

## Solution to floods: New paradigm needed

Md KHALEQUZZAMAN

**F**OLLOWING the recent devastating floods in North Bihar, the Deputy Chairman of the Indian Planning Commission Montek Singh Ahluwalia said in an interview, "the flood caused by the Kosi in Bihar underlines the need for storing water by building dams or barages. Since the issue involves Nepal, vigorous diplomatic efforts are needed." He also said that he did not see any other visible solution. It is a sorry state of affairs that the Planning Commission of India is still trapped within a failed paradigm of engineering and structural solution to a natural process, namely flooding. How long will it take for our policy makers to realize that flooding is a natural process, and it can't be "managed"?

We cannot defy the nature, we need to live in harmony with it. A recent fact finding report for the Kosi floods of 2008, prepared by a civil society organization under the leadership of Dr. Sudhir Sharma, Dr. Dinesh Mishra, and Gopal Krishna of India, highlighted that although India has built over 3000 km of embankments in Bihar over the last few decades, the flooding propensity has increased by 2.5 times during the same time period, not to mention that embankments failed during each major flooding event. Embankments provide a

false sense of security to people living behind them. It has been proved time and again that no matter how strong the embankments are, and no matter who builds them (US, India, the Netherlands, China, Bangladesh, you just name it) they are destined to fail.

Every time there is a flood in Bihar or Assam, the people living downstream in Bangladesh get worried, since it takes only a few days for flood waters in upstream regions to roll downstream in Bangladesh. However, the Kosi flood of 2008 revealed an interesting fact. Although parts of Bangladesh are located directly downstream of the Kosi confluence with the Ganges (called Padma in Bangladesh), no major floods occurred in those downstream areas following the deluge in North Bihar in mid August. Analyses of the data for river monitoring stations in the Padma at Pankha, which is located downstream of Farakka, showed that the stage of the river did not rise significantly following the floods in Bihar. The question that begs answer is why the flood in Bihar did not contribute to increased flow in the Padma in Bangladesh?

The answer lies in the underlying causes of flooding in Bihar. The breaching of embankment on the Kosi river allowed the flood waters to spread over the floodplains in

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North Bihar, resulting in reduced velocity and volume of flood waters that enter the Padma in Bangladesh. In addition, at the time of breaching, the flow of Kosi was only 1.4 lakh cusec, which is not an unusual flow during the monsoon period. The flood in Bihar was an unexpected phenomenon for the people living behind the embankments since they had a false sense of security. If the embankments were absent on either sides of the Kosi, the flow that caused a deluge in northern districts of Bihar probably would be an ordinary "two-day flood" that would spread over wider floodplain areas in Nepal and Bihar, and would not cause any misery for select group of people who happened to be in the wrong place (downstream of where the embankments broke in Nepal) at the wrong time (August 18 and afterwards).

Despite an increase in investments for construction of embankments and other flood control measures, the intensity and magnitude of flooding have increased substantially in all co-riparian



countries (Nepal, India and Bangladesh) within the Ganges-Brahmaputra-Meghna (GBM) basin in recent decades. All countries in the GBM basin are looking for solutions to flood damage to their economy and lives. However, so far there has been a minimum amount of involvement among co-riparian nations to tackle this common problem. All countries are working in isolation or in a bilateral manner to solve a problem that requires participation by all stakeholders living in the GBM basin. India, being the largest power and strategically located, needs to provide leadership role among the co-riparian nations (China, Nepal, Bhutan, India, and Bangladesh) and devise an integrated water resources management (IWRM) plan for the GBM basin.

The IWRM plan will require adaptation of a new paradigm that embraces an ecological approach to reducing flood damage through implementation of best management practices in land-uses in the entire basin (from the source to mouth of these mighty rivers). All people living in the floodplain of the GBM basin need to find a way to reduce land erosion and deforestation. Should they build on the floodplains, they need to adapt new construction standards that facilitate floodwaters flow under their houses, or be prepared to evacuate to higher grounds during high flow events. Drainage congestion due to urbanization and other land-use changes that increase surface run-off and reduce infiltration is another reason for increased flooding in the region. Widening of natural drainage network through

dredging in proportion to the amount of urbanization, and increasing efficiency of storm sewage system in urban centers will be essential to avoid water-logging and flooding.

All stakeholders living in a watershed area, regardless of their political boundaries -- need to work together, there are no other alternatives. The planner and decision makers in the basin countries can hide their face in the sand hoping that flooding will not occur again, but such wishful thinking will not stop floods or reduce damage to economy and the environment. Humans will have to make room for rivers to spread during flooding, because floodplains have been an integral part of any natural rivers for millions of years; whereas human invasion to floodplains and interference with the natural flow have been a relatively new phenomenon. Every time humans decide to change natural forces to meet their needs, it becomes a duty for them to study the laws of nature and abide by them. Sooner we realize that humans cannot defy the nature, we can only live in harmony with it, better it will be for the humanity, because natural forces will always outweigh any human endeavour. Rivers flowing over to floodplains is one of such natural laws.

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## Time to move to green energy

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**G**REEN energy synonymous with renewable energy is used to describe sources of energy which are considered environment friendly, non-polluting, and therefore may provide a remedy to the global warming, mostly caused by conventional fossil fuel burning. Generally, renewable energy combines that resources which restore themselves over short periods of time and do not diminish. Such fuel sources include the sun, wind, moving water, organic plant and waste material (biomass), and the earth's heat (geothermal).

Few years ago, renewable energy was considered as an alternative power source to the remote areas where regular power line is absent or not cost effective. But, with the changing circumstances from the impacts of climate change, the whole world is now trying to reduce CO2 emissions and thinking more about green energy sources for its low or no carbon emitting characteristics. Moreover, the extinguishing character of conventional fuel sources allured the world communities to shift their fuel consumption behaviour. Though, still debate is going on along with research for the use of renewable energy, but all agree to the point that in the coming decades renewable energy sources will take a significant share in the global fuel market. Many world famous energy companies like BP, Shell are now investing on green energy, which beckons its bright future.

Bangladesh is a mineral resources poor country except natural gas. Disappointingly, this resource is now fraught with dangers. Gas based power station, industries now face unanticipated

gas shortage. Consequently, half day or more electrical load-shedding has become a regular event. Though we have no immediate remedy to this huge problem that affects every sector of the economy, yet if we rationally utilize our resources then we have all potentiality to become self-sufficient in power within near future.

Bangladesh has a comparative advantage of renewable energy sources like sun, wind, biomass and tidal forces. But, needs systematic evaluation of these resources and organized planning for using the resources to attain stability in its energy sector.

Solar energy: Being situated in the tropical climate zone, Bangladesh has huge opportunity to use solar energy over a long period in the year. Here, daily average solar radiation varies between 4 to 6.5 kWh per square meter with maximum amount of radiation available in the months of March-April and minimum in December-January. Except few days in the rainy season, the sun appears all day for 10 to 12 hours with required radiation that can be used effectively to produce electricity. Earlier, it was thought that solar energy could be used only to electrify some remote and island areas where regular power line is unavailable. But, it is fascinating to note that a few international companies are now showing interest to install solar panel in new built up urban and sub-urban areas which will reduce pressure on the national grid and help attain self-sufficiency in power sector as well. Grameen Shakti has already won Ashden Awards-2006 (Global green award, which is generally considered as an alternative nobel prize) for outstanding contribution in the renewable energy sector.

**It is imperative to go for green energy not only for combating climate change but also to attain self-sufficiency in the energy sector. We are lucky to have a lot of green energy options; now we need systematic utilization of these. We have no way to stay back further and hope for miraculous solution of our vexing energy problem.**



Besides the environmental advantages of individual solar panel, another important advantage is reduction of system loss. Now one third of electricity is misused due to so-called system loss, basically caused from individual extravagance as well as departmental corruption. In case of solar panel, every panel holder will be responsible for its use so, system loss will come down to nil.

Wind energy: Windmill is a fashionable item showed in western movies used in farm house, many people still think so. But Denmark, being pioneer in wind energy use, changes people's perception and they use free wind to generate a major share of their

power consumption. It is beyond imagination but true that in 2007 Denmark generated 3125 megawatts (MW) electricity by windmill (19% of their national consumption) that is almost equal to our national demand, though three times smaller in area than us.

Geographically Bangladesh is blessed with a constant flow of strong trade and monsoon winds. It has 724 km long coastal belt, around 200 km hilly-coast-line and about 50 islands in the Bay of Bengal. The strong south/south-westerly monsoon wind, coming from the Indian Ocean enter into the coastal areas of Bangladesh from March to October. This wind enhances speed on V-shaped

coastal regions in Bangladesh, as research stated. Based on last 16 years wind speed records at 20m above the ground, assembled by the Bangladesh Meteorological Department, it was known that average wind-blow in areas like Chittagong, Dhaka, Jessore, Patenga and Thakurgaon was between 5.5 to 9.50 m/s almost throughout the year. "This speed has been proved as appropriate for setting up commercial and non-commercial level wind power plants," power experts explained. However, using modern wind turbines, each windmill is capable to generate electricity from 250 watts (W) to 5 megawatts (MW). Besides, 12 other locations in

Bangladesh were also identified as moderate wind energy generation sites, where use of non-commercial and household level wind turbines would be pumping water for irrigation, as well as charging batteries, experts added.

Biomass energy: Bangladesh entered into biomass energy technology in 1972 through the bio-gas demonstration plant at Bangladesh Agriculture University. After that, a huge blow to install bio-gas plant in rural areas was found. Unfortunately, lack of government support and improved technology, difficulty in installation and bad smell from the plant made it less attractive to the user. However, recent bonanza of bio-fuel again brings the biomass energy in hot seat. In spite of some criticism, it has to be agreed by all that bio-fuel is the ever best invention that has full potentiality to be an alternative to fossil fuel.

Every year Bangladesh spends about \$2 billion to import oil, 15 percent of total national budget. Through bio-fuel production, Bangladesh can save half of its foreign currency from avoided oil import and can allocate the savings to other sectors of the economy. In Bangladesh, other than sugarcane, bio-fuel can be produced from some crops that can be grown in areas not suitable for traditional food crops. Jatropha (verenda), pongamia (caron) can grow under conditions of low fertility and rainfall. The north-western region with low fertility could be put into bio-fuel crop production commercially which may convert the munga-affected area into an

important economic zone.

Hydro power: As a riverine country, Bangladesh always has opportunity to go for hydro power. Few hilly rivers with strong current make this opportunity more feasible from economic point of view. As large hydro electricity projects has some environmental impacts, therefore we should go for small scale hydro power project which are more environmentally and ecologically acceptable. Already, in Khagrachori, a member of indigenous community succeeded in producing electricity from small-scale hydro power plant made by indigenous technology.

To explore the possibility of hydropower from small hilly rivers/streams in the country, a working committee was constituted on February 1981 with officers from both Water and Power Development Board (BWDB) and BPDB. The committee explored 19 prospective sites for possible installation of small hydro power plant. Regrettably, their work were only confined to study rather than implementation.

Sea power: Almost every year Bangladesh suffers from cyclone and tidal surges originated in the Bay of Bengal. But, our policy makers seldom thought to use this huge sea power for generating electricity, though many countries are using it.

The normal tidal head rise and fall in the coastal region of Bangladesh is between two and eight meters. This tidal range can easily be converted to pollution free clean renewable energy by using the simple low-cost technology of a "tidal wheel" in the sluice gates. ISTP of Murdoch University, Australia is planning a demonstration tidal power project in Sandwip. ISTP has developed a feasibility plan for rebuilding

recently damaged sluice gate with a tidal paddle wheel. If becomes successful, the tidal project of Sandwip can be replicated in the other coastal areas and may usher new light in the region.

Geothermal energy: Geothermal energy is the heat from the Earth. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma. Generally, geothermal reservoirs are located in hilly region and exposed by the presence of magma or hot salt water spring. Though we have well defined hilly region in the south and south-eastern region, but no feasibility study has so far been taken to explore the possibility and potentiality of geothermal energy source.

There is a known hot salt-water spring, known as Labanakhya, five kilometres to the north of Sitakunda (40 kilometres from Chittagong). Possibility of extracting energy from this site or any other unknown sites should be carried out by Satellite Remote Sensing or Physical Surveys.

It is imperative to go for green energy not only for combating climate change but also to attain self-sufficiency in the energy sector. We are lucky to have a lot of green energy options; now we need systematic utilization of these. We have no way to stay back further and hope for miraculous solution of our vexing energy problem.

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## Light pollution: An emergent threat to health and ecosystem

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**T**HE immediate past century saw an unprecedented advancement in science and technology and an acceleration of economic well being. At the same time it also experienced an ever more polluted world, specially an ever-increasing environmental pollution which has emerged as a major global concern for the very survival of human beings as well as all other life forms and the balance of ecosystem. When man of this modern era, especially in the developed world, is busy to make life easier and more comfortable, light pollution is emerging as a serious menace surreptitiously. This write up intends to elucidate from geographic and environmental points of view how light pollution is having its awful and appalling effect on human health, astronomy and ecosystem.

Light pollution, also known as photo pollution or luminous pollution, refers to the obtrusive, misdirected or misused light created by humans generally resulting from an inappropriate application of exterior lighting products. It comes in several modes each with its own negative effects including sky glow, glare and light trespass.

Light pollution is basically a side effect of industrial civilization. Its sources include building exterior and interior lighting, advertising, commercial properties, offices, factories, street lights, LED screens, electronic billboards, illuminated sporting venue etc.

Geographically, it is most severe in highly industrialized, densely populated areas of North America,

Europe and Japan and in major cities of the Middle East and North Africa like Dubai and Cairo. In North America from east coast to west, from Texas up to the Canadian borders there is very significant global light pollution. This is not only true in cities but also in suburbs and in rural areas where street lamps and other sources of light obscure the view of constellations, meteor showers and even the planets.

Human health: A variety of adverse health effects may be caused by light pollution or excessive light exposure. These include increasing headache incidence, worker fatigue, medically defined stress, and increase in anxiety. Some studies reveal that lengthy daily exposure to moderately high lighting leads to diminished sexual performance (Mc Cohen, 1988). Several published studies also suggest a link between exposure to light at night and risk of breast cancer, due to suppression of the normal nocturnal production of melatonin (Mac Gregor, 2006). In 1978 Cohen et al proposed that reduced production of the hormone melatonin might increase the risk of breast cancer citing "environmental lighting" as a possible causal factor.

Astronomy: For astronomy and science the impact of light pollution has been even more dramatic. Astronomers require observation of extremely faint objects that can be made only with large telescopes. But sky glow resulting from light pollution reduces the contrast between stars and galaxies in the sky itself, making it more difficult to detect fainter objects. The light

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from these objects can be lost at the very end of its journey in the glare of our own sky.

About 90 percent of all Americans live under skies that are "affected" by light pollution while roughly half cannot see the Milky Way from their homes. Mankind has throughout history looked to the stars to try to understand the events around them. The stars above us are a priceless guide -- not only for astronomers but for all humans.

Ecosystem: All life forms, both flora and fauna, exist with natural patterns of light and dark. So disruption of these patterns influences many aspects of animal behaviour. Light pollution can confuse animal navigation, alter competitive interactions, change predator-prey relations, and influence animal psychology. This type of pollution around lakes prevents zooplankton, such as daphnia, from eating surface algae, helping cause algal blooms that can destroy the lakes' plants and lower water quality. Lepidopterists and entomologists have documented that night-time light may interfere with the ability of moths and other nocturnal insects to navigate. Night blooming flowers that depend on moths for pollination may be affected. This can lead to decline of plants that are unable to reproduce, and change an area's long-term ecology.



Migrating birds can be disoriented by lights on tall structures. The Fatal Light Awareness Program (FLAP) works with building owners in Toronto, Canada and other cities to reduce mortality of birds by turning off lights during migration periods. Nocturnal frogs, salamanders and other species are also

affected by light pollution. Since they are nocturnal, they wake up when there is no light. Light pollution may cause salamanders to emerge from concealment later, giving them less time to mate and reproduce. Many wildlife won't even go near an area that has bad lighting. Also many species will

simply stop reproducing if habitat destruction from overly bright lights becomes too severe. It currently threatens all Florida sea turtles. Apart from the above impacts, it also wastes incredible amount of valuable natural resources and money. Hundreds of millions of

barrels of oil...and hundreds of millions of tons of coal are just used in this respect every year throughout the world. It does little to increase night time safety, security or utility. Rather it produces only glare and clutter, costing more than one billion dollars annually in the US alone.

After seeing through all the above mentioned negative effects, movements have already been launched against this pollution. For instance, since the early 1980s, a global Dark-Sky Movement has emerged, with concerned people campaigning to reduce the amount of light pollution. A number of organizations have also been formed in response to rising light pollution including 'International Dark Sky Association' and 'SELENE -- Sensible Efficient Lighting to Enhance the Night-time Environment'.

Reduction strategies: Reducing light pollution is not a difficult job at all. It just needs to make sense and awareness of the problem and to act to counter it. On an individual level, people can help reduce this pollution. However, some control strategies are suggested here:

- \* All exterior lighting should be ordinance compliant.
- \* Outdoor lights should be kept on only when needed.
- \* Dawn to dusk lighting should be strictly avoided.
- \* The wattage of our bulbs should be reduced.
- \* Choosing well-shielded lighting fixture.
- \* Utilizing light sources of mini-

mum intensity necessary to accomplish purpose.

\* Turning lights off using a timer or occupancy sensor or manually when not needed.

\* Improving light fixtures so that they direct their light more accurately towards where it is needed, and with fewer side effects.

\* Evaluating existing lighting plans, and re-designing some or all of the plans depending on whether existing light is actually needed.

Concluding remarks: To sum up, light pollution is a wasteful habit that provides nothing positive to society, rather it threatens us in a number of very fundamental ways. Like any other form of pollution, it disrupts ecosystems, causes adverse health effects, obscures the stars for city dwellers and interferes with astronomical observations. Under these circumstances, light pollution control has become a matter of urgency. First we should think that we are going to be part of the problem. But we can also be a part of its solution. Each one of us can contribute to the reduction of light pollution in our own way. We should keep in mind that curing light pollution saves money while reducing glare and sky glow detrimental to human health, astronomy and environment. So let us think of it seriously, do the duties and discharge responsibilities normally and morally bestowed on us from our respective platforms towards a light pollution free environment.

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