Fighting greenhouse effect without curtailing amenities

MD. ASADULLAH KHAN

BITTER TRUTH

All countries of the world including Bangladesh can meet their energy needs without fouling the environment. "But it won't happen," asserts Thomas Johansson, an energy adviser to the United Nations Development Program, "without the political will." To begin with, huge government subsidies for fossil fuels must be dismantled to level the playing field for renewables. Renewable energy is necessary for the assurance of life on earth. There is no time to waste.

ENVIRONMENTAL scientists are now certain that global warming poses a threat to mankind. Which means massive climate change will cause rise in sea levels, chaotic weather patterns, catastrophic droughts in some places and torrential rains in other places -- all caused by small increase in average global temperature.

Climatologists are now confident that this warming is at least partly the result of human activity such as the burning of fossil fuel in electric power plants and automobiles. Moreover because populations, national economies and the use of technology are all growing, the global average temperature is expected to rise by 1.0 to 3.5 degree Celsius by the year 2100. The effect will be complex varying considerably from place to place. Of particular interest are the changes in regional climate and local weather and especially extreme events -- record temperatures, heat waves, very heavy rainfall or drought, which will very well have staggering effects on populations, agriculture and ecosystems. This variability of daily temperature would result in public health threats and even unprecedented levels of mortality.

Climate change would affect pattern of rainfall and other precipitation, with some areas getting more and others less, changing global patterns and occurrences of droughts and floods. Similarly increased variability and extremes in precipitation can exacerbate existing problems in water quality and sewage treatment and in urban storm-water-routing, among others.

People, by now, know what it will take to save the world from the greenhouse effect: To cut emissions of carbon dioxide when coal, gas or oil burn, and the one responsible for more than half the impending global warming, as already mentioned. One will, as such, need to shut down the heater in winter and replace 100 watt bulbs by compact fluorescent lamps. Replacing the standard incandescent with the compact fluorescent can cut electricity by two- thirds. Although fluorescents can cost ten times as much as incandescent, they last ten times longer, saving the consumer money. Substituting incandescent prevents emission of up to 382 pounds of carbon dioxide that would otherwise be emitted from power plants. In the affluent countries of the West people are thinking of trading in the dishwasher and clothes dryer for a dish drainer and laundry line.

We have to show superb commitment and a high degree of motivation to avert the disaster that is waiting in the wings. Now we have to think about constructing green buildings. When we are planning to build a house we must hire an architect who would work out ways to optimise the use of energy so that the house does not go for higher billing on heating in winter or air-conditioning during the summer. We have to go to go for using fuel-efficient cars, not just to save energy but also to beat the galloping rise in petrol price hurting the car owners every six months. We must know that for every litre of petrol consumed, about 4 kg of carbon dioxide gets injected into the atmosphere.

We must walk and not drive if we have to buy a packet of chips, or a can of coke or soap from the store next door. If we must drive we must combine a lot of chores. It has now been proved beyond any shade of doubt that car exhaust is a major source of the heat-trapping gases that produce global warming. The traffic jam in the roads of Dhaka shows how badly a developing country like Bangladesh needs cleaner autorickshaws, cars, trucks and buses.

Thinking in terms of global perspective, the better way to meet the world's energy needs is to develop cheaper, cleaner sources. In India, there has been a boom in wind power because the government has made it easier for entrepreneurs to get their hands on the necessary technology and has then required the national power grid to purchase the power that wind systems produce. Precisely speaking, wind is now the world's fastest growing power source -- a high-tech challenge to the coalmines, oil rigs, nuclear reactors and hydro-electric dams. Experts say wind could provide up to 12 percent of the earth's electricity within just a decade from now.

It may be inspiring for us to learn that more than a decade ago, Denmark required utilities to purchase any available renewable energy and pay a premium price, today the country gets 18 percent of its electricity from the wind. Germany and Spain have enacted vigorous incentives for renewable sources. Europe today accounts for 70 percent of the world's wind power. In Japan hundreds and thousands of households have installed solar roof panels since the government offered generous subsidies in 1994, consequently Japan has displaced the US as the leading manufacturer of photovoltaic. India established a fund that has lent $1.1 billion to alternative-energy projects; the country is now the globe's fifth largest generator of wind and solar power.

Other technologies can work their own miracles. Micro-hydroelectric plants are already operating in numerous nations, including Kenya, Sri Lanka and Nepal. The systems divert water from streams and rivers and use it to run turbines without complex dams and catchment areas. Each plant can produce as much as 200 kilowatts -- enough to electrify 200 to 500 homes and businesses -- and lasts 20 years. One plant in Kenya was built by 200 villagers, all of whom own shares in the cooperative that sells the power. Along with our efforts to develop cool alternatives, every individual in the country has to shun energy profligacy in their day-to-day work.

We must turn computers off when not in use. They consume as much electricity as three 60 watt bulbs and this means avoiding the standby mode. We must switch off the lights and fans when the office shuts down and especially the lights while sleeping. This will mean saving a huge amount of energy that we have never comprehended.

Moreover, offices, organisations and business houses, homes in the affluent countries and even in poor countries like ours are indulging in energy profligacy with indiscriminate use of air conditioners. These air conditioners use hydrochlorofluorocarbons (HCFCs) as the cooling fluid and indirectly release carbon dioxide when electricity to run them is generated. HCFCs and carbon dioxide are greenhouse gases. But plug-in cooling needn't turn up the global thermostat. A model patented in the recent past by Albers Technologies Corp.of Arizna in the US cools air to 54 degrees Fahrenheit, dehumidifies it and removes contaminant. Most importantly it uses water, not HCFCs and draws half the electricity of conventional units.

Shockingly, even in America makers have hardly expressed any interest -- they don't want to fiddle with their product unless the government bans HCFCs. Only recently, a Saudi Arabian firm, Alessa industries agreed to turn out 25000 every year and export 2000 back to the United States.

From now on, we must use public transport to drive down to office or markets instead of using car as a status symbol. In many countries private cars are not allowed to ply on the roads at least in the peak hours with solo driver or with only one companion. If the owner of the car has to drive either on emergency or for any other reason he has to post a fine tag on the windshield of the car. At the same time we must push the government to improve public transport facilities: bus must have comfortable seats and fans over the passenger seats and be sufficiently large.

Going back to household chores or farm activities, we have to conserve water and as a first step towards that direction, we must either use sprinklers or drip-irrigation services for watering kitchen gardens, lawns or crop fields. We have to remember that the days of wasteful use of water are gone. It is time that we turn the tap off while soaping our face or shaving. We mustn't let the water flow out unnecessarily. Water is going to be a scarce commodity if we haven't learnt to conserve it now.

Scientists are still concerned because penchant for sacrifice to forestall the greenhouse effect is yet to take root in people all over the world. Even in America surveys have shown that only about one fifth of the Americans questioned would keep their homes warmer in summer or chiller in winter to help the environment. But conservation does never mean freezing in the dark and at least it was never agreed on that line in the "Montreal Protocol." From super windows that leak no heat to fridges that work like giant Thermos bottles, "there is a host of technological changes we can make that will let us keep the amenities we are used to," says Eric Hirst of OakRidge National Laboratory.

We have got to take concrete actions because other than climatologists, World Resource Institute announced new data that suggest the greenhouse threat as more serious than have been realised. About fifty million acres of tropical forests are disappearing each year, said WRI -- 50 percent faster than earlier satellite photos showed. Deforestation is second only to the burning of fossil fuels as a source of carbon dioxide. Even without any new data, an international panel convened at the urging of the previous American President Bush administration and 38 other countries concluded that global warming will raise sea levels enough to inundate the plains of Holland and Bangladesh and obliterate the Maldives, among other disasters! It called for 60 percent cut in carbon dioxide emissions.

And all shades of opinion unanimously agree that conservation is the fastest and cheapest way to do that at least until solar and wind power which emit no carbon dioxide are widely available. This necessarily calls for planting trees because trees are the best sinks for carbon dioxide. If every human being planted one and looked after its growth, we would have six billion trees growing. That could take away thousands of tons of carbon dioxide from the atmosphere. Efficiency, conservation practice and commitment alone, calculates Christopher Flavin of World Watch Institute, could cut global carbon dioxide emission three billion tons a year by 2010, from today's about six billion.

Unquestionably true, all countries of the world including Bangladesh can meet their energy needs without fouling the environment. "But it won't happen," asserts Thomas Johansson, an energy adviser to the United Nations Development Program, "without the political will." To begin with, huge government subsidies for fossil fuels must be dismantled to level the playing field for renewables. Policy makers must factor in the price of pollution: say for example, coal plants are more expensive than renewable power when one includes the cost of scrubbers on smokestacks and the expense of health care for coal related illnesses.

Factoring in all the disasters visiting us with such frightening frequency, renewable energy is necessary for the assurance of life on earth. There is no time to waste.

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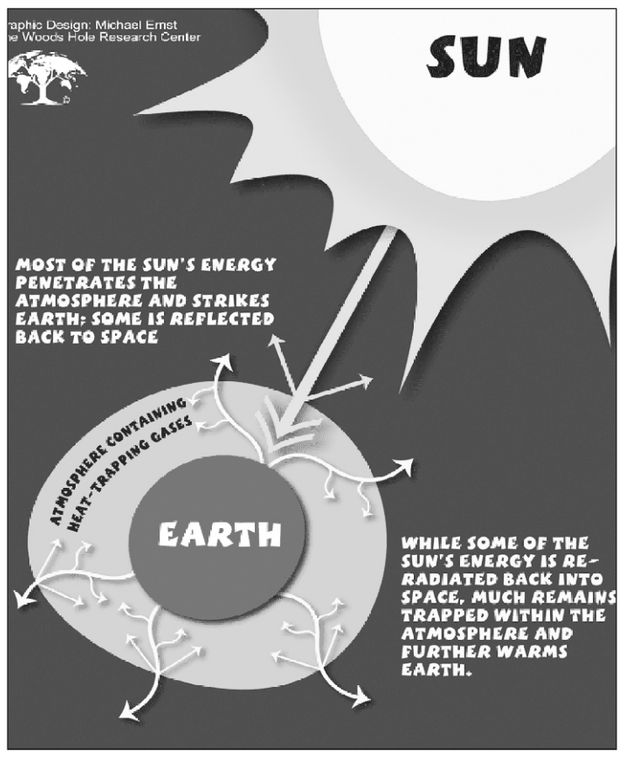
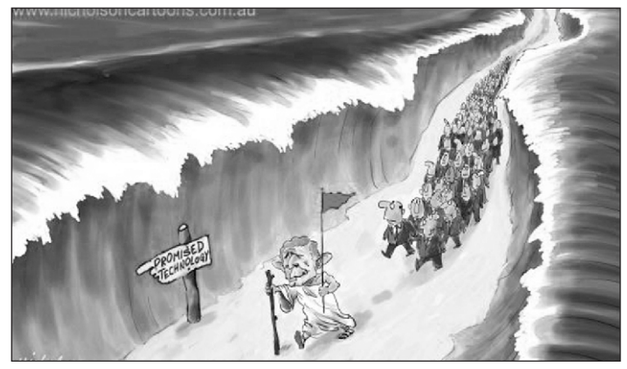


Bearing the burden of global warming

Very less heard about before 80s, Global Warming has now turned into an issue which no more remains a hypothesis but advancing in a pace more than predicted. It is an outcome of the lavish and indiscriminate exploitation of the nature by the developed countries but the burden is to be borne more by the developing and underdeveloped countries.

DR ZULFIQUER AHMED AMIN



GLOBAL Warming is a phenomenon where the temperature of earth's surface rises as a result of human activities when there is collection of Green House Gases (GHG) in the atmosphere which trap and prevent the infrared radiation of the sun from returning back to the solar system. If the present trend of temperature rise continued, then much before the turn of the century the sea surface will rise by three feet inundating one tenth of Bangladesh.

Greenhouse Effect

Prior to the advent of the industrial age, the concentration of CO2 in the atmosphere was about 280 ppm (parts per million). Today it's over 360 ppm. That's an increase by about 30 percent in less than 300 years. For the earth, this is an unprecedented rate of change, about 10,000 years' change compressed into 100 years. Carbon dioxide is critical to controlling the earth's heat balance because it absorbs infrared radiation (IR), basically heat. Heat coming to earth from the sun, visible radiation passes through the clear atmosphere and hits the earth and portion of it is absorbed and re-radiated back to space as IR. CO2 traps this IR and reflects it back to the earth's surface, causing further warming. This is called the greenhouse effect. Without it, water would freeze on earth. But with too much greenhouse effect, water would evaporate leaving the surface of earth.

Rising Ocean

Global sea level rise is caused by two factors. One is the delivery of water to the ocean as land ice melts, such as mountain glaciers and polar icecaps. Current evidence of global warming includes the widespread retreat of glaciers on five continents. For example: The ice cap on Mount Kilimanjaro may be gone in 20 years. About 1/3 of Kilimanjaro's ice field has disappeared in the last 12 years and 82 percent of it has vanished since it was first mapped in 1912. Next evidence is that sea ice in the Arctic Ocean is thinning. Massive Antarctic ice sheets have collapsed into the sea with alarming rapidity. The second factor is the thermal expansion of water within the oceans. As the temperature of water rises and the seas become less dense, they will spread, occupying more surface area on the planet. Increased temperature will accelerate the rate of sea level rise.

Impact Region Wise

Asia: Glacier melt in the Himalayas is projected to increase flooding, rock avalanches from destabilised slopes, and affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede. Freshwater availability in Central, South, East and Southeast Asia particularly in large river basins is projected to decrease due to climate change which, along with population growth and increasing demand arising from higher standards of living, could adversely affect more than a billion people by the 2050s.

The endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and Southeast Asia due to projected changes in hydrological cycle associated with global warming. Increases in coastal water temperature would exacerbate the abundance and/or toxicity of cholera in South Asia. A 1 meter rise in sea level would inundate half of Bangladesh's rice land. Bangladeshis would be forced to migrate by the millions. Other rice growing lowlands which would be flooded include those of Viet Nam, China, India and Thailand. Millions of climate refugees could be created by sea level rise in the Philippines, Indonesia and Egypt.

Africa: By 2020, between 75 and 250 million people are projected to be exposed to an increase of water stress due to climate change. If coupled with increased demand, this will adversely affect livelihoods and exacerbate water-related problems. Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change. This would further adversely affect food security and exacerbate malnutrition in the continent. In some countries, yields from rain-fed agriculture could be reduced by up to 50 percent by 2020. The cost of adaptation could amount to at least 5-10 percent of GDP.

Australia and New Zealand: As a result of reduced precipitation and increased evaporation, water security problems are projected to intensify by 2030 in southern and eastern Australia and in New Zealand, in Northland and some eastern regions. Production from agriculture and forestry by 2030 is projected to decline over much of southern and eastern Australia, and over parts of eastern New Zealand, due to increased drought and fire.

Europe: Negative impacts will include increased risk of inland flash floods, and more frequent coastal flooding and increased erosion (due to storminess and sea level rise). Mountainous areas will face glacier retreat, reduced snow cover and winter tourism, and extensive species losses (in some areas up to 60% under high emission scenarios by 2080). In Southern Europe, there will be reduced water availability, hydropower potential, summer tourism, and in general, crop productivity. It is also projected to increase health risks due to heat waves and the frequency of wildfires. In Central and Eastern Europe, summer precipitation is projected to decrease, causing higher water stress. Health risks due to heat waves are projected to increase.

Latin America: By mid-century, increases in temperature and associated decreases in soil water are projected to lead to gradual replacement of tropical forest by savanna in eastern Amazonia. Semi-arid vegetation will tend to be replaced by arid-land vegetation. There is a risk of significant biodiversity loss through species extinction in many areas of tropical Latin America. In drier areas, climate change is expected to lead to salinisation and desertification of agricultural land. Productivity of some important crops are projected to decrease and livestock productivity to decline, with adverse consequences for food security.

North America: Major challenges are projected for crops that are near the warm end of their suitable range or depend on highly utilised water resources. Warming in western mountains is projected to cause decreased snow pack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources.

Conclusion

Very less heard about before 80s, Global Warming has now turned into an issue which no more remains a hypothesis but advancing in a pace more than predicted. It is an outcome of the lavish and indiscriminate exploitation of the nature by the developed countries but the burden is to be borne more by the developing and underdeveloped countries. If the issue is not rightly and timely addressed, a disaster is imminent. What it needs, is a real concern and commitment by the national and global political bodies and a global awareness to bring to an end to arbitrary abuse of the nature, and to reverse the damage that has already been done.

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Destroying hills: Disasters yet to follow

DR. MD. SIRAJUL ISLAM

WHILE I joined as a young lecturer of the Department of EEPC SUST Sylhet in 1997, I was struck by the indiscriminate destruction of those beautiful hills along Sylhet region. Being an environment specialist I took it as my professional responsibility to aware people about the ill-effects of such imprudent act. We started to do research on it and probably in December 1998 in collaboration with Sylhet Disaster Forum, arranged a seminar at the SUST premises which was attended by representatives from almost all quarters of the society including government officials, educational institutes, NGOs, social and political groups. So far I can remember it attracted huge attention at that time and most of the local newspapers covered the story as lead. Knowing the far reaching effects of hill cutting, administration pledged to take action against it and we were hopeful.

I left Sylhet in January 1998 for higher study at the National University of Singapore (NUS). On the very first day at NUS I was so amazed by the undulating view of the campus where even a minor variation in natural topography was conserved. It took me around six months to get familiar with the route from my laboratory to the department premises just few buildings away -- 6th floor of one building connected with the ground floor of another building and then 3rd floor of another. They could easily flatten those hillocks, instead kept them intact. The same I found in Japan or Switzerland or even Malaysia -- cautiously preserved natural topography.

Well, what was happening in Bangladesh at that time? While staying abroad I used to keep in touch with SUST colleagues, but utterly shocked to know that hill cutting was continuing unabatedly in Bangladesh and even at a faster rate. Very frequently I used to encounter newspaper stories through internet on such massive destruction of hills along Sylhet as well as Chittagong and Hill Tracts region. More shocking was that the administration was not taking any attempt to stop it.

In 2004, we presented a paper at an international symposium held in Dhaka on the topic and the paper was highly appreciated by the conference attendees including foreign delegates. In 2006, we published an international journal paper on our research entitled Destroying Hills Along the North Eastern Part of Bangladesh: A qualitative Assessment of extent of the Problem and its Probable Impact.

Now, when I see those ill-fated dead bodies of Cittagong tragedy, it seems to me that all of our tireless efforts were actually futile. Probably it is our national characteristic that we are always reactive rather than proactive. In many other cases, even about those clearly visible environmental problems of Dhaka city we are showing almost same the attitude -- unless Dhaka is sunk we will not take any action to repair its drainage system or restore those water bodies, unless and Dhaka is subsided probably we will not take any action to stop withdrawing groundwater, any unless a severe earthquake hit and the country and millions of people die probably we will not realise that we are living a highly vulnerable earthquake zone where two converging plate boundaries are very close to us, and above all we will not stop unplanned urbanization in Dhaka unless it turns to be a big squatter or concrete jungle. Actually we cannot resist our temptation to destroy all of these delicate balances in nature unless it takes revenge destroying us.

I cannot understand the reason for such attitude -- we rarely listen to experts, rather the country is led by bureaucrats of general knowledge. This is the age of specialisation, but our decision making process rarely includes specialists. Well, even if now, at the cost of 120 lives, government takes some serious actions, one would be happy. But we are afraid probably within few days all these will fade out until another land slide takes say, 240 lives.

After the Chittagong tragedy everybody is talking about the consequence of hill cutting. I just like to confirm that landslide is just one of the numerous consequence of cutting hills a short term effect. Apart from this, a number of long term far reaching effects are there which can gradually destroy the ecosystem, affect river regime, regional climate and biodiversity. This write-up tries to summarise the technical issues in simple language based on the journal paper already published. The study is based on the data and information collected along the Sylhet region. No doubt like Chittagong, Sylhet is going to be the next target for disaster related to hill cutting.

Extent of the problem

It is estimated that every year about 10-12 percent of the total hills and hillocks are cut or destroyed along Sylhet region. The types of such destruction varies in forms like simply uncovering of hills from their natural vegetation and replace it with new types of crops or trees, or in an extreme case of completely destroying it and flattening the lull for residential, agricultural or in other development purposes. Like other regions, the vested interest of rich and powerful local land grabbers in collaboration with corrupt elements of district administration is mostly the culprit. However, poor people, especially those migrated from other districts are also liable in some cases.

Impact

Among the topographical features of the region, hills are the most dominating one contributing to the delicate balance in the ecosystem. Heavy rainfall, tea garden, dense bamboo and cane bushes, high flood plain and the flashy rivers, all the features are intimately related and contributed by the hills. It is obvious that any sort of mishandling of the hills will make the ecosystem of this region complicated.

Effects on ecosystem and biodiversity: Destruction of hill affects indigenous flora and fauna. As the direct effect of hill cutting, natural vegetation covers including trees and grasses over the hills are gone. On the other hand, the fertile topsoil with enriched nutrient and biomass are removed. Further growth of plants and trees from the cut portion of the hill thus retarded or takes long time. Such deforestation can change the microclimatic condition of the region like rainfall, temperature, wind velocity, etc and also lead to soil erosion removing top soils which will further retard plant growth.

Likewise, hill cutting will affect different species living there disturbing their movement and shelter, killing some or pushing them away. As a consequence their interdependency for food or food chain will be disrupted and many species will be endangered. It has been already noticed that many species of forest animals have become rare in the Sylhet region. Tigers are almost lost or rarely seen, different types of monkeys are also endangered.

Chances of earthquake will increase: Depending on its geographical location, both Sylhet and Chittagong are highly prone to earthquake. Most of the earthquakes in the world occurred along the fault lines of the tectonic plates. As it is evident the Eurasian plate and the Indo-Australian plate meeting line passes just along the east and north boundary of Bangladesh. Chittagong and Sylhet, the two regions are at a very close distance from the fault line and thus highly susceptible to earthquakes. Bangladesh National Building Code has already ranked Sylhet and Chittagong as the highest risk zones for earthquake.

Destruction of hills along such sensitive zones will obviously aggravate earthquake risk as it will leave some sorts of imbalance in earth pressure. Even though there is no literature on such incidents, however, almost same incident is noticed at different parts of the world. For instance, construction of large dam along the mountainous region found to increase intensity of earthquake occurrence due to pressure change from excess water storage. Hill cutting issue can be considered as analogous to it and highly possible.

Reduction in the intensity of rainfall: For precipitation, lifting of moist air mass is necessary for condensation into droplet and cloud formation. In this case hills act as a helpful barrier, where the moist air, after being obstructed, lifts upward and gradually condenses to form cloud, which is termed as orographic precipitation. This is the main reason for high intensity of rainfall in the Sylhet region. Due to destruction of hills, now moist air will not be obstructed as before and the amount of rainfall in Sylhet region is likely to decrease. The phenomenon has already been proved as the average yearly rainfall over the Sylhet region has decreased. This will result in a massive change in the eco-system of tea plantation, which requires heavy rainfall. On the other hand, the moist air that blows from south will now move to the northern hilly region Meghalaya of India.

Soil erosion and landslide: After precipitation, water from different places comes to the nearest rivers, channels, etc which is called runoff. Forests or vegetation cover of the land surface make this runoff movement slower with high infiltration and less erosion of soil. On the other hand, runoff from deforested surface is much higher due to less obstruction of from vegetation resulting in higher erosion which in the long run will decrease the recharge of ground water. Lowering ground water table has already been detected in some experiments by the Public Health Engineering Department of Sylhet.

Siltation in rivers and canals: The eroded soil ultimately comes into the rivers and wetlands with runoff. Here it gradually starts to settle, reducing the effective capacity of water bodies to hold water. Huge siltation has already become a big problem for our rivers, especially the rivers in Sylhet region. The frequency of floods in monsoon period thus increases and reduces the storage capacity of rivers in dry season. Most of the hilly channels along Sylhet city or nearby areas are already blocked due to such siltation. Likewise, some canals along Chittagong including Chaktai Khal are also silted by such eroded soil. Soil quality of the hilly region of Bangladesh is mainly acidic. So, the eroded soils will turn water acidic as well. Wetlands like Haor and Bills, etc may also be affected because of siltation and water quality problem. Haors along Sylhet region are considered as highly valuable in ecological importance with a vast reserve of aquatic flora and fauna, which are already started to suffer from problems like these.

Change in catchment drainage and flush flood: The region from which a river collects its water after rainfall is known as its catchment. For a particular river, catchment is determined from the land slope. Normally the hills act as divide between two river catchments. Now if the hills are cut, then the land slope pattern and divide would change resulting in changes in water availability at different rivers and channels. On the other hand, river cross-sections build up based on the catchment pattern and the amount of rainfall over it. As mentioned, if rainfall in Sylhet region decreases and increases is Meghalaya region, them for the upstream sections of the rivers in the Sylhet region this excess flow will appear as unusual to the capacity of the river cross sections, causing flash flood. Also deforestation and resulting accelerated soil erosion, which increases the sediment load of rivers, will boost the magnitude of floods.

From the above discussion it is clear that indiscriminate destruction of hills can result in drastic consequences threatening life and properties. So what should we do? Keep all those hills intact? Probably it is not possible. In a lowlying country with ever-increasing population there will always be increased pressure on those highlands. Again if sea level rises by one meter, probably we will have no option but to take shelter on those highlands! Well, developing highlands or hilly region is not rare in the world. In many countries of the world most of the people live in mountainous areas. The things that need to be ensured here is to be aware of all those implications mentioned above and take technically sound measures accordingly. There should be always trade-off between conserving and exploiting nature. In many cases we are motivated by early profits because of ignorance and lack of understanding about the cause and effect relationship in the long term. The concept of sustainable development emerges here. Where to develop and how to develop should be decided based on sound scientific studies.

So what should we do? Keep all those hills intact? Probably it is not possible. In a lowlying country with ever-increasing population there will always be increased pressure on those highlands. Again if sea level rises by one meter, probably we will have no option but to take shelter on those highlands! Well, developing highlands or hilly region is not rare in the world. In many countries of the world most of the people live in mountainous areas. The things that need to be ensured here is to be aware of the implications and take technically sound measures accordingly.

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