a spontaneous overflow of enthusiasm after a U.S. geologic and geographical survey of the territories, had exposed the beauty and exceptional wonders of the area. Then in 1875, some lovers of nature, including avid bird lovers who are sometimes ahead of the public in matters such as environmental protection, formed the American Forestry Association. Finally in 1891, there was authorization to establish "forest preserves on the public domain". Next, Teddy Roosevelt with Gifford Pinchot put more political pressure on Congress to create protective measures and laws resulting in national parks, national forests, national monuments, and national wildlife sanctuaries. John Muir was another forceful persuader. Yosemite, Sequoia National Parks, the Petrified Forest, and the Sierra Club, formed in 1892 are attributed to him. Laws prevented any impairment to these public properties.

By 1903, irreversible changes in the environment were brought to the attention of many. The Passenger Pigeon, the Carolina Parakeet, much of Michigan's white pine forests were gone and the Buffalo and Antelope were down to remnants.

Now, I would like to discuss the pollution that is taking place in the three essential parts of our planet.

The air we breath. Living plants absorb carbon dioxide and many release oxygen. This simple sounding cycle kept up a fairly constant ratio in our atmosphere until about the time of the industrial revolution when the amount of carbon dioxide began to climb slowly. (Hand out)

The burning of any carbon-containing material--wood, coal, oil, or gas, releases carbon dioxide into the air. So does animal and human breathing as well as volcanoes. When the automobile came along, the accumulation of carbon dioxide got worse. Sulfur dioxide and nitrogen dioxide from ore smelting, ammonia and methane from animals were more contaminants.

It may take years to settle the argument concerning the possibility that there is a Greenhouse Effect taking place. All the gasses mentioned above permit ultraviolet and infrared rays from the sun to pass through our atmosphere but the heat cannot escape. Thus earth warming (the Greenhouse Effect) could occur. If it were to take place, the effects would be tremendous--seas getting higher,

3.

temperate zone land getting more desertified, croplands going north etc.

Man should be able to curb the pollutants he is putting into our atmosphere and the Earth itself may have its own mechanism to counteract such a change. After all in the early history of our planet, the carbon dioxide/oxygen relationship wasn't ideal and many other gases were probably present in the atmosphere.

Among the other pollutants present is chloro-fluoro-ethylene (Freon). I can relate to this compound because it was discovered just before my years at Ohio State U. and much work on it was done there. Now known as CFC, it has been used as a refrigerant, in aerosol cans, as a cleaning compound and in foam insulation. It has been escaping to the atmosphere where some 10-20 miles up, it reacts with the incoming ultraviolet light to release nascent chlorine. The chlorine reacts with ozone giving molecular chlorine which reacts again with the incoming ultraviolet light releasing nascent (atomic) Chlorine and the cycle continues with a gradual loss of ozone. Holes in the ozone layer were found over Antarctica in 1986 and are now being found over the Arctic and extending southward. The satellite that went up a few weeks ago may give more insight. When the ozone is absent, ultraviolet light gets through to cause skin cancer and bad effects on crop growing. The use of CFC is being banned.

Attempts to alleviate the air pollution are going on throughout the industrial world. Substitute methods to replace the burning of fossil fuel for energy are gaining in popularity as air pollution increases.

The use of wind for practical energy is thousands of years old. Hydrostatic power ran our historic saw-mills and is still very important; solar energy concentrated by solar screens and used in photoelectric cells is of value; finally nuclear energy is a clean source although the waste is a problem. If and when nuclear fusion comes about it should be the ultimate clean energy source.

Conservation of energy in all aspects of our life is fundamental. If you can sit, don't stand. Cars are using less gas per mile and Chrysler is developing a battery-powered van with a 100 mile range. When fossil fuel is used, the polluting gases that we have mentioned can be removed to some degree using scrubbers, electronic

4.

precipitators, filters etc. Educationn giving understanding is a necessary part in reducing pollution. The cost effectiveness of clean air has shown that the cost for effective clean-up is \$3 billion per year but in spending this bundle, the clean air will save an estimated \$9.4 billion per year in health costs. If a city such as Los Angeles doesn't meet federal and state standards in pollution control by the year 2007, it could lose tens of billions of dollars of state and federal funding for necessary projects. Such types of pressure for clean-up is going on in many large cities.

Emphasis on tree planting is becoming more common and forest protection is gaining in public concern. You know, trees not only clean up our air but present shady areas for napping, are aesthetic and are good for a guy's psyche.

One other aspect of air pollution should be mentioned. For about 150 years, ores have been smelted to reduce them to the base metal. These processes release sulfur dioxide primarily and this plus nitrogen dioxide from cars and other chemical plants has led to a condition called "acid rain". In parts of Canada, our north-east, German's Black Forest and in sections of eastern Europe, trees are dying from this "acid rain". In addition, there are rolling landscapes bereft of vegetation and lakes made sterile. These gases can be reduced certainly, perhaps eliminated following the same control methods mentioned for carbon dioxide.

Next in importance to our health, is water. The only potable natural water is that found in wilderness areas, far from civilization. When one canoes in the Canadian border waters, water for drinking can be taken directly from rivers and lakes. In addition the fish that are caught are free from toxins, especially heavy metals.

For thousands of years, world wide, the seas, lakes and rivers suffered from waste dumping. In our area, the Kalamazoo River was polluted from the paper industry's waste. Lake Macatawa (Black Lake) accepted the sewage from Ottawa Beach, from Heinz Co. and from other industries. Ice in Black Lake is "softer" now than in years past because of the lowered freezing point due to pollutants in the water. The Grand River periodically gets it's charge of raw sewage from Grand Rapids. And for centuries, Venice has dumped sewage into their harbour. The water systems also receive heavy metal from industries, pesticides, herbicides and

fertilizers that run off croplands, our yards, and beautiful golf courses.

I recall one early fall in the 1970's, when over 100 Common Loons were found dying on the Lake Michigan shores from Traverse City down to the Indiana Dunes. They had eaten decaying fish on the lake bottom. The decaying fish had died from toxic chemicals and later became infected with the Botulina organism. At the same time, Gulls were dying also from infected fish. One hundred years ago, miners took caged canary birds into the mine shaft with them. If the bird behaved abnormally, they knew that the air was impure and everyone got out. There is some thought that the demise of wildlife is giving us a strong signal to do something about our environment. Rachael Carson said it in her "Silent Spring" back in the 1960's.

In 1972, the Clean Water Act became effective. There is still need for it. Such rivers as the Connecticut River which had been called a sewer, were so effectively cleaned up that fishing and swimming became safe again. As the river improved the natural beauty of the whole area developed.

A pioneer in land protection and a person I admired was Aldo Leopold. He had strong ideas that the relationship of people to land was most important for the continued stability and advancement of civilization. Humans have changed the land severely in almost every country.

Ten thousand years ago, the forests covered 6.2 billion hectares (about 15 billion acres); now forests cover only some 10 acres. Forests were eliminated for the obvious reasons--for croplands, to sell the lumber and to provide living space. In the third world countries, when the trees that were easily accessible were cut down, the tropical forests were attacked. But in this case, the soil was not very fertile so that in a short time--2-3 years--at least half of the land that was cleared for crop growing, had to be abandoned. Native people in many third world areas are beginning to protect and cultivate useful forest trees in managed stands. Useful products are extracted from the forest without disrupting the ecological integrity. But there is powerful opposition by those who gain by cutting down the forests.

A parallel is the loss of our grasslands. Not many of us think about this but long ago we had tall grass prairies.

They were eliminated by farming until there is less than 1% left. Leopold was bothered by this and in 1934 began to try to restore the grasslands. He recreated plant communities by reintroducing native species in a pattern and sequence that permitted natural selection. Don't forget when you plant trees or plants in your yards, only plant what belongs there. Exotic flora may survive but plants that were found there originally will do much better.

Croplands can be easily mismanaged and the soil become unproductive. In the developed countries, there are available university agriculture centers that will give help. To reduce the amount of toxic chemicals that might be applied to the land, there is taxation on the sale of certain chemicals, substitution of non-toxic materials, the use of crops resistant to pests, the use of insects that selectively kill the pests and gene substitution methods.

The extinction of any specie can be anticipated as the environment is degraded and the area reduced in size. (One would see more species in 250 acres than in 25 acres.) Specie extinctions have been periodic in global history--possibly from collosions with meteors, from climate changes--but this is the first brought on by man.

As population increase , up to 10 billion in the next 30 years, forests will have to be eliminated to provide more croplands. As this happens, more wild life will be destroyed. Already, the original forests of Central America, southeast Asia, and West Africa have been more than 90% cleared. Protected areas such as our national parks are helpful but are proving inadequate in the preservation of wild life. The Rocky Mountains and Yosemite have lost 25-30 % of their native animals.

It would be difficult but very rewarding to visit a Biosphere Reserve where the purpose is to protect and preserve an intact area of each of th earth's ecological zones. It is believed that some 3 billion acres is needed for an adequate "Biosphere Reserve" and it is remarkable that there are 252 Biosphere Reserves in 66 countries.

Up-to-date zoos are doing a terrific job in specie preservation but zoos can afford to take care of only some 900 species world-wide and there are no such places for the 4 million species of invertebrates, or for the 25,000-40,000

7.

species of flora. In order for any specie to be healthy and survive there has to be enough population to maintain diversity.

Toxic Waste--We mentioned water pollution and how wet-lands, swamps and marshes function to purify water. Sewage can be cleaned up by these natural methods but the disposal of chemical waste is more complicated. Waste in ponds, landfills or waste in any kind of impoundment will probably eventually leak. Right now there are some 35,000 waste disposal sites in W. Germany and about 10,000 of them in the U.S.

Waste disposal in industry is becoming a major cost item. Most successful companies are researching and developing effective control methods. Besides the financial gain there is often an incentive in the way of a tax break. The developing countries and Russia do poorly in handling their waste, especially hazardous waste. Currently the U.S. recycles 10% of its trash, incinerates 10% and sends 80% to landfills. The Japanese lead in recycling. In the next few years, about 1/3 of our remaining landfills will close either because they are full or because they are toxic leakers. It should be embarrassing to all of us in the U.S. that the average amount of household waste is 1274 pounds per person per year.

Remember the Mobro? Three years ago, that ill-fated scow left Islip, Long Island, carrying some 3,000 tons of garbage and sailed into symbol-hood. The barge was looking for a place to get rid of its cargo. N. Carolina and Florida turned it away as did Belize, the Bahamas and Mexico. After 57 forlorn days on the high seas, the Mobro returned to New York, still bearing its by-now-infamous load. Three and a half months later, the trash was burned and finally buried back home in Islip.

One would assume that trash left in a landfill eventually becomes soil, but recent studies show that this is not the case; most things remain virtually mummified. The dirt covering, and the landfill's bulk, tend to keep out rain, air and oxygen. As a result, oxygen-loving bacteria can play only a limited role in transforming ordinary household trash into earth. In effect, a landfill is often like a pyramid where trash lays embalmed.

Archaeologist Wm. Rathje of the U. of Arizona, who conducts landfill digs, has turned up 1952 newspapers that

are still readable. At Fresh Kills recently, his team un-earthed a hunk of ham fat thrown away five years earlier, and still as plump and supple as if it had been trimmed from yesterday's dinner.

Once these hills of garbage are capped, closed and seeded, communities often give them a name, like "Mt. Trashmore", and declare them parks. In Florida, we play golf on a county course, made on top of a landfill. Maybe it has something to do with my junky score. It is hard to believe that underneath the fairways and greens, evil juices trickle.

A controversial alternative is burning trash in incinerators. The ash is collected and mechanisms keep most toxic material from escaping up the stack. The heat from the burning boils water and generates electricity. The ash left after the burning amounts to 20-30% of the compacted waste and goes to a landfill.

Developed countries like to have neat packaging but this nicety constitutes about 30% of the compacted waste. It is encouraging to see that biodegradable material and materials that can be recycled are being produced. McDonald's restaurants in Canada are using a foam packaging that is not CFC and is 100% recyclable. Avoiding waste and recycling is the way to go.

Although only 30% of the world's population are in industrialized countries, these nations consume 70% of the world's resources and are at fault for the world's ecological problems. This is the thinking of the undeveloped nations. It is partly true.

In June 1992, there will be a United Nations Conference In Brazil on environment and development. The purpose of the meeting is to encourage cooperation between the industrialized north and the developing south in cleaning up the planet. The biggest hurdle is money. Third world countries want to be compensated for the extra costs they would incur, and the potential earnings they would give up by embracing the principle of "sustaining development" or development only to the point that the country can tolerate. The most sensitive area at the moment is tropical forestry. The north wants the developing countries to cut back on the logging and to forgo the quick buck but it is unlikely that the developing countries will do this because they are burdened by debt; have much unemployment and political

unrest. They will probably only make such sacrifices if the richer nations agree to a massive transfer of funds and technology. The rise in environmentalism in international relations has given the poor countries a powerful bargaining power in their dealings. The third world isn't going to change unless they can be helped in their debt and unless there are changes in the unfair trading practices. The third world believes that the cost of saving the planet should be borne by those who can afford it--the rich nations of the north. People in the north are poor examples; they only talk about recycling and changing their way of life of wasteful consumption. Unless they change, the disparity between the rich and poor nations will not disappear.

On their own, the third world is trying to find any way to raise their economic level. They have exploited their natural resources and have borrowed much money to build roads, dams, factories and schools. This has resulted in a debt of \$1 trillion with an increase at the rate of \$60 billion per year and with an interest of \$80 billion per year.

Two weeks ago it appeared that the U.N. Earth Summit meeting in Rio D.J. this June would be doomed by the issue of who would pay for the clean-up work in the Third World Countries. As a leader, the U.S. had decided not to send any delegates but a few days ago, the U.S. changed and will have representatives there. At least there will be an open exchange between the so-called north and south nations.

The idea of debt-for-nature-swap was proposed in the early 1980's. The plan was that a non-governmental organization would purchase part of a developing country's debt from a lending bank. Or, a government owned enterprise would be purchased by a private party in exchange for a debt. This proposal did not reduce the debt anywhere significantly. But in some way, the strangle hold of the debt must be eased. The problem is analagous to the situation that the war-torn countries of Europe were in after World War II. In 1947, the allied countries acted to provide international assistance to rebuild Europe. Something of this nature could be done for the Third World's situation.

Overpopulation is the basic cause of the debt problem. The vicious cycle of high birth rate and the declining economy emphasizes this underlying cause of all the environmental problems. Just too many people! By 2000

A.D., the total number of people on the planet will be about 6.3 billion. The world population has doubled in the last 40 years with a growth rate of 2% per year. Most of this takes place in Asia and Africa. Again, the effect of population growth is most striking where there is no sustainable economy. Such a system will deteriorate even when population growth stops.

Family planning is the most important way to control population growth. But when Family Planning becomes available, we have to get people to use it. The use of contraceptives is blocked by religious taboos, the belief in the benefit of large families and the ignorance concerning conception. In Third World Countries, usually a woman has low status and the male has a lack of responsibility caring little about family size. These people need to be educated about pregnancy; that pregnancy has a higher morbidity and mortality when there is poor health and malnutrition plus a lack of Family Planning. Legal abortions are usually not available and complications are high with illegal ones. In third world countries, maternal mortality accounts for 25% of the deaths of woman between the ages of 45-49 years.

In most of the undeveloped countries, funding for Family Planning is lacking. There is poor public support and poor political climate. But in progressive areas there are loan funds to villages that accept family planning and extra privileges to individuals who use it. This is true in China.

If Family Planning fails and population continues its present torid pace, one can only think of disease, wars, political killings, (as is now going on in Iraq with the Kurds), or starvation (in Ethiopia), to reduce populations. Malnourished people are more prone to disease. Bacteria do adjust to their environment and can produce disease when we think they are no longer a threat, human immunity may decrease and groups which are not immune may fall to new diseases such as with the present HIV virus. Examples of this in the past were Measles and Smallpox that the Spanish explorers brought that decimated the native people. It is morbid and bad thinking to believe that we should depend on disease and starvation to control global population. Man is intelligent enough to discover better ways.

The more wealthy nations may not have the financial resources to make the investments needed to return the world to a sustainable development state if they continue to pour

//.

financial resources into the arms race. However at the moment, it seems that the arms race will slow considerably and more funding will be available if the nations work together as well as they have in recent months. Again, I want to mention the analogy between the situation here and the one that was present in Europe after World War II. Now, there has to be a new mechanism of international cooperation in helping the third world countries in the many problems that have been outlined.

If the developed nations can't cooperate in this way, then the psychological toll of failure will be high, risking widespread demoralization and uprisings, a sense of loss in our ability to control our destiny. But if our concerns motivate political action and if the needed changes in national priorities and individual life-styles take root, then we can expect improvement in the human condition.

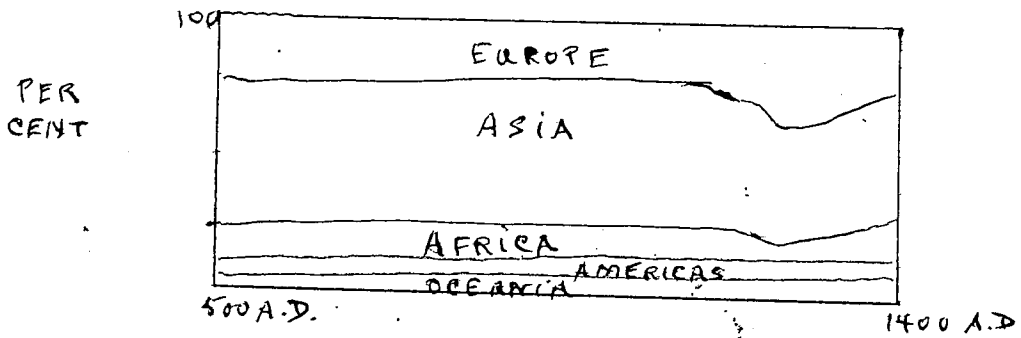
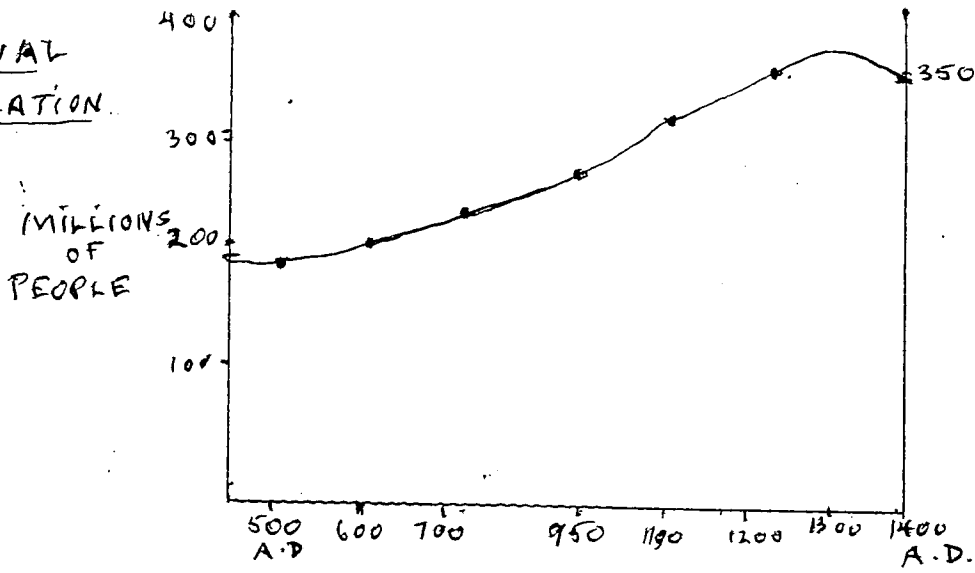
There is an interdependence of nations. The fate of even the most wealthy powerful nation is intertwined with that of the most destitute. Raising the level of living standards in every less developed country is a universal responsibility and will benefit all of us.

Efforts to save the environment will always have to be made until education has shown everyone its importance. I guess one could say that the future has three possibilities: one, our present form of destructive civilization will collapse and humankind will disappear; two, humankind will have been reduced to a very small group; lastly and the most reasonable, humans will have learned to live in harmony with creation.

Bibliography

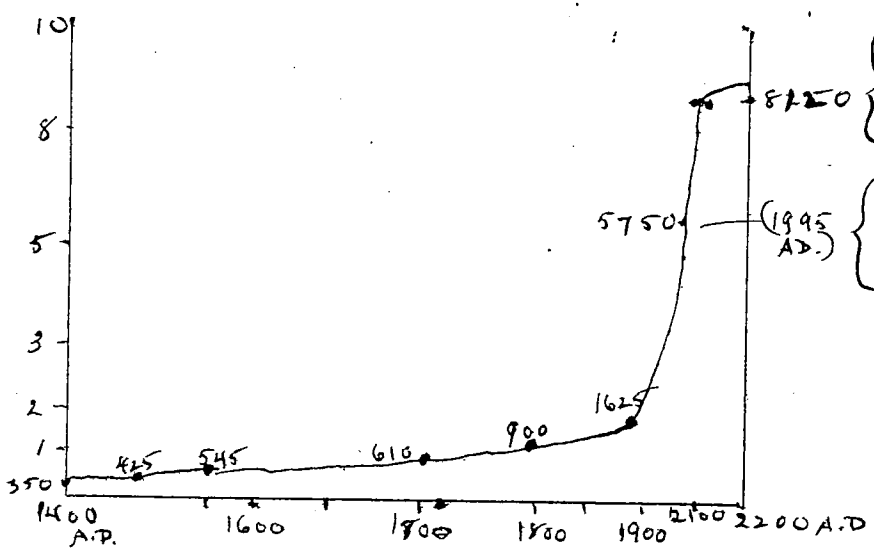
1. Audubon Magazine
July-August 1991
Nov.-Dec., 1991
2. World Almanac
Population Reference Bureau, Inc., 1992
3. State of the World
World-Watch Institute Report of Progress Toward a
Substantial Society; W.W. Norton and Co., N.Y., N.Y., 1988
4. Maclean's Magazine
The Evolving Image; Sept. 17, 1990
Fate of the Earth; Dec. 16, 1991
5. Environment
Dec. 1990; 32, #10, p. 5
6. Living Bird
Autumn, 1991; Cornell U.
7. Smithsonian Magazine
March 1992

MEDIAEVAL
POPULATION.



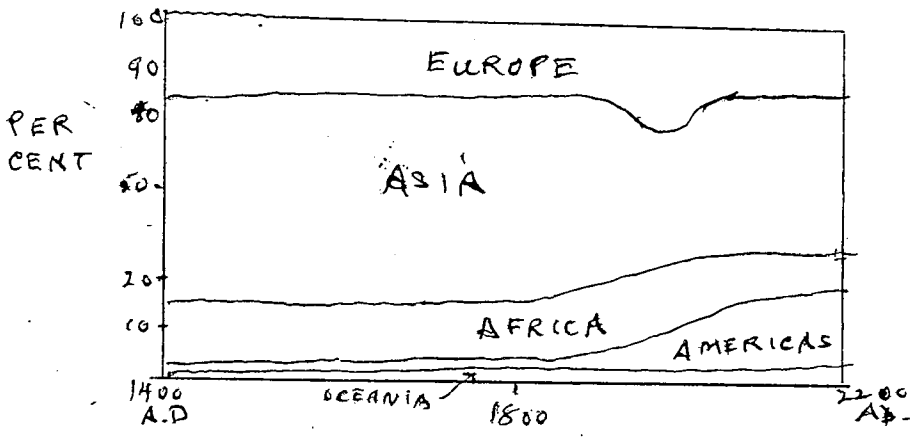
MODERN
TIMES

MILLIONS OF PEOPLE

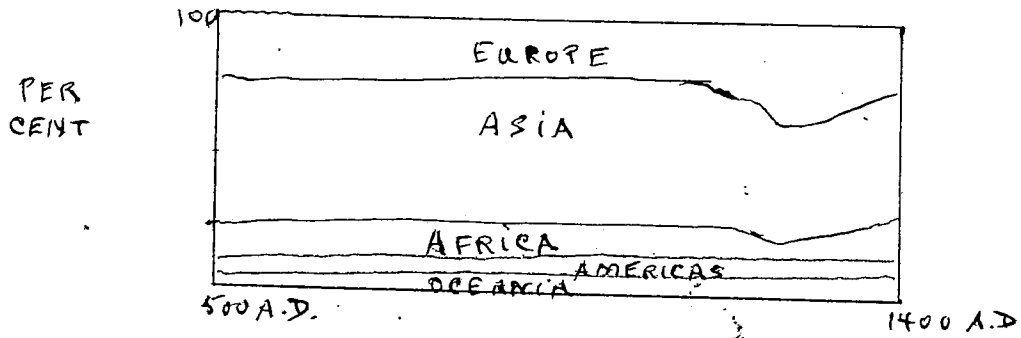
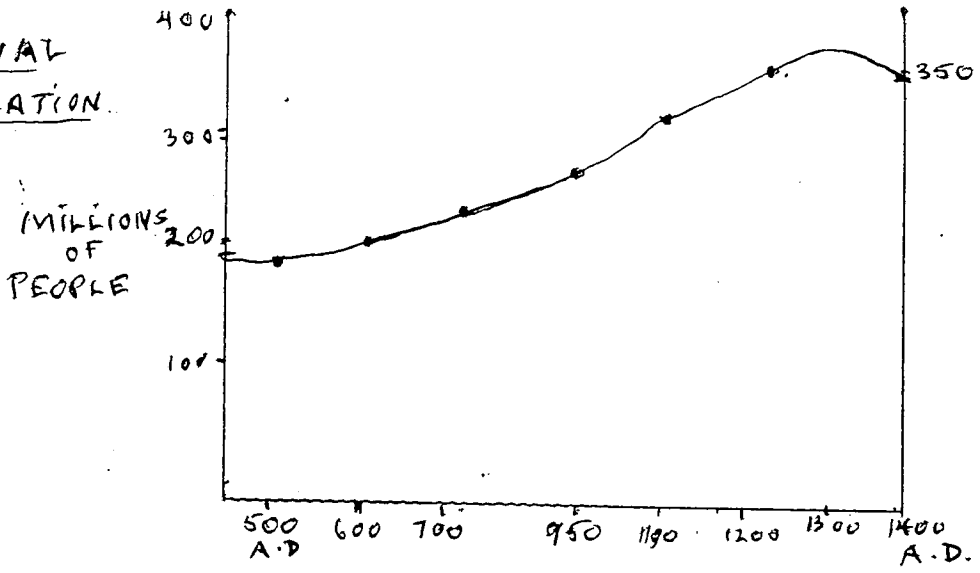


MORE DEVELOPED 1.340 M
LESS DEVELOPED 6.780

MORE DEVELOPED 1243 M.
LESS DEVELOPED 4.436 M.

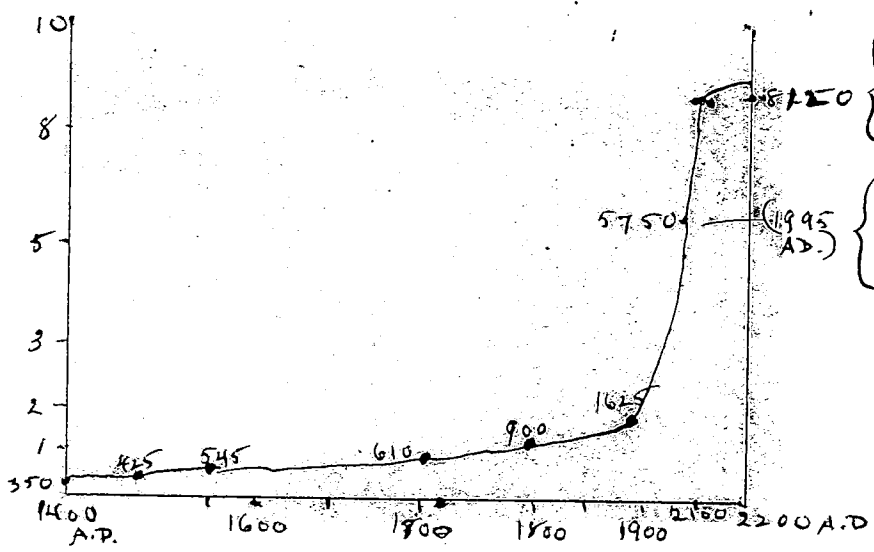


MEDIAEVAL
POPULATION.



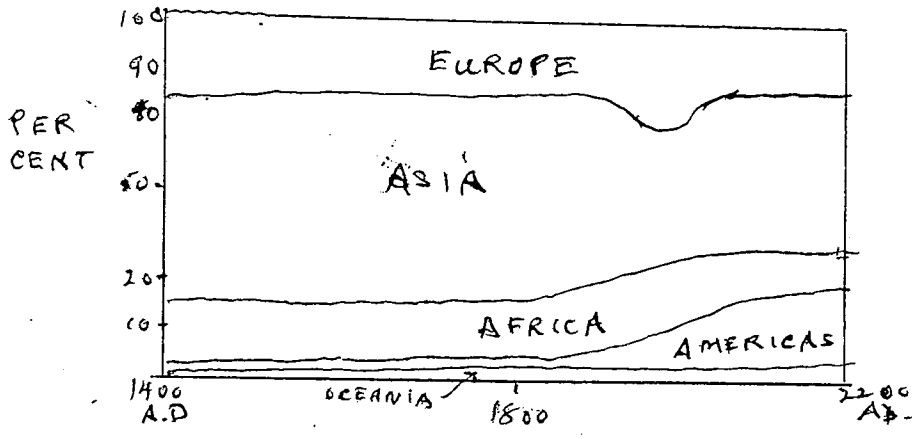
MODERN
TIMES

MILLIONS OF PEOPLE

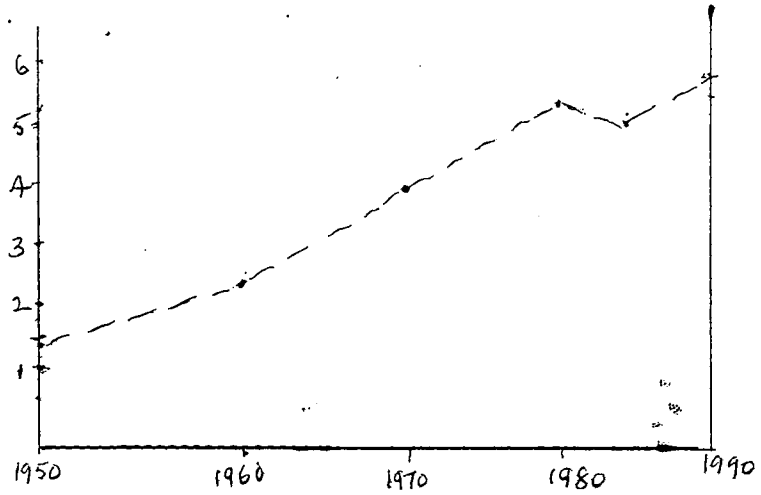


MORE DEVELOPED 1.340 M
LESS DEVELOPED 6780

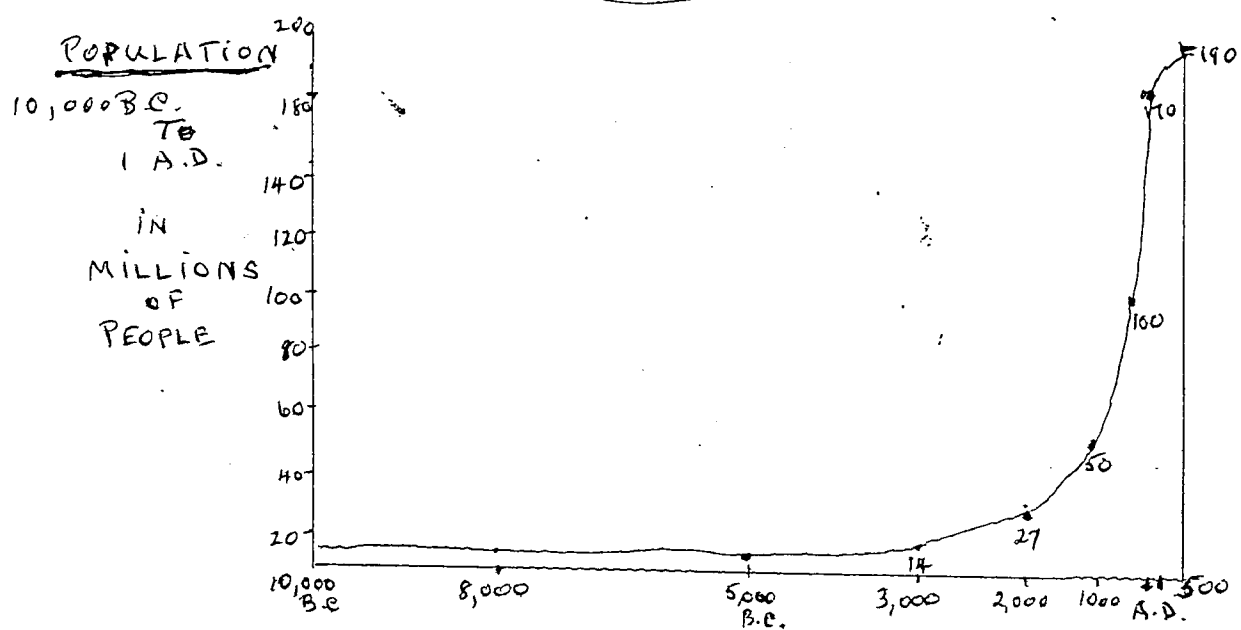
MORE DEVELOPED 1243 M.
LESS DEVELOPED 4436 M.



AIR POLLUTION



WORLD CARBON EMISSIONS FROM FOSSIL FUELS
5.4 TONS OF C. PER YR. TO ATMOSPHERE
OR 1 TON PER PERSON.



POPULATION IN 10,000 B.C.
DOUBLE THAT IN 100,000 B.C.

