POPULATION EXPLOSION AND FRESHWATER CRISES

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Overview:

On October 31, the world's 7 billionth person will be born. Each of us is part of that population. With the world growing by more than 200,000 people a day, it's hard to know where you fit in. Earth's population was just 2.2 billion in 1950. This rate of increase is alarming when compared with resources available. Unfortunately the increase is relatively more in the developing countries such as Pakistan where it has already touched 180 million figures. The resources for human survival such as water food energy and transport are already beginning to pose serious problems. The number of humans is expected to rise from seven billion in 2011 to at least nine billion by 2050, boosting demands for water that are already extreme in many countries and set to worsen through global warming. The record population can be viewed as a success because it means people are living longer — average life expectancy has increased from about 48 years in the early 1950s to about 68 in the first decade of the 21st century — and more children are surviving worldwide. Fig1: Shows world population growth curve while Fig2: Shows distribution and Fig4: Pakistan's Population.

Population:

- Currently the world's population is 6.7 billion.
- Rate of growth is roughly 75 million per year.
- On Oct, 21 (2011) it reached to 7 billion mark.
- At this rate it is expected to reach 9.5 billion by 2050.

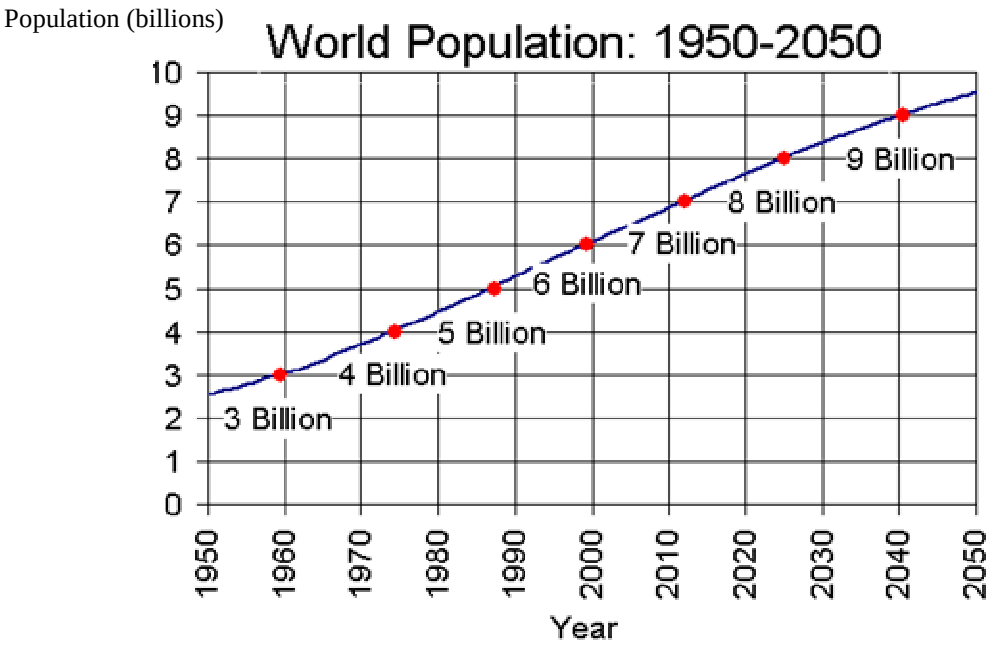
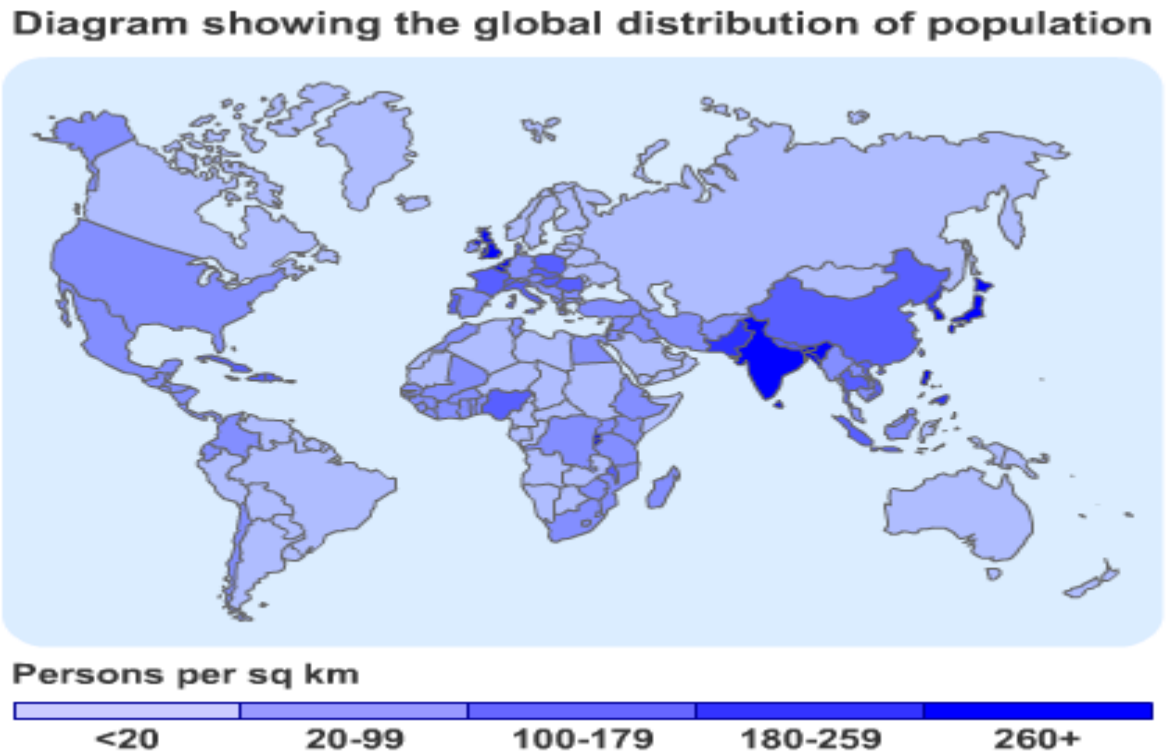


Fig1: Shows global population growth curves.

Distributic



- China and India have a population greater than 1 billion, together possessing more than a **third** of the world's population!

Fig2: Shows Distribution of population.

Trend in Pakistan Population growth:

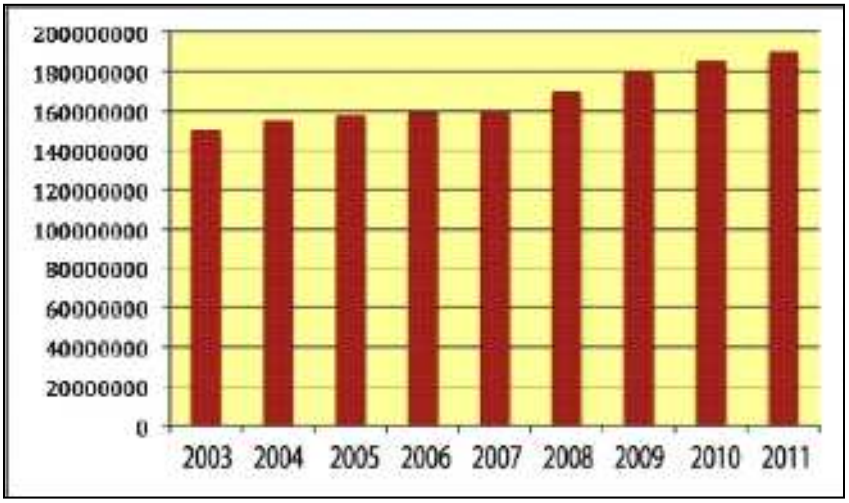


Fig4: Shows population increase in Pakistan.

Half the population (66%) lives in the rural part of the country Poverty, compounded by illiteracy, low status of women, and inadequate water and sanitation facilities, has a deep impact on health indicators two main divisions: the public domain and the private domain.

"Currently, 1.6 billion people live in areas of physical water scarcity and this could easily grow to two billion soon if we stay on the present course," according to the UN report.

How Population growth can cause problems from water scarcity to species extinction:

Fresh water supplies, on which agriculture depends, are running low worldwide. This water crisis is only expected to worsen as the population increases. Potential problems with dependence on desalination are reviewed below; however, the majority of the world's freshwater supply is contained in the polar icecaps, and underground river systems accessible through springs and wells.

Fresh water can be obtained from salt water by desalination. For example, Malta derives two thirds of its freshwater by desalination. A number of nuclear powered desalination plants exist; however, the high costs of desalination, especially for poor countries, make impractical the transport of large amounts of desalinated seawater to interiors of large countries. The cost of desalinization varies; Israel is now desalinating water for a cost of 53 cents per cubic meter, Singapore at 49 cents per cubic meter. In the United States, the cost is 81 cents per cubic meter ($3.06 for 1,000 gallons).

According to a 2004 study by Zhoua and Tolb, "one needs to lift the water by 2000 m, or transport it over more than 1600 km to get transport costs equal to the desalination costs. Desalinated water is expensive in places that are both somewhat far from the sea and somewhat high, such as Riyadh and Harare. In other places, the dominant cost is

desalination, not transport. This leads to somewhat lower costs in places like Beijing, Bangkok, Zaragoza, Phoenix, and, of course, coastal cities like Tripoli." Thus while the study is generally positive about the technology for affluent areas that are proximate to oceans, it concludes that "Desalinated water may be a solution for some water-stress regions, but not for places that are poor, deep in the interior of a continent, or at high elevation. Unfortunately, that includes some of the places with biggest water problems." Another potential problem with desalination is the byproduction of saline brine, which can be a major cause of marine pollution when dumped back into the oceans at high temperatures."

The world's largest desalination plant is the Jebel Ali Desalination Plant (Phase 2) in the United Arab Emirates, which can produce 300 million cubic meters of water per year, or about 2500 gallons per second. The largest desalination plant in the US is the one at Tampa Bay, Florida, which began desalinizing 25 million gallons (95000 m^3) of water per day in December 2007. A January 17, 2008, article in the Wall Street Journal states, "Worldwide, 13,080 desalination plants produce more than 12 billion gallons of water a day, according to the International Desalination Association." After being desalinized at Jubail, Saudi Arabia, water is pumped 200 miles (320 km) inland though a pipeline to the capital city of Riyadh.

I think the biggest issue confronting the planet is the collective demand we put upon it. And what is the difference in impact between population growth in Third World ountries, which are poor, against that in the U.S., where we consume and waste so much more.

The global rate of human population growth peaked around 1963, but the number of people living on Earth—and sharing finite resources like water and food—has grown by more than two-thirds since then, Human population is expected to exceed nine billion by 2050.

“Trends such as the loss of half of the planet’s forests, the depletion of most of its major fisheries, and the alteration of its atmosphere and climate are closely related to the fact that human population expanded from mere millions in prehistoric times to over seven billion today.”

Population Growth Causes Multiple Environmental Problems:

According to Population Connection, population growth since 1950 is behind the clearing of 80 percent of rainforests, the loss of tens of thousands of plant and wildlife species, an increase in greenhouse gas emissions of some 400 percent and the development or commercialization of as much as half of the Earth’s surface land.

The group fears that in the coming decades half of the world’s population will be exposed to “water-stress” or “water-scarce” conditions, which are expected to “intensify difficulties in meeting…consumption levels, and wreak devastating effects on our delicately balanced ecosystems.”

Some problems associated with or exacerbated by human overpopulation:

- **Inadequate fresh water** for drinking water use as well as sewage treatment and effluent discharge. Some countries, like Saudi Arabia, use energy-expensive desalination to solve the problem of water shortages.
- **Depletion of natural resources**, especially fossil fuels.
- Increased levels of **air pollution, water pollution, soil contamination and noise pollution**. Once a country has industrialized and become wealthy, a combination of government regulation and technological innovation causes pollution to decline substantially, even as the population continues to grow.
- **Deforestation and loss of ecosystems** that sustain global atmospheric oxygen and carbon dioxide balance; about eight million hectares of forest are lost each year.
- **Changes in atmospheric composition and consequent** global warming.
- Irreversible **loss of arable land** and increases in **desertification**. Deforestation and desertification can be reversed by adopting property rights, and this policy is successful even while the human population continues to grow.
- **Mass species extinctions** from reduced habitat in tropical forests due to slash-and-burn techniques that sometimes are practiced by shifting cultivators, especially in countries with rapidly expanding rural populations; present extinction rates may be as high as 140,000 species lost per year. As of February 2011, the IUCN Red List lists a total of 801 animal species having gone extinct during recorded human history.
- High **infant and child mortality**. High rates of infant mortality are caused by poverty. Rich countries with high population densities have low rates of infant mortality.
- **Intensive factory farming** to support large populations. It results in human threats including the evolution and spread of antibiotic resistant bacteria diseases, excessive air and water pollution, and new viruses that infect humans.
- Increased chance of the emergence of **new epidemics and pandemics**. For many environmental and social reasons, including overcrowded living conditions, malnutrition and inadequate, inaccessible, or non-existent health care, the poor are more likely to be exposed to infectious diseases.
- **Starvation, malnutrition** or poor diet with ill health and diet-deficiency diseases (e.g. rickets). However, rich countries with high population densities do not have famine.
- Poverty coupled with **inflation** in some regions and a resulting low level of capital formation. Poverty and inflation are aggravated by bad government and bad economic policies. Many countries with high population densities have eliminated absolute poverty and keep their inflation rates very low.
- **Low life expectancy** in countries with fastest growing populations.
- **Unhygienic living conditions** for many based upon water resource depletion, discharge of raw sewage and solid waste disposal. However, this problem can be reduced with the adoption of sewers. For example, after Karachi, Pakistan installed sewers, its infant mortality rate fell substantially.
- **Elevated crime rate** due to drug cartels and increased theft by people stealing resources to survive.

- Conflict over scarce resources and crowding, leading to **increased levels of warfare**.
- **Less Personal Freedom / More Restrictive Laws.** Laws regulate interactions between humans. Law "serves as a primary social mediator of relations between people." The higher the population density, the more frequent such interactions become, and thus there develops a need for more laws and/or more restrictive laws to regulate these interactions. It was even speculated by Aldous Huxley in 1958 that democracy is threatened due to overpopulation, and could give rise to totalitarian style governments.

CAUSES OF POPULATION EXPLOSION:

Is Access to Contraception an Environmental Imperative?

In less developed countries, lack of access to birth control, as well as cultural traditions that encourage women to stay home and have babies, lead to rapid population growth. The result is ever increasing numbers of poor people across Africa, the Middle East, Southeast Asia, and elsewhere who suffer from malnourishment, lack of clean water, overcrowding, inadequate shelter, and AIDS and other diseases.

OUR LIFESTYLE AND POPULATION PROBLEMS:

High-Consumption Lifestyles Exacerbate Problems of Population Growth and while population numbers in most developed nations are leveling off or diminishing today, high levels of consumption make for a huge drain on resources. Americans, who represent only 4 percent of world population, consume 25 percent of all resources. Industrialized countries also contribute far more to climate change, ozone depletion and over fishing than developing countries. And as more and more residents of developing countries get access to Western media, or immigrate to the United States, they want to emulate the consumption-heavy lifestyles they see on their televisions and read about on the Internet. As populations age and urbanize, fertility rates are bound to recede, but the speed of the decline depends significantly on whether women have access to family planning and contraception services. Unwanted pregnancies and abortions are declining in countries which have made abortion legal, according to the Guttmacher Institute. Yet 70,000 women die each year from illegal, often seriously botched abortions. In Pakistan family planning is still not very effective. "With the same (farming) practices, increased urbanization and dietary patterns, the amount of water required for agriculture in terms of evapotranspiration would increase from 7,130 cubic kilometers (1,711 cubic miles) today to 70-90 percent more to feed nine billion people by 2050." These funding are taken form the UN report compiled recently". "This report was released at the start of World Water Week in Stockholm, a forum on water issues." "The report said that in many high-intensity food-producing regions, water limits are already being "reached or breached." "They include the plains of northern China, India's Punjab and the western United States". "Climate change will accentuate scarcity as it will alter in patterns and intensity of rainfall. In Africa alone, agricultural output could be reduced by 15-30 percent by century's end."

“Using today's farm techniques, focussing on always higher yields and ever-wider use of land, would be disastrous, said the report.”

* (The 35-page assessment was compiled by the UN Environment Programme (UNEP) and the International Water Management Institute (IWMI), drawing mainly on estimates in peer-reviewed journals).

"If the same agriculture practices continue to be used, it would result in the inevitable degration or complete destruction of the terrestrial freshwater and coastal ecosystems that are vital to life itself."

How innovation can help:

(The Report, an Ecosystem Services Approach to Water and Food Security, called for innovation to improve yields and end hunger but also be less damaging to the environment). Ideas include better training for farmers, including incentives for environmentally-sound practices. The Green Revolution that began in the 1960s brought dramatic gains in new corn, wheat and rice varieties, huge new irrigation systems, synthetic fertilizers and pesticide use, however more crop gains may be seriously limited. "The great agricultural system that feeds the human race is in trouble," Justin Gillis says, reporting on global food issues. Critical staples, wheat, rice, corn and soybeans — have begun to outstrip production. Some grains more than doubled in cost in 2007 and again in the most recent price hikes. Crops should be selected that are more suited to scarce or erratic rainfall, better irrigation techniques would improve the efficiency of water use and catchment ponds in hot countries could be invaluable mini-reservoirs, helping small farmers to survive in times of absent rain, said the report. Planting trees and shrubs on the perimeter of fields discourages water runoff and retains soil moisture, thus helping crops. It also enables habitat links for species living in fragmented patches of forest. How advancements in agriculture are affecting the planet are clear form Fig 9, 10, 11, 12, 13, and 14 to 20.

- **More than half evaporates.**
- **A third ends up in the oceans.**
- **Only 1.5% is directly used by people!**

Table 7: Shows where does water go?

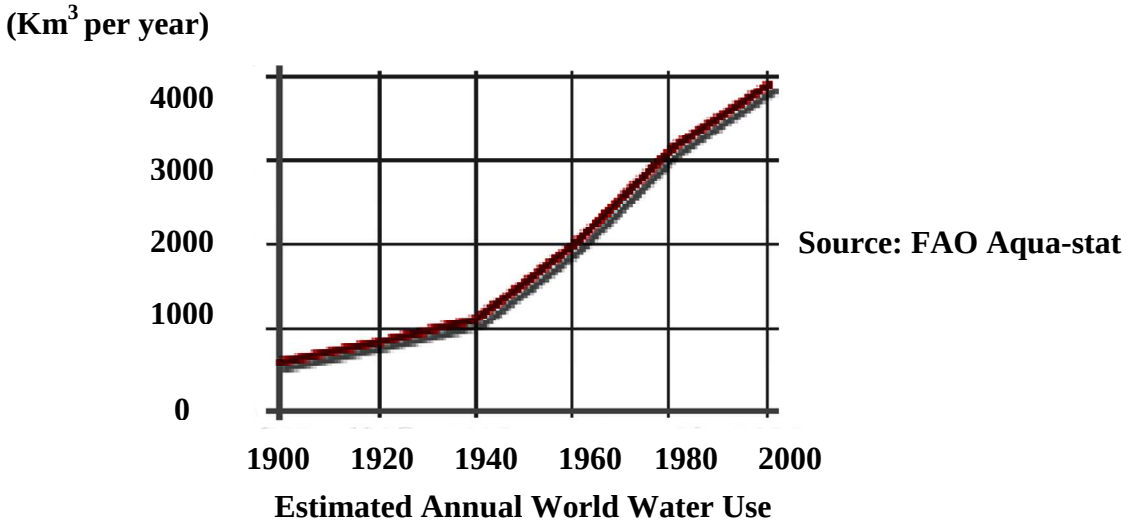
- **In western India 30% of wells have dried up and been abandoned. Underground water is drying up rapidly.**
- **In Las Vegas People are biggest consumers of water in the world. Las Vegas was built on desert.**
- **Colorado River no long reaches the sea any more.**
- **Water shortage could effect 2 billion people by (2025).**
- **It is time for mankind to listen carefully to this wake up Call.**

Table 8: Rapidly occurring changes in our Natural Resources of Water

Shortages:

- **Today 1 out of 6 people face inadequate access to safe freshwater.**
- **By 2025 more than half of the countries across the globe will face shortages according to the UN.**
- **By 2050 up to 75% of the world could face shortages.**

Table 9: Shows Shortages of water.



Cubic kilometer
the volume of a cube of side length one kilometer (1,000 m)
Equal to a teralitre
1 km3 = 1,000,000,000 m3 = 1 TL

Fig10: Shows Estimated Annual world water use.

- **Not only doe's demand rise with population size and growth rate, it also tends to go up with income level.**
- **The rich also require wastewater treatment and intensive farm irrigation.**

Table 11: Shows water consumption.

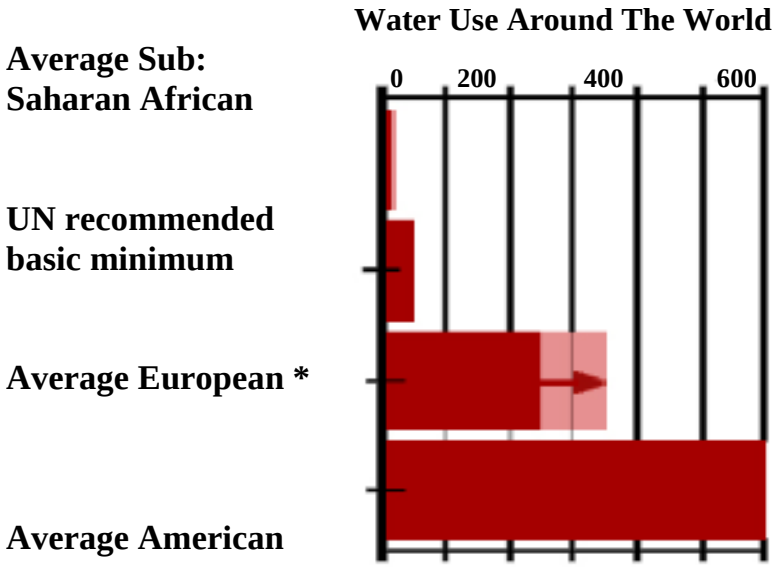
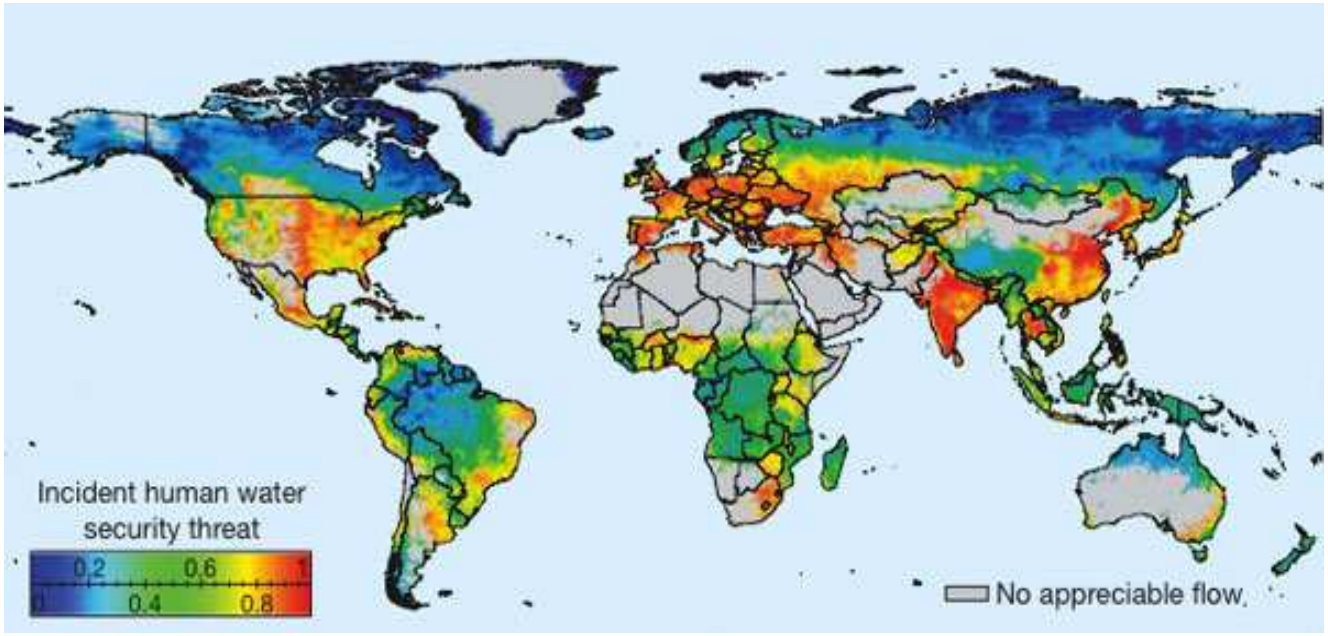


Fig12: Shows water use around the world.

The Current Situation:

(All Figures approx in Liters per person per day.) *Consumption differs between European countries. Ranging from 250-350 liters/day. World's largest consumer of water is an American next in line is an European.

- **Regions in Central Asia and North America face “physical” scarcity i.e., demand exceed supply.**
- **Regions in Central Africa, South & South-East Asia face “economic” scarcity i.e., lack of training, bad governments or weak finances limit access, even though sufficient supplies are available.**



A Selection of the World's Water Hotspots and what is happening to these Reservoirs of Water

- **Ogallala Aquifer: 95% of the US fresh water supply is underground. The Ogallala aquifer was formed over millions of years and supplies 1/3rd of all US irrigation water. According to expectations it might last for only 60 more years.**

- **Tigris & Euphrates: Drainage and irrigation schemes in Iraq have led to the loss of an estimated 90% of one of the world's most significant wetlands.**

- **China: In the north all 3 rivers are severely polluted while the Yellow River which supplies water to China's most critical farming region runs dry 200 days every year.**

- **25,000 years ago fossil water gathered under deserts this water is non renewable but is being used for growing vegetables and grain in KSA, Libya and Africa.**

- **Mighty river Jordan is now a trickle Across the Planet.**

- **One in ten major rivers no longer flow into the sea for several months of a year.**

Table 13: Shows the reservoirs of water in the world and what is happening to them.

- **India risks most from scarcity of water in the coming century.**
- **In last 50 years 21 million wells have dried up the ground water is going deeper and deeper.**
- **Level of the water in oceans is going down, I meter per year.**

Table 14: Shows the current situation of water scarcity.

- **Limit waste.**
- **Build recycling and reclamation systems.**
- **Improve water-delivery systems to reduce losses.**
- **Channeling water for crop fields to underground storage in the non-growing season.**
- **Extensive use of drip-irrigation systems that allow water to seep in slowly.**
- **New crop varieties that can tolerate low water levels.**
- **New desalination techniques such as membrane reverse-osmosis systems.**

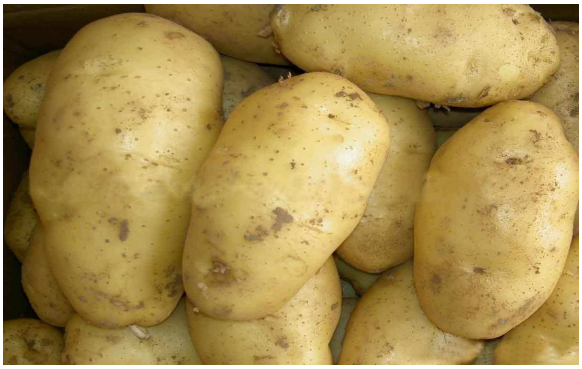
Table 15: Shows Solution for shortage of water.

Food:

- **Power of coal and oil (black gold) has dramatically changed the world.**
- **All the grain produced is converted into bio-feed which is fed to raise live stock and thus converted to meat.**
- **Toxic Pesticides used to improve yield penetrate the heart of every mother cell.**
- **Fertilizer another petrochemical bi product which is generously used in harvest is producing its own harmful effects.**
- **varieties of grain developed by farmers over thousands of years have been wiped out of the planet by new fast growing crops.**
- **More a country is considered developed more meat is consumed. Manufacturing of meat faster than animals is going on every hour.**
- **Soya bean and protein rich grain is mainly used to feed cattle and not humans.**

Table 16: Shows human greed and loss of long term planning for survival of mankind.

- **It takes 100 litters of water to produce 1 kg of potatoes.**



- **While it takes 4,000 litters of water to produce 1 kg of rice.**

- **And takes 30,000 litters of water to produce 1 kg of beef.**

Fig20: Shows use of water in Modern Agriculture

The Role of Government Policy and long term commitment:

The report stressed better governance, in which ecosystems are managed holistically -- in other words, governments, farmers, urban dwellers and specialists come together to look at how to balance the needs of all water users with those of the environment.

“By putting a dollar figure on the value of natural resources, farmers and consumers would get a better idea of the need to conserve, it said.”

Our natural Resources of Water are underground fresh water. The Government policy should place a Rupee value on total available resource; same must be done to our rivers, canals, oceans, snow and glaciers. Similarly our forests of Changa Manga, Jallo,

evergreen trees on our mountains are important resource and should have a value tag for the consumers

It cited a rough estimate of 70 billion dollars for the global economic value of wetlands, of which 5.25 billion is generated in Africa and 37.1 billion in Asia. The Role of Government is very important and can create awareness and reduce wastage which at present is unchecked. This will also have a positive effect on family planning and voluntary restriction of increase in population.

Conclusion:

How population growth especially the rate it is growing is can be dangerous if allowed to go unchecked. The demand put by the excessive population on resources, such as water, food, energy and transport is alarming. In fact sources of water and its consumption due to high consumption life styles as shown in fig.12, where water consumed per person per day is highest is America, the next in line is Europeans when we look at the world's water reservoirs or hot spots such as Ogallala aquifer in USA which took millions of years to gather under ground.

Tigris and Euphrates in Iraq with their wetlands last for ever, and deprived the planet from purification of water. We get real picture of our wasteful practice.

Similarly in China's North all three rivers are polluted and the yellow river is rapidly drying up. We are indiscriminately consuming our non renewable resource such as fossil, water gathered under deserts in over 25000 years. Our demand for lavish diet made of potato, Rice and beef is consuming water at alarmingly high rate.

The consumption is so rapid, excessive and disproportionate that there is real threat to our survival and other species.

It is clear how much water is required to produce 1kg of potatoes, rice and beef. All parts of our present day cuisine and fast food. Human race is going the wrong way with complete disregard to the other species living on the planet. As for might is right is befitting in this situation the rich and industrialized countries such as America and Europe are taking up lion's share of water and food for their never ending greed and desire with almost complete disregard to less developed and less industrialized countries where the majority of poor live as shown in Fig. 12. What a rich and powerful man's greed is doing to his fellow poor and other living things on the planet such as trees birds, fish and animals is destroying almost the whole of our ecosystem, where pollution, Co_2 emission and global warming are adding up every hour.

Nothing seems to be frightening the man today. Our modern agriculture where 98 percent of grain produced for human is consumed by the livestock to raise beef and non organically grown fruits and vegetables. The man to day seems to be in complete trans like lotus eaters, half sleep drowned in luxurious life style eating exotic food, irrespective

with the time scale when the resources will run out and his own existence will be threatened.

"We need to be thinking about bringing more and more agriculture into the 'green economy', where we value farming practices that protect our precious water resources in the same way we are beginning to value forest management that helps reduce greenhouse-gas emissions," said IWMI head Colin Charters.

World population must decline in parallel with the decline in world oil production: for example, oil production will fall to half of its peak in 2030, and population must therefore also drop to about half of its peak level. The second claim is that there will be approximately 2.5 billion “extra” (i.e. famine) deaths and lost births by the end of the century.

A world of 7 billion people poses many challenges – and countless opportunities to make a positive difference. 7 Billion Actions, established by the United Nations Population Fund, inspires change that will make a difference by highlighting positive action by individuals and organizations around the world.

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