



ECONOMIC CONSEQUENCES OF CLIMATIC CHANGE ON THE AVAILABILITY OF WATER AND DISTRIBUTION - SOME EXPOSITIONS

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INTRODUCTION

On a daily basis, not much attention is given to everyday household appliances and products, including clothes, food or water. From the raw materials to production, manufacturing and transport, these items journeyed around the world to you. It is not inconsequential. The things you own have been affected by politics, economics, geopolitical rivalries, and the environment and vice versa. The consequences of heavy industry in developing states are a short-term dream, and a long-term nightmare.

Climate change heavily affects water supplies and does so in multiple ways. Warm temperatures can cause water to evaporate faster than it can be replenished, especially in arid and dry regions with little precipitation. This leads to long-term droughts and as in the case of California, rationing of water for local and private use for economic and recreational purposes. Additionally, there is also the problem with the rise of sea levels, which push into coastal fresh-water aquifers, making the water more saline and unusable for human consumption. Lastly, there is the population problem; this ties closely with the economic problem. With an increasing population, there is naturally an increasing demand for water consumption, power generation, and agricultural sectors.

To exacerbate the problem further, apart from the basic problem of climate change, there is an extremely poor governance issue in terms of water allocation and sanitation systems. The UN Millennium Development Goals (MDGs) included improving environmental sustainability and to halve the number of people worldwide without access to fresh drinking water. It was then the responsibility of the UN established "Joint Monitoring Program" (JMP) for Water Supply and Sanitation, along with UNICEF and the World Health Organization (WHO), to monitor progress to achieve this MDG.

Water-borne diseases, which have killed millions of people, also have a negative and long-term effect on families, threatening children's health and economic productivity of a society as a whole. These diseases affect family income not only through a decreasing economic productivity of individuals, but also the increased cost of official and unofficial healthcare. Lack of access to water therefore reduces income and economic contributions.

Access to water in this case is not just a climate change issue, but a problem of poor public policy and governance that limits access. Options of importing freshwater or "virtual water" are not sustainable. Examples of this can be seen in 2003 when Turkey signed a 20-year agreement to ship 50 billion liters of water a year to Israel to boost Israeli agriculture. Cyprus imported water from Greece to sustain its growing agricultural needs when it was hit by a drought in 2008. While these actions seem harmless, it is important to be mindful of the fact that when more water is pulled out of the ecosystem than can be replenished, water no longer remains a "renewable resource."

On May 3, 2016, The World Bank released a report, stating, "Water scarcity, exacerbated by climate change, could cost some regions up to 6 per cent of their GDP, spur migration and spark conflict." In North America, water is taken for granted and we seldom concern

ourselves with the many aspects of a society and economy that demand on water. Water is the backbone of modern infrastructure from urban planning to agricultural development; water space to allocation must be taken into consideration. While Canada does not currently have a water scarcity crisis, economies we rely on, do.

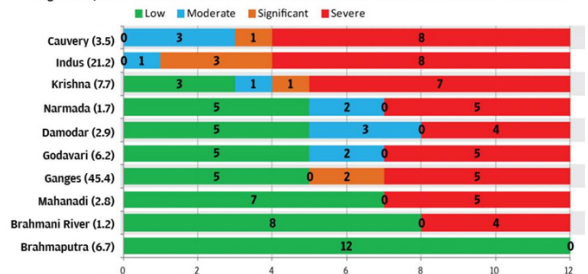
Water scarcity affects countries that are leading economic powers in production and manufacturing of material goods we consume. Places such as India, China and the Middle East are currently facing severe drought, and the additional challenge to meet their economic quotas and surpass competition. Water scarcity according to the World Bank report suggests a high risk of conflict. As food prices spike, caused by droughts, it could inflame latent conflicts and drive migratory forces. However, according to economist Richard Damania; "When governments respond to water shortages by boosting efficiency and allocation even 25 percent of water to more highly-valued uses, losses decline dramatically and for some regions may even vanish. Improved water stewardship pays high economic dividends."

Water is indeed a renewable resource when used correctly. When governments invest in sustainable projects and local developments as their populations grow, their emissaries will thrive. In order to tackle conflicts before they arise and deal with migration flows, environmental sustainability must be a top priority for governments worldwide.

CHANGE IN WATER AVAILABILITY AND DEMAND

Most of India has severe water scarcity

Bars show the number of months in a year by water scarcity situation in given river basin. Figures in parentheses with river basin indicate the population in crores. Data refers to 1996-2005



Note: Concept of different water scarcity levels are explained in the story. Indus river basin includes areas in Pakistan. Source: Hoekstra, A.Y. and Mekonnen, M.M. (2011) Global water scarcity: monthly blue water footprint compared to blue water availability for the world's major river basins. Value of Water Research Report Series No. 53, UNESCO-IHE, Delft, the Netherlands.

Affirming that the total rainfall or average rainfall has not really changed much, he broached the issue of increased water use. According to him, increased demand-supply gap has led to the perception that rainfall is decreasing.

An area is believed to be water-stressed when annual water supplies drop below 1,700 cubic metres per person per year. "We are already surviving with around 1,700-1,800 cubic metres per year. We are soon going to be in a situation where there will be wars for water. Much of the prosperity in the last two decades is because of groundwater exploitation. As our demand for water has increased drastically over the years, per capita water availability has taken a

beating. Change in food habits is also responsible for exploitation of this resource as more water is required to produce the kind of food we prefer nowadays," argued Venkateshwarlu.

Table on water availability

| Year | Population (Million) | Per capita water availability (m ³ /year) |
|------|----------------------|--|
| 1951 | 361 | 5177 |
| 1955 | 395 | 4732 |
| 1991 | 846 | 2209 |
| 2001 | 1027 | 1820 |
| 2025 | 1394 | 1341 |
| 2050 | 1640 | 1140 |

Source: Government of India, Ministry of Water Resources, 2009

Until a few years ago, there was usually a rule that you have to produce locally produced food. Most of us were grinding wheat. We were buying wheat in the market, making flour and making chapati. Now, half of urban India is depending on packaged Atta. Good quality wheat is produced in Madhya Pradesh, transported to Bengaluru, packed there and sold in Jammu. Thousands of miles of transportation consume lot of fuel and energy," said Venkateshwarlu.

"But surprisingly, despite our lifestyle, India is still far behind in causing global warming. If you compare the countries globally, Americans produce 17.8 tonnes carbon per capita per year, whereas India is far behind at about 1.78 tonnes per capita per year. But due to high population, overall emissions in India are very high," he added.

Farmers should select genotype in crops that have a higher per day yield potential to counter yield loss from heat-induced reduction in growing periods. Preventive measures for drought that include on-farm reservoirs in medium lands, growing of pulses and oilseeds instead of rice in uplands, ridges and furrow system in cotton crops, growing of intercrops in place of pure crops in uplands, land grading and leveling, stabilization of field bunds by stone and grasses, graded line bunds, contour trenching for runoff collection, conservation furrows, mulching and more application of Farm yard manure (FYM). Efficient water use such as frequent but shallow irrigation, drip and sprinkler irrigation for high value crops, irrigation at critical stages.

They should emphasize on efficient use of fertilizer such as optimum fertilizer dose, split application of nitrogenous and potassium fertilizers, deep placement, use of neem, karan products and other such nitrification inhibitors, liming of acid soils, use of micronutrients such as zinc and boron, use of sulphur in oilseed crops, integrated nutrient management. Seasonal weather forecasts could be used as a supportive measure to optimize planting and irrigation patterns. Provide greater coverage of weather linked agriculture insurance.

LACK OF ACCESS TO CLEAN WATER

Currently 1.1 billion people in the world lack access to clean freshwater. Without access to clean freshwater, these vulnerable populations are exposed to deadly water-borne illnesses and water gathering can limit educational and economic opportunities. As the global population grows and water resources shrink, greater numbers will face the challenges of inadequate water accessibility.

FOOD SHORTAGES

With a global population on pace to reach 9.6 billion by 2050, shrinking water resources will make it difficult for food production to keep up with rising demand. The United Nations warns that

political turmoil, social unrest, civil war and terrorism could result from food shortages unless food production is increased by 60% by 2050. Agriculture already accounts for about 70% of global freshwater withdrawals to keep up with current food demand. Increased farm water conservation through water saving irrigation techniques are needed to slow the unsustainable withdrawals from groundwater sources.

ENERGY SHORTAGES

World energy requirements are rapidly increasing with modernization and population growth, however energy production is one of the world's greatest consumers of freshwater resources. In the United States, thermoelectric power plants accounted for 38% of freshwater withdrawals in 2010. Global electricity demand is projected to grow 70% by the year 2035 with India and China accounting for half of the growth. Alternative energy sources like wind and solar energy require far less water to produce but only make up a small fraction of today's energy production.

ECONOMIC SLOWDOWN

The United Nations estimates that half of the world's population will live in areas of high water stress by the year 2030. It is difficult to have a thriving economy when fresh water is not easily accessible for industrial, farming, and individual use. Production of water-intensive goods like cars, food, and clothing could be limited by lack of freshwater resources. Lack of freshwater can also affect worker productivity by causing illnesses and higher water costs for individuals can reduce household disposable income.

WHAT IS OUR ROLE IN WATER PRESERVATION?

Sometimes the magnitude of a problem can make one feel that there is nothing that can be done. But there is a lot you can do for water. There is a high chance that people reading this do not live in water deprived areas, and may think it is not their problem.

AWARENESS

Learn about water crisis, just like you are doing. If you understand a problem, you are in a better position to have a solution. Talk about it with family and friends. Look out for news and facts on water shortages and crisis areas.

TAKE PART

Be part of competitions, organizations and societies that aim to preserve and defend natural resources including water. Speak to you parents about donating or helping out charity grouped to provide water to the most needy places.

USE WATER WISELY

Never assume that your society is too advanced to experience water shortage. If we do not acquire the right attitude towards water, it is only a matter of time and one day there will be a shortage. Keep the tap off when not in use. Minimize the flushing of toilets and bath times. In effect, anything that you can do to save water, do it.

INDUSTRIES AND GOVERNMENTS

Join pressure groups that stop individuals, industries and governments from cutting down trees and doing other things that pollute and degrade the environment.

CONCLUDING REMARKS

Agriculture is by far the biggest user of water, accounting for almost 70 percent of all withdrawals, and up to 95 % in developing countries. The water needed for crops amounts to 1000-3000 cubic meter per tonne of cereal harvested. Put another way, it takes 1—3 tonnes of water to grown 1kg of cereal. The daily drinking-water requirements per person are 2-4 litres. Between now and 2030, the world's population is expected to grow by 2 billion people. Feeding this growing population and reducing hunger will only be possible if agricultural yields can be increased significantly and sustainably. With so much of the Earth's water being used for agriculture, it is

clear that an improvement in the management of agricultural water becomes key to the achievement of global food security. One out of every three people is affected by water scarcity. Water researchers believe that the problem is getting worse with urbanization, population growth, industrialization and competitive commercial activities.

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