GLOBAL WARMING

Reduce greenhouse gas emissions

FARHAD TUHIN

Bangladesh cannot afford to build barriers to hold back the sea, so people would have to move inland, increasing the population density and leading to an increase in hunger and disease. Recently IPCC states that the atmospheric temperature will be increased by up to 2 degree Celsius in Bangladesh.

GREENHOUSE gases naturally blanket the Earth and keep it about 33 degrees Celsius warmer than it would be without these gases in the atmosphere. Over the past century, the Earth's temperature has increased by about 0.5 degrees Celsius and scientists believe this is because of an increase in concentration of the main greenhouse gases namely carbon dioxide (76%), methane (13%), nitrous oxide (6%), and fluorocarbons (5%). People are now calling this climate change over the past century the beginning of 'Global Warming'. Fears are that if people keep on producing such gases at increasing rates, the results will be just negative in nature, such as more severe floods and droughts, increasing prevalence of insects, sea level rising, and Earth's precipitation may be redistributed. These changes in the environment will most likely cause negative effects on society, such as lower health status and decreasing economic development.

The "greenhouse effect" is the heating of Earth due to the presence of greenhouse gases. Shorter-wavelength solar radiation from the sun passes through Earth's atmosphere, then is absorbed by the Earth surface, causing it to warm. Part of the absorbed energy is then reradiated back to the atmosphere as long wave infrared radiation. Little of this long wave radiation escapes back into space; the radiation cannot pass through the greenhouse gases in the atmosphere. The greenhouse gases selectively transmit the infrared waves, trapping some and allowing some to pass through into space. The greenhouse gases then remit the absorbed waves and remits the waves downward, causing the lower atmosphere to warm.

Carbon Dioxide (CO_2) is a colorless, odorless non-flammable gas and is the most prominent Greenhouse gas in Earth's atmosphere. CO_2 producing culprits include power plants 33%, factories and home heating systems 33%, cars and trucks 22% and major transportation 12%. It is recycled through the atmosphere by the process of photosynthesis, which makes human life possible. Carbon Dioxide is emitted into the air as humans exhale, burn fossil fuels for energy, and deforest the planet. The U.S. continues to emit more than any other country in the world, accounting for 22.2% of all emissions. Other important CO_2 emitters include China (18.4%), European Union (14.7%), Russia (5.6%), India (4.9%), Japan (4.6%), and Canada (2.3%).

We use coal, oil and natural gas to generate electricity, heat our homes, power our factories and run our cars. These fossil fuels contain carbon, and when they are burned, they combine with oxygen, forming carbon dioxide. Deforestation is another main producer of carbon dioxide. The World Energy Council reported that global carbon dioxide emissions from burning fossil fuels were rising. The increase from developing countries was three times of that from developed countries. Middle East carbon dioxide emissions from burning of fossil fuels increased by 35%, Africa 12%, and Eastern Europe 75% from 1990 on ward.

Impacts

Naturally, if there are more greenhouse gases in the atmosphere, the effect will be more significant and will raise the temperature of Earth more. The planet is heating up and the evidence suggests that human activities are having a significant impact. The Intergovernmental Panel on Climate Change (IPCC) has concluded by consensus that "The balance of evidence suggests a discernible human influence on global climate." They project that global warming will have severe impacts on human health, natural ecosystems, agriculture, and coastal communities. This evidence supports the common belief that global warming is occurring due to the increased concentration of greenhouse gases in the atmosphere -- carbon dioxide, nitrous oxide, methane, and HFC.

There are many environmental problems coming from the increased concentration of greenhouse gases in Earth's atmosphere. As Jeff Rubin of ABC NEWS reported, "Several signs indicate that we've begun changing Earth's climate: increased water vapour in the atmosphere, glaciers and polar ice caps appear to be melting, floods and droughts are becoming more severe, and sea levels have risen, on average, between 4 and 10 inches since 1990". Experts concur, "We are already beginning to see this (global warming) taking place -- a lot more flooding, a lot more droughts". Jerry Malham added, "By 2100, we might get a 2-foot sea level rise, but levels might continue to rise. This rise in sea level can increase the salinity of freshwater throughout the world, and cause coastal lands to be washed under the ocean. Warmer water and increased humidity may encourage tropical cyclones, and changing wave patterns could produce more tidal waves and strong beach erosion on the coasts.

Increasing amounts of greenhouse gases in the atmosphere and global warming could also lead to more health concerns. A statement released from IPCC said, "Climate change is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life." As temperatures increase towards the poles, similar to farmland, insects and other pests migrate towards Earth's poles. Some insects carry diseases such as malaria and dengue fever. Thus, an increase in these particular insects and pests closer to the poles would result in an increase in these diseases. This could lead to 50 to 80 million additional cases of Malaria annually, a 10-15% increase. "Malaria and dengue fever are already beginning to spread pole wards", said Jane Lubchenco (past president of American Association for the Advancement of Science).

The most obvious health effect is directly from the heat itself. With an increase in heat waves, there will be more people who will suffer from heatstroke, heart attacks and other ailments aggravated by the heat. Warming of the oceans could also promote toxic algae which can lead to cholera.

Global warming causes the oceans to warm and expand, inducing a rise in sea level. Eventually, the rising waters could take away land inhabited by people, forcing them to move. Dr. Robert Buddemieir of the Kansas Geological Survey (USA) said, "Bangladesh is massively populated, achingly poor, and something like a sixth of the country is going to go away". Bangladesh cannot afford to build barriers to hold back the sea, so people would have to move inland, increasing the population density and leading to an increase in hunger and disease. Recently IPCC states that the atmospheric temperature will be increased by up to 2 degree Celsius in Bangladesh. he Maldive Islands in the Indian Ocean have the same problem. They are a nation of 1190 islands with an average height of about 1.5 meters above sea level. If the sea level rises, more than 200,000 people will have to abandon their homes.

However, the world's leading scientists project that during our children's lifetimes global warming will raise the average temperature of the planet by 2 to 6 degrees Fahrenheit (1-3.5 degree Celsius). In contrast the Earth is only 5 to 9 degrees Fahrenheit (3-6 degrees Celsius) warmer today than it was 10,000 years ago during the last ice age. Man-made global warming is occurring much faster now than at any other time in at least the last 10,000 years. The environment day's slogan this year was 'Kick the Habit! Towards a Low Carbon Economy'. Life and environment are intimately interrelated. This environment is the safeguard for all animals and plants. Therefore we should come together to save our environment by reducing the harmful green house gases.

The writer is a professional geologist.

SOLAR ENERGY PROMOTION

Success of Bangladeshi environmentalist

MOHAMMAD AMJAD HOSSAIN

YET another expatriate Bangladeshi has been gaining prominence slowly but steadily in the international arena. He has been working on renewable solar energy for more than a quarter of a century. This particular area of science has come to the forefront in view of energy crisis and global warming. Recently he has won Boston Mayor's Green award for community leadership in energy and climate protection.

He is Dr. Sajed Kamal the youngest son of the illustrious poet Sufia Kamal and Kamaluddin Ahmed. Born in 1947 at Burdawan, West Bengal in India, he obtained his graduation in Economics and Education from North Eastern University in Massachusetts, USA in 1971, and doctoral degree in humanistic studies from Boston University also in Massachusetts.

Dr. Sajed Kamal had launched first phase of photovoltaic pilot program in 1986 based on solar energy in Bangladesh. During his sojourn in Bangladesh from 1986 to 1988 photovoltaic solar electric system was demonstrated to over thirty non-government organizations, and educational institutes. Being inspired by the interest generated and feasibility study the second phase programme of 50 watt stand-alone was installed in 1989 at poet Sufia Kamal's Dhanmondi residence which turned out to be the pioneering project in Bangladesh. Each stand-alone project includes a 50 watt module, three fluorescent lights, a battery and a charge controller.

This particular project was installed in a number of places, including a clinic and school for children at Dhamrai operated by Bangladesh Protibondhi Foundation and Nijera Kori training center at Noongola, Bogra. By the end of 1990 eight more pilot photovoltaic systems were installed across Bangladesh. These are: Energy park of the department of Applied Physics and Electronics of Dhaka University; UBINIG's rural school in Tangail; the school/community center of the Centre for Mass Education in Science in Rangpur; Nijera Kori's training center at Char Jabbar, Noakhali; Deepshikha, Protibondhi Foundation's school for children and vocational centre for women at Malibagh, Dhaka and a village market place at Mahmudpur, Pabna as a part of the village development project of Dhaka Rotary Club.

Initial expenses for installing such project came from Dr.Sajed Kamal and his wife Dr.Rosie coupled with a grant from the Overtook Foundation of Massachusetts. Dr.Rosie also holds doctorate degree in Humanistic Education from Boston University and they met first when they were students in late 1960's.

In 1997, Bangladesh Rural Advancement Committee (BRAC) invited Dr.Sajed Kamal to serve as the consultant to plan, train and launch a renewable energy programme. During the consultancy period until 2000 "BRAC Solar Energy Programme for Sustainable Development" had succeeded to install over 30,000 40-50 watts stand-alone PV systems across the country, growing at the rate of about 750 systems per month. That was a phenomenal achievement by BRAC. Since Bangladesh is facing energy crisis this innovative project could be installed by non-government and government agencies to overcome the crisis.

In 2004, Sajed and Rosie Kamal and some friends from the United States contributed PV systems to Bangladesh Poribesh Andolan (BPA), Muktijodha Jadughar, Bishwa Shahitto Kendro, the South-Asia school of photography in Dhaka and the Wetland Research Centre of the Bangladesh Centre for Advancement Studies in Gopalganj and Rokeya Sadan, a shelter for girls and women operated by Bangladesh Mahila Parishad

On an experimental basis Sajed Kamal introduced stand-alone photovoltaic system at his residence at Fenway, Boston in Massachusetts in 1986 with a 50 watt solar panel sitting on a south facing window sill. The system has been generating clean electricity for two fifteen watt fluorescent lights, a small energy efficient table lamp and a record player round the year since it was installed.

With the motto of thinking globally and acting locally Sajed Kamal initiated in 1999 Solar Boston, a partnership of renewable energy experts, community organization and business communities committed to promoting solar technologies throughout Boston. Solar Boston became a partner of the US Department of Energy's million solar roofs initiative in 2000. Solar Boston helped install over fifty grid connected photovoltaic solar electric systems in the region.

Sajed Kamal distinguished himself as an international educator on sustainable energy and an adjunct lecturer in the Sustainable International Development Programme at Brandeis University. Sajed Kamal by now helped setting up pilot projects in the United States, Bangladesh, Sri Lanka, Armenia and El-Salvador.

As one of the participants Sajed Kamal presented a scholarly paper in the conference on 'Bangladesh in 21st Century' at Harvard University in June this year. The theme of the paper was 'the untapped energy mine' which, interalia gave the impression that Bangladesh, which is endowed with renewable energy sources including sunshine and wind, is truly an exceptional renewable energy mine. If judiciously planned and implemented, this energy mine has an inexhaustible capacity meeting the country's annual 4000 megawatts electricity need.

Dr. Sajed Kamal is the president of the International Consortium for Energy Development, a Boston based non-profit corporation. Apart from this, he is involved with many energy and environmental related projects and associations. Sajed Kamal received Mayor of Boston's first annual green award in 2007 and Life time Achievement Award was given to him in 2008 by US Environmental Protection Agency.

Mohammad Amjad Hossain, a former Bangladesh diplomat, writes from Virginia.

Blazing Dhaka: An urban heat island

MD SAYEED ISLAM

Since we know what causes the urban heat island effect, we can control it to a significant extent. The fact is green trees and only trees can help us. Yes, to escape the heat island effects, cities need a lot more vegetation and a lot fewer dark and hard surfaces.

WHOEVER has experienced the sweltering summer days of Dhaka will agree that average temperature of Dhaka City has increased over the decades. The scorching heat during daytime and hot, see thing nights coupled with load shedding are the bane of the city dweller's life. But why the temperature is so high in Dhaka? The answer can be attributed to a unique feature of the urban climate known as Urban Heat Island (UHI) Effect. The urban heat island phenomenon was first discovered in the early 1800s in London. But it is not clear yet whether it is related to global warming.

A UHI is a metropolitan area which is significantly warmer than its surrounding rural areas. The temperature difference usually is larger at night than during the daytime and larger in winter than in summer, and is most apparent when winds are weak. The main cause of the urban heat island is modification of the land surface by urban development; waste heat generated by energy usage is a secondary contributor. Since we have covered most of the land surface of Dhaka with concrete and asphalt pavements, the city has become an oven with millions of people in it.

Though the UHI air temperature is generally most apparent at night, urban heat islands exhibit significant and somewhat paradoxical diurnal behaviour. The UHI air temperature is large at night and small during the day, while the opposite is true for the UHI surface temperature. Throughout the daytime, particularly when the skies are free of clouds, urban surfaces are warmed by the absorption of solar radiation. As described above, the surfaces in the urban areas tend to warm faster than those of the surrounding rural areas. By virtue of their high heat capacities, these urban surfaces act as a giant reservoir of heat energy. (For example, concrete can hold roughly 2000 times as much heat as an equivalent volume of air). This daytime heating creates convective winds that minimize the surface temperature to a great extent. At night, however, the situation reverses. The absence of solar heating causes the atmospheric convection to decrease. This traps the urban air near the surface, and allows it to heat from the still-warm urban surfaces, forming the nighttime UHI air temperature.

Significance

The effects of UHI are manifold. UHIs have the potential to directly influence the health and welfare of the urbanites. Compared to rural areas, cities experience higher rates of heat-related illness and death. The heat island effect is one factor among several that can raise summertime temperatures to levels that pose a threat to public health. The nighttime effect of UHIs can be particularly harmful during a heat wave, as it deprives urban residents of the cool relief found in rural areas during the night. Furthermore, the poor air quality that results from this increased energy usage can affect our health, aggravating asthma and other respiratory illnesses. People in Dhaka, especially the poor, suffer from various acute respiratory diseases during summer. In 1995, a heat wave in Chicago illustrated why excessive temperature and heat islands are of concern. This episode of unusually hot weather resulted in the deaths of over 700 people.

Another consequence of urban heat islands is the increased energy required for air conditioning and refrigeration in cities that are in comparatively hot climates. The Heat Island Group, a research and advocacy organization that works to educate the public and policymakers about the heat island effect, estimates that the city of Los Angeles spends about $100 million per year in extra energy costs to offset its heat island effect. Urban heat islands also can impact local weather, altering local wind patterns, spurring the development of clouds and fog, increasing the number of lightning strikes, and influencing the rates of precipitation as we are experiencing now in Dhaka. Sometimes it also affects growth of the trees. Using satellite images, researchers discovered that plants take more time to grow in UHIs than the rural areas.

Causes

Poor urban design is the biggest cause of heat island in our city. Heat islands are created when city growth alters the urban fabric by manmade asphalt roads and tar roofs and other features substituting forest growth. These surfaces absorb - rather than reflect - the sun's heat, causing surface temperatures and overall ambient temperatures to rise.

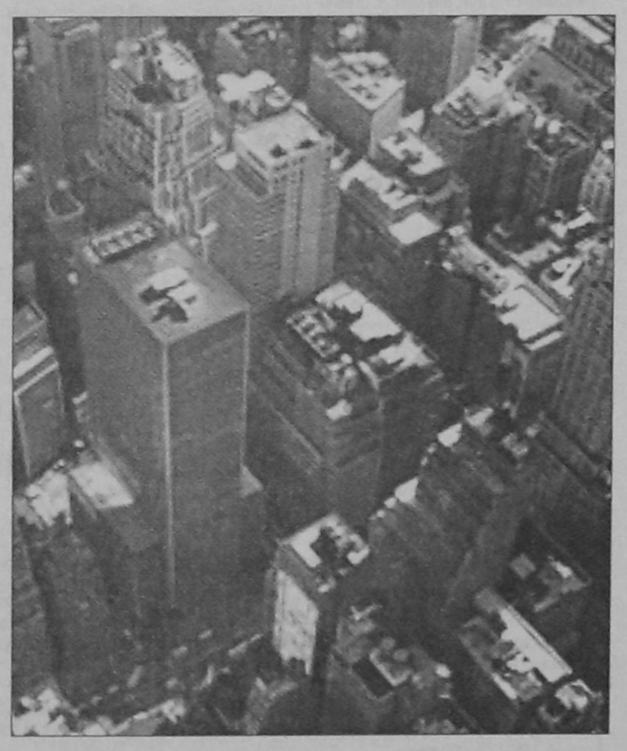
The principal reason for the night-time warming is (comparatively warm) buildings blocking the view to the (relatively cold) night sky. Two other reasons are changes in the thermal properties of surface materials and lack of evapotranspiration in urban areas. Evapotranspiration (ET) is a term used to describe the sum of evaporation and plant transpiration from the earth's land surface to atmosphere. Materials commonly used in urban areas, such as concrete and asphalt, have significantly different thermal bulk properties (including heat capacity and thermal conductivity) and surface radiative properties than the surrounding rural areas. This causes a change in the energy balance of the urban area, often leading to higher temperatures than surrounding rural areas. But that's not the only thing that causes the urban heat island effect. Scientists believe that vegetation plays a large part in keeping an area cool through a process called evaporative cooling. Plants take in water through their roots and depend on it to live.

But after the plant is done with it, dry air absorbs that water by turning it into gaseous water vapour. The air provides the heat that drives this process, so during the process, the air loses heat and becomes cooler. Because building a city means replacing vegetation with structures, the city loses the evaporative cooling advantages of vegetation.

Other causes of a UHI are due to geometric effects. The tall buildings within many urban areas provide multiple surfaces for the reflection and absorption of sunlight, increasing the efficiency with which urban areas are heated. This is called the "canyon effect". Meanwhile, tall buildings and narrow streets can heat the air trapped between them and reduce airflow. Waste heat from automobiles, air conditioning, industry, and other sources also contributes to the UHI. High levels of pollution in urban areas can also increase the UHI, as many forms of pollution change the radiative properties of the atmosphere.

Ooptions

Luckily, since we know what causes the urban heat island effect, we can control it to a significant extent. The fact is green trees and only trees can help us. Yes, to escape the heat island effects, cities need a lot more vegetation and a lot fewer dark and hard surfaces. But the inconvenient truth is that some of our wise guys are plotting to cut down hundreds of trees here and there in UHIs. Celucas, what a strange country this is!



However, some people don't like the idea of a glaring, all-white city. Low-reflectivity coating offers an alternative and comes in non-white colors. These kinds of coatings reflect invisible radiation without reflecting all light. So, they keep an object relatively cool without sacrificing its dark color. Certain high-reflectivity coatings can also be applied to asphalt. Asphalt chip seals and emulsion sealcoats are two such examples that treat asphalt to make its surface more reflective.

One fad that's gaining popularity is the installation of green roofs atop city buildings. This solution doesn't have anything to do with colour. A "green roof" is simply a roof that includes plants and vegetation. Green roofs harness the same evaporative cooling effect that cities lose when they hack away vegetation. So a green roof not only prevents the building's roof from absorbing heat, but cools the air around it, offsetting the urban heat island effect to an extent. Many sustainable buildings use green roofs to reduce their reliance on energy consumption.

Several other methods help reduce the urban heat island effect as well. For instance, roof sprinkling is another evaporative cooling solution. Sprinklers on the roof wet the surface so that the air around it cools through evaporation. Urban planners also set up traditional parking lots along lots where trees and vegetation grow. Tall trees not only contribute to evaporative cooling but also provide much-needed shade.

Unfortunately, most of the above mentioned measures are costly, especially for a country like us. But there must be something that we can do to ameliorate the existing condition. We cannot be apathetic any more regarding the apocalyptic effects of climate change. Political governments should also ponder this matter seriously and more urban planners are needed to tackle the situation. Many problems already have beset our adored Dhaka. Let's not belie the situation and make it worse.

Md. Sayeed Islam, Department of Urban & Regional Planning, BUET.
Email: octavirum@yahoo.com

Water, water everywhere

AIJAZUDDIN

Over the years, India has negotiated water treaties with Bangladesh (1972), Bhutan (1993), and Nepal (1996). It is time that in our geophysical basin, countries created after Creation should learn to accept that politics is not (as Napoleon maintained) simply a matter of geography, but a matter of common survival.

SATYAJIT Ray's film Shatranj ke khilari satirises two determined chess-playing nawabs who are so engrossed in their game that they ignore the evaporation of their princedoms by the British.

The two Indus Waters Treaty Commissioners are their modern counterparts.

Since the Indus Waters Treaty was signed in September 1960, these two officials, representing their countries, have played the game uninterruptedly, determined to checkmate each other on technicalities, while in the background their countries gradually dehydrated.

The Commissioners have met 99 times, one short of a century. That the game should have continued for so long despite 1965 and the 1971 wars, military standoffs and political stand-downs, is a tribute less to the tenacity of successive Commissioners than to the skill of those who drafted the original Treaty.

An economist who recently retired from the World Bank has predicted that the next war between Indian and Pakistan would be over water. His predecessors sixty years ago feared the same, hence the deal. They could see clearer than Pakistan or India would admit the disastrous effect of Cyril Radcliffe's ragged solution to the division of the Punjab and its five rivers.

Radcliffe had hoped that the two new nations might evolve 'some joint control and management of the irrigation system'. He left the largest irrigation system in the world on one side of the border and the source of its waters on the other.

Unlike India which has innumerable options, Pakistan is dependent entirely upon the Indus. It accounts for one quarter of Pakistan's GDP, two-thirds of its employment, and sustains 80% of its exports. Any future Pakistan has as an agro-based economy is again in the hands of India.

Until scientists can find a substitute for water (so far they have been adept only at inventing different types of containers), every country in the world will have to come to grips with pressures from water stress, water scarcity, and water criticality (the officialese for drought).

Our grandparents will remember at a time in the 1950s when the per capita availability of water was a comfortable 5,177 M^3 per head in India and 5,300 M^3 in Pakistan. Our generation has seen it fall drastically to about 1800 M^3 and 1100 M^3 respectively. The critical level is 1000 M^3. Meanwhile the IWT Commissioners continue to quibble over ink long since dried while our rivers themselves are drying up.

The issues between the two countries have been too well-ventilated to be repeated again here Wullar Barrage, the Kishenganga Project, and more recently the Baghliar Dam. While neither signatory may or indeed can unilaterally abrogate the IWT, there may be some justification for improving the procedure being followed by the Commissioners to resolve issues. The aggrieved writes to his counterpart, who then refers it to his country's Ministry for its views, which in turn sends it to the executing agency for comments, and then back again. Sowing seasons are lost as the complaint meanders through the rivulets of officialdom.

It is a slur to both Indian and to Pakistan that when they could not agree with each other, they agreed to be bound by the decision on the Baghliar Dam issue by a neutral expert nominated by the World Bank. That such an appointment was in accordance with the terms of the IWT is immaterial; what saddened many patriots on both sides of the border was that Cyril Radcliffe found reincarnation in a Swiss engineer Raymond Lafitte.

It is not for a Pakistani to quote the Taittiriya Upanishad to an Indian readership but recognising that the Upanishads were composed when the Indus was still young, one should repeat its message -'Water is food.'- to two agrarian neighbours, dependent for their nourishment on the same water sources.

Over the years, India has negotiated water treaties with Bangladesh (1972), Bhutan (1993), and Nepal (1996). It is time that in our geophysical basin, countries created after Creation should learn to accept that politics is not (as Napoleon maintained) simply a matter of geography, but a matter of common survival.

The Indus problem was once described as an engineering problem, rather than a political one. Although neither President Asif Ali Zardari nor Prime Minister Manmohan Singh is an engineer, hopefully, their recent meeting in New York will lead to a cohesion of political wills. After all, their people do not drink ink.

Aijazuddin is a Pakistani Journalist
(Will also be publishied in Covert)