Can the ocean slow global warming?

MIRZA GALIB

Unlike the situation with other aspects of climate change, there is no controversy over ocean acidification. Thomas Lovejoy, president of the Heinz Centre for Science, Economics and the Environment, has described ocean acidification as "the most profound environmental change I have observed in my entire professional career." It is highly necessary to get people talking about ocean acidification and immediately formulate research strategies to deal with this potentially catastrophic problem.

THE ocean plays an important role in the climate system by regulating the amount of carbon dioxide in the atmosphere. It is generally accepted that more than 80 percent of anthropogenic CO_2 emissions will eventually be absorbed naturally by the oceans, primarily through a slow exchange between the atmosphere and the surface waters. This exchange process behaves like a clog in a sink's drain: drainage occurs too slowly to prevent a large build-up; in this case of CO_2 in the atmosphere. Carbon dioxide entering the deep waters of the ocean is removed from interaction with the atmosphere for periods of hundreds of years. A significant fraction of the excess carbon dioxide released by man's activities enters the deep waters of the ocean and plays no further part in global warming over century timescales.

Last time Earth suffered a carbon-induced fever, it was the oceans that helped save the day, say marine scientists in California. Massive ocean-bottom accumulations of the mineral barite show that the last severe global warming episode 55 million years ago was accompanied by several thousands of years of ocean plant life kicking into high gear. All that productivity captured excessive carbon from the atmosphere and dropped it to the ocean floor, where it was buried -- or "sequestered."

To date, the world's oceans have absorbed nearly a third of the excess carbon dioxide emitted as a result of anthropogenic activities. One way to reduce CO_2 emissions is to capture and store it. An option for storing the captured CO_2 is ocean storage, in which CO_2 is injected deep into the ocean, where it dissolves, or deposited onto the ocean floor, where it is denser than water and therefore forms a "lake" of CO_2. On entering the ocean, carbon dioxide undergoes rapid chemical reactions with the water and only a small fraction remains as carbon dioxide. The carbon dioxide and the associated chemical forms are collectively known as dissolved inorganic carbon or DIC. This chemical partitioning of DIC ('buffering') affects the air-sea transfer of carbon dioxide, as only the unreacted carbon dioxide fraction in the sea water takes part in ocean-atmosphere interaction.

It is hypothesized that the rate of carbon dioxide fixation by microscopic plants called phytoplankton that live in the surface waters of the oceans may be limited by the availability of iron. In particular, field experiments in high nutrient, low chlorophyll (a measure of plant biomass) ocean waters such as Southern Ocean and the Equatorial Pacific have shown that addition of iron increased the rate of removal of carbon dioxide through the process of photosynthesis.

Ocean sequestration technologies to reduce carbon emissions may be good news for the atmosphere, but scientists and policymakers are increasingly concerned about the side effect of carbon dioxide absorption: ocean acidification. CO_2 could be stored in the ocean but the effects that this may have are not fully understood. It may make the oceans more acidic which would damage sea-life. Although deep ocean storage is possible we have to consider how much excess carbon dioxide can the ocean hold and how will it affect marine life?

Scientists are becoming increasingly worried about ocean acidification, a direct result of the increase in atmospheric CO_2 levels and storing captured carbon in ocean. On 30 June 2005, the Royal Society of London published a Report on why this is important:

- Carbon dioxide from the atmosphere dissolves in the ocean, and makes it acidic.
- This is inevitable with high carbon dioxide, no fancy models are involved.
- The oceans are already 30 percent more acid than before the fossil fuel burning started.
- Acidification will kill corals, and probably make many other species (like squid) extinct.
- The overall effects are unknown - there has been no period like this in the last two million years.

Since the industrial revolution, ocean pH has gone down by 0.1 units, which translates into a 30 percent surge in acidity. Scientists predict that pH will go down another 0.14 to 0.35 units by the end of this century. Accompanying the lower pH are lower saturation points of minerals such as calcium carbonate, the primary skeletal material of marine organisms that form the basis of ocean food webs, such as phytoplankton and coral reefs. As the ocean becomes more acidic, calcium carbonate begins to dissolve. The shift in ocean chemistry is so profound that the shells will literally dissolve off the backs of some organisms under the ocean conditions predicted for 2100, according to experiments conducted by Victoria Fabry, of California State University in San Marcos.

Already, ocean acidification is damaging surface waters and having an impact on marine ecosystems. It makes unavailable the compounds necessary for marine organisms to build shells and skeletons, thus impeding the growth of plankton, starfish, urchins, oysters and other shelled organisms as well as coral. Due to ocean acidification, coral reefs will begin to erode more quickly than they can rebuild. Ocean acidification will have a devastating effect on shell fisheries. Research shows that nearly 100 percent of the larval clam community dies within several days of exposure to pH levels already seen now in some regions of the oceans, and that will be seen nearly everywhere by 2100. If none of the larval clams are able to survive, it will only be a matter of years before entire adult clam communities disappear.

The lowered pH will also dissolve several small phytoplankton species that represent the very base of marine food webs, and the disappearance of these microscopic plant species will cascade throughout the entire ocean with devastating consequences. And all these changes are occurring so quickly that marine life will have great difficulty adapting to changing seawater chemistry.

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Global climate change and local perspective

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Implementation of global policy at local or national level needed to develop some strategies which can be achieved by increasing income levels, getting education and technical skills, and improving disaster preparedness and management systems. Our national policy makers should think about the future benefit from the emission credit system.

Sdir devastation: A global warming consequence?

INTERGOVERNMENTAL Panel on Climate Change (IPCC) and Albert Arnold (Al) Gore Jr. have been jointly declared for the Nobel Peace Prize-2007 for their research and effort to spread out the knowledge about man-made climate change and also the measures that are needed to counteract such change. Greenhouse gases that mainly absorb and emit heat to the atmosphere have the effect on global temperature and make habitable environment for earth. Continuous deforestation and extensive fossil fuel exploitation and natural sources contribute carbon dioxide (CO2) in atmosphere dramatically in higher rate since industrialisation and rising relentlessly.

IPCC 4th assessment report shows that, the global mean concentration of carbon dioxide (CO2) in 2005 was 379 ppm. The growth rate of CO2 in the atmosphere was 1.9 ppm yr1 and this is the largest change observed or inferred for any decade in at least the last 200 years. Developed countries, with less than 20 percent of the world's population, are responsible for 80 percent of the atmospheric CO2 accumulation since 1751 and the least developed countries, with 800 million people, have contributed less than 1 percent yet they are the most vulnerable to climate change. 60% of the current growth in emissions is due to China. Global average surface temperature has increased (0.74°C ± 0.18°C for the last 100 years); 1998 and 2005 were the warmest two years in the instrumental global surface air temperature record since 1850.

As a consequence of global warming, the exposure of extreme events like flood, cyclone, draught, sea-level rise, vector-borne diseases and many more natural disasters are appearing recurrently and will be more distressing in near future. We already have experienced very frequent floods and extreme "cyclone Sidr" in Bangladesh that demonstrates the vulnerability of global climate change.

In United Nations Framework Convention on Climate Change (UNFCCC) Bali Conference decision have been made to collect so called "compensatory fund" for third world countries. Compensatory fund is one way to immediate response in any natural disaster situation but not the solution for global climate change.

All UN countries agreed to reduce carbon emission by 50 percent by 2050; whereas, the USA is one of the greater polluter who did not sign the "Kyoto Protocol". On one hand, developed countries are polluting much and have less control on carbon emission reduction, while on the other, third world countries are suffering for the consequences of such pollution. Even, before affected by deadly "Hurricane Katrina" in August 2005, USA and also other developed countries didn't want to believe global climate change phenomenon rather they tried to establish climate change as propaganda!

After getting scientific and more reliable data from different research organisations and experiencing frequent natural disasters, all have started to believe and act on global climate change. How can we prepare ourselves to combat and adopt strategies against adverse natural disasters as one of the least developing country? One view is, think globally and act locally, where we can make our policy regarding management, technologies, strategies etc. based on global framework with the help of global partnership and co-operation and have to implement those strategies at local level.

Now I would like to address two different perspectives that we can consider to strengthen our policy and management system to reverse environmental degradation in Bangladesh. One is "Carbon Trading" and another is "User Pays" principle.

Carbon trading through emission quotas is one of the effective tools to reduce overall carbon emission and establish global environmental justice. "Kyoto Protocol" preserves the right of emission credit for the member nations based on the emission quotas. Under the treaty, the nations that emit less than their quota will be able to sell emission credits to the nations that exceed their emission limit. Under the treaty, for the 5-year compliance period from 2008 until 2012 all members needed to cut emission according to the emission quotas. If the developed countries failed to execute the treaty, most of the third world countries will be benefited from this emission reduction scheme by getting emission credit since that emission rate is very low compared to the developed countries, in the same time policy will encourage developed countries to halt the emission rate. Implementation of global policy at local or national level needed to develop some strategies which can be achieved by increasing income levels, getting education and technical skills, and improving disaster preparedness and management systems. Our national policy makers should think about the future benefit from the emission credit system and have to take action to make a better policy, effective technologies and skilled personnel who can bravely negotiate with the international personnel in global arena, because, we don't need to compensate if we can acquire our right.

I would like to give my idea regarding Readymade Garment (RMG) in Bangladesh as local context. As RMG is one of the main contributors to national GDP, the same way, also a main polluting source that is degrading our environment through discharging wastewater directly into nearby areas or lakes without any treatment. Recently, Department of Environment (DoE), has taken strict steps for installing effluent treatment plant (ETP) for every washing and composite unit. Installation of ETP is the first step of improving current environmental degradation but in the long run it is important to ensure effective operation of all ETPs. It is very difficult to monitor all the ETP's performance by DoE with its limited manpower. Even, the guideline provided by the DoE, there is no specific instructions for sludge (solid waste produced by ETP) management system. However, the volume of sludge produced from a medium chemical type ETP is difficult to manage by oneself without any governmental support as municipality is not taking care of this waste. As a result, sludge is disposed nearby low land in an insecure way, and consequently surface water and, in the long run, ground water is polluted again.

Moreover while, ETP installation cost and running cost is quite high so how RMG can achieve this goal in the competitive global market? In all European and other developed countries, every consumer needs to pay product recycle or waste management fees as charge earlier than they consume their product, like, if one buy a bottle of beverage then he/she needs to pay the recycle cost of the bottle as well. As RMG is primarily export-oriented and exporting mainly to the developed countries why don't we consider the same principle for industrial wastewater management system? It will be fruitful if government authority, BGMEA, buyers' organisation and other responsible authorities work together on a common platform and set a guideline considering the concept of making environmental friendly production unit in Bangladesh for a sustainable global development.

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Eco-colonialism?

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IT is very clear that colonialisation bears some specific objectives that may be getting cheap raw materials, cheap labour and a captive market for product manufacturing. Here I have used the term eco-colonialism that means the colonialisation which is a growth to the exploitation of ecology. But how colonialisation damage the ecology?

Colonialisation often changes diversified food production into a single crop for the colonizer's market. For example, rice farming was once common in Gambia but with colonial rule so much of the best land was taken over by groundnuts for the European market that rice had to be imported to counter the mounting prospect of famine. Colonialism even forces peasants to replace food crops with cash crops.

Though the third world countries have achieved independence but they want to develop in the context of modernisation. Vandana Shiva says this is male development. As a result of single crop production or monoculture or modern development, biodiversity has decreased day by day.

For example, in Europe 80 percent of all farm lands are sown with just four crops. In Netherlands a single potato variety covers 80 percent of potato growing land; three wheat varieties cover 90 percent of wheat growing land. In UK three varieties of potatoes make up 68 percent of the crop, one variety makes up the remaining 32 percent. In Greece, wheat diversity has declined by 95 percent. In India under the impact of green revolution, rice varieties cultivated decreased from more than 1,00,000 to 10 and in Sri Lanka 2000 varieties of rice were cultivated in 1959 but only five major varieties today.

Globalisation has accelerated the biodiversity destruction also. It turns all forests and farms into industrial monocultures which destroy both biodiversity and cultural diversity of local communities.

In Bangladesh not only agricultural discourse but also "The Bangladesh Wildlife (Preservation) Order of 1973," "The Bangladesh Wildlife (Preservation) (Amendment) Act of 1974," "The Forest Act of 1927," "The Private Forest Order of 1959" subtly indicate the colonial legacy.

A great example this is the so-called eco-park. There are Modhupur eco-park project in Tangail district, eco-park in Moulovibazar of Sylhet, Alutilla eco-park of Khagrachhari. At first site we assume that eco-tourism makes our country developed by earning money. But we overlook such tourism as may be damaging to the natural resources. We can give example of a colonial management. In Belize, eco-tourism increasingly mean eco-colonialism, damaged coral reefs and rainforest. Two decades after it own independence from Britain, Belize found itself yoked to another kind of colonial enterprise, the foreign dominated eco-tourism trade.

With a small population of 2,50,000 spread over 9000 square miles of coastline, mountain and lush forests, Belize has so far managed to avoid the uncontrolled development that dominates so much of Central America. Today close to 70 percent of the country is still covered by native forest.

So we can say with Vandana Shiva "they threaten to create a new era of bio-imperialism, built on the biological impoverishment of the third world and the biosphere. Patents, industrialisation of food and agriculture, globalisation of trade are the new mechanisms, leaving the third world poorer both ecologically and economically."

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