Depletion of forest cover portends climatic disaster

MD. ASADULLAH KHAN

We must concede that the people actually carrying out the destruction are obeying the first rule of any living being: to survive. Political problems, drought, salinity and river erosion often contribute to the destruction of forests as it has been in Chittagong region by the heavy influx of Rohingyas from Myanmar. To preserve an environment, in any part of the world, more so in Bangladesh, there must be an acceptable and rising level of economic well-being for the humans who live in and around it.

TREES are the most essential bounties of Nature contributing to the sustenance of life on earth. To industrialised countries trees are a treasure trove of biodiversity and green house gas sinks that not only absorb carbon dioxide and thus keep global warming in check but also release oxygen to keep people hale and hearty. To the developing nations these trees, so to say, the forests are resources ripe for exploitation: a potential farmland, a free source of fuel and a store house of such kinds of woods that command high prices in the markets. And these forests and plantations must be continued to maintain ecological balance of the planet earth. Without any contradiction, the world needs a lot of them to store the carbon produced by the growing population that triumphs on industrialisation. The need calls for preserving the forests that are still there after massive logging by human beings and restoring those that have been destroyed.

Unsurprisingly, in Bangladesh trees are being felled for fuel in the households and brick fields and also to meet the growing need of croplands for feeding the burgeoning population. But other than this type of extinction, there is another deadly culprit at work that is slowly denuding the forests of the Sunderbans, Cox's Bazar, Sylhet and in northern parts of Bangladesh much beyond our knowledge. The disease called "the dying forest syndrome" which in the Sunderbans is known as "top dying disease" strikes selectively but with deadly effect. The onset of the disease starts with the dark green branches hanging limply. Between five weeks and three years later, the branches are tinged yellow and then brown. The weakened tree soon drops its needles and eventually stops growing new ones. It becomes leafless at the top and appears stunted. Finally drought, insects, and parasites finish off the weakened plant.

In parts of Africa, Europe and most notably in the Sunderbans in Bangladesh, the dying forest syndrome causing death of trees has come up as a big environmental disaster. The epidemic of dying trees which has struck the forest resources of the world appears to be quite mysterious. But the most convincing evidence points to air pollution, specially sulfur dioxide and oxides of nitrogen spewed in the air by the ton from electrical generating stations, industrial boilers, smelting plants and automobiles located thousands of miles away. One school of thought points out, by itself sulfur dioxide can sap the vitality of the tree;.so can oxides of nitrogen. But the real problem seems to begin when two gases work in combination in the atmosphere. Hurled into the air by tall smokestacks, the substances mix with water vapour to form sulfuric acid and nitric acid known as acid rain and in the presence of sunlight turn into oxidants such as ozone. When these new chemical mixtures fall to earth as snow or rain or float into forests as wind or fog, they can be far more lethal than the ingredients that went into them.

Acid rain, in the form of dry particles, snow and fog, attacks a tree on all fronts. Airborne pollution settles first on the highest treetops of the forest crown, which acts as a natural windbreak. Acid precipitation filters down to the soil, eats away at the root system and eventually leaches out key nutrients such as calcium and potassium and mobilises toxic metals like aluminum. Once on a leaf or needle, acid rain disrupts the operation of the stomata, the tiny openings that permit a tree to "breathe." The process of photosynthesis is thrown off balance, and subtle changes take place in the internal chemistry of the tree that result in discolouration and premature aging. Finally acid rain washes away vital nutrients from the leaves and needles so that the tree slowly starves to death, its respiratory, circulatory and digestive systems being crippled. Much like an AIDS victim whose immune system has broken down, the ailing tree is defenceless against the ravages of nature.

Experts now say that precipitation these days has become more acidic since the onset of the industrial revolution in the mid 19th century. Measured on a chemical scale of pH from 0 to 14 (most acidic to most alkaline), acid rain is defined as precipitation below 5.6. In most of the industrialised countries of Europe, rainfall now has a pH between 4.5 and 5.5. In some parts of Italy, it has been recorded as low as 2.6 or acidic than table vinegar, which has a pH of about 2.9.

What makes tracking down the cause of toxic poisoning so frustratingly difficult is the caprice of the wind. Modern smokestacks rising more than 1200ft, may spare the surrounding countryside. But they can emit pollutants high into the air, where they travel along wind-formed "skyways" that can carry them hundreds of miles even beyond the country that produced them. That answers the dilemma of the non-industrialised countries like Bangladesh who are not sinners but have to pay a heavy price for other's faults. ... The dying forest has had a greater importance to the Germans than any other issue.

They look at forests as being more important than their own health That leads us to think how much oblivious and unconcerned we are about the depletion of our forest resources through factors like dying forest syndrome or top dying disease in the Sunderbans other than rampant logging by interest groups.

Any country for its ecological balance needs at least 25 percent forest cover. But in our country at the moment pollution hazard coupled with human assault, and outright theft have brought forest cover down to almost 7 per cent. Reports have it that in August last a huge consignment of wood worth Tk.18 lakh was seized from the Sunderbans territory while these were being pilfered by unscrupulous groups in collusion with the forest officials. Reports have it that existence of Sitakunda mangrove forest is at stake as a syndicate of land grabbers has been felling a large number of growing trees for establishing a ship-breaking yard. Because of human greed and insensible activities, we are losing the emerald forest resources the showcase for the diversity of life either in the Sunderbans, Chittagong hill tracts or Sylhet.

Sheer management problem and inadequate attention in protecting forest wealth are largely to blame for the decimation of the Sunderbans. The author during his last visit to the Sunderbans while passing through the different forest nranges found to his utter surprise that Harintana camp under Sharankhola Range covering about 200 to 300 crore taka worth of forest resources is protected by only 3 to 5 forest guards with no modern arms and mechanised boats to challenge and run after the organised gangs. More shockingly, their pay is unbelievably low to draw them to their professional duties. On the other hand, battered by cyclone, tidal surge and most importantly because of lack of management, the present area of the Sunderbans in the Bangladesh territory has shrunk to five thousand seven hundred sq km from its previous ten thousand six hundred sqkm hundred years ago.

In recent years, other than the impact of Farakka barrage, indiscriminate poaching, shrimp cultivation and hatchery in the entire coastal belt of the Sunderbans have caused serious ecological damage. Moreover explosive growth of population in the country and loss of livelihood in the densely packed ancestral villages has forced people to move to new locations for a better life and living and consequently this has caused more forest land to be cleared with consequent loss of many species of plants and animals. Consequently, potentially valuable food and medicinal sources hidden in these areas are being lost forever before they are even discovered. Shockingly, spurred by poverty, population growth and wrong policy decisions of government and simple greed, humans around the globe, especially in Bangladesh are at war with the plants and animals that share the region.

The present blight and lamentable depletion of forest resources account for the drought and climatic variations experienced in the country. Shockingly, because of lax governance, the city planners and agencies concerned in their bid to build houses and construct roads have perhaps forgotten the age old adage ,"The city was seen as something made by man and the forest as something made by God."

Precisely speaking, lack of environmental awareness in the country has significantly contributed to the extinction of trees bringing in its wake unusual flooding, inundation of coastal belts and severe crop losses due to inadequate rainfall. On the other hand spectre of devastated woodland triggers a spate of illnesses like respiratory tract infections, malignant tumours and congenital deformities of babies. Experts have cautioned against a move in the offing to conduct seismic survey for oil and gas exploration in the Sunderbans covering over 1000 km area that are likely to pose dangerous threat to forest wealth as well as biodiversity in the adjoining area. The penetrating ray shot over the sky that can easily penetrate 5-6 km down the earth surface may cause severe damage to biodiversity other than the fact that it can affect humans through spreading severe diseases like tumours, cancers and cataract.

Interestingly, climate and rainfall make certain areas better suited than others to the creation and maintenance of large standing stores of carbon. It is only logical that the countries that control actual or potential forest areas will begin to demand rent in one form or another for the service they provide to the rest of the world. But it is equally true whether it is Brazilian, Philippine, African, Indonesian or Bangladesh forests, we must concede that the people actually carrying out the destruction are obeying the first rule of any living being: to survive. Political problems, drought, salinity and river erosion often contribute to the destruction of forests as it has been in Chittagong region by the heavy influx of Rohingyas from Myanmar.

To preserve an environment, whether it is wetland or forest in any part of the world, more so in Bangladesh, there must be an acceptable and rising level of economic well-being for the humans who live in and around it. Environmentalism requires restraint. Poor people who lack food to eat or fuel to burn lack restraint as well. The slaughter of the elephants should teach us a lesson relevant to trees. Precisely true, without some economic surplus in human society, there will never be meaningful conservation. Speaking about Bangladesh or the world at large, if we need to protect the remaining forests, a crash effort must be made to provide alternative livelihood to the people living in and around them.

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To turn a curse into a blessing

Needed a socially, ecologically and commercially sustainable solution to the Arsenic problem

MURSHED SYED

PROVIDING absolutely pure drinking water from the tap has been the ambition of international water professionals for more than a century. Time has proven that in most places, it does not work. Although water professionals are reluctant to give up their dreams and still keep arguing that water from the tap is the best solution, international consumers are already choosing another path.

Those who can afford it buy bottled water or they buy special purifiers for purifying tap or well water before drinking. Also in Bangladesh, the long term solution for drinking water -- whether well or tap water -- will be bottled water and home water purifiers -- according to consumer's choice.

It goes without saying that to be accepted, these solutions must have low life cycle costs, be technically robust, reliable, easy to maintain, socially acceptable and, above all, affordable.

Here is a proposal on how overcoming the curse of arsenic in some areas of the country could be turned into a blessing for the entire country.

Distributed utilities

What is proposed by Scarab Development is that waste heat from a small power plants that run on bio-gas is used to purify water by low temperature distillation. Scarab's equipment is state-of-the art membrane distillation technology that is especially tuned to be maintenance free.

The plant is only meant to be used to make perfect food grade water. Distribution will be done in containers of convenient sizes, one, four, or five litres. Except for initial investment, the water will be virtually free since it runs on waste heat from the engine of the power plant it is being located at.

As an example, in this way a power plant may deliver 1 MW of electricity and 100 M3 water per day. Additional water output can, if necessary, be obtained by adding solar panels to the system or bio-fuel heaters.

Ecological sustainability

This type of distributed energy and water production will eliminate the need of huge dams and other environmental disruptions. And it will avoid huge investments in transmission infrastructures and the cost of their up-keep.

Neither the water treatment nor the energy production will create waste and modern engines create minimal air-pollution. And they will not contribute to global warming.

Popular tubewell: Often not dependable.

Rather, both processes utilise waste and return whatever residue to nature's cycle, even minerals to the soil which will stop the present depletion of agricultural lands.

After the investment is made, the running costs are minimal. The total running input for the system, except maintenance, will be human and agricultural waste. According to a study made by the Swedish Aid Agency Sida, the world-wide energy content of agricultural waste approximately equals the energy content of annually used petrochemical fuels.

Social sustainability

A distributed utility of this kind will not only reduce poisoning from arsenic. It will contribute two of the most important factors for development, electricity and clean water. In addition it will free the human work now being used for fetching and treating water.

Commercial sustainability

Probably the most important aspect of this solution is that it will empower all the people that are beneficiaries of the systems and support their move from dependency to economic self sufficiency. Specifically it will, of course, benefit the people who are directly involved in the commercial implementation and operation of the equipment.

Small is beautiful

Distributed utilities could vary very much in size, from a few hundred kW of electricity production and a few thousand litres of clean water per day to several MW of electricity and hundreds, maybe thousands, of cubic meters of water per day. What they all have in common is that the electricity is delivered through a local grid and the drinking water is delivered in bottles and containers locally or regionally.

Costs

Assuming a rather large plant with an electrical capacity of 1 MW, 24 000 kWh electricity and approximately 100,000 litres of water is produced per day.

The capital cost for such a plant will be approximately $2 million and it should be written off in five years although the real life will be much longer, more than ten for the power and water equipment, perhaps less for the bottling equipment. The capital cost for this high grade water produced is therefore almost negligible.

Another capital cost would appear if there is no local grid to connect to. Then one would have to build a local grid. Also, assuming that the water is not bought by a retailer, there would have to be delivery trucks for distribution to retailers or directly to end users. These costs fall outside of this calculation and would have to be added to the final price. However, these costs are not wasted. Just like the costs for producing electricity and clean water, they contribute to the over-all economic development of the region and the country.

The bio waste for the engine will initially have a collections cost and later when the use of bio-fuels is more common it will have a market price. A probable future market price should be used in the feasibility.

The power equipment and the water treatment need very little maintenance and service whereas the bottling equipment needs more. We can assume an average of a few percent of capital cost annually. Since the equipment is largely self-regulating, the labour cost is not high. There are virtually no consumables for the water treatment equipment. For the power plant, apart from bio-fuel, running costs are also small. For the bottling, the cost of bottles can be calculated on non-returnable bottles although in most cases bottles would be reused.

Total cost including depreciation, interest and operation would be less than 1 million US$ per year. A system ten times smaller in size (2 400 kWh electricity and 10 000 liters of water per day) would have an annual total cost of approximately US$ 200 000. These will all be very profitable investments both in commercial and human terms.

Income

Electricity: In many of the target areas there is no electricity or not sufficient electricity. Many of the people may not be able to afford electricity. However, in the long run everybody should have electricity. Everybody would benefit from electricity and will eventually be able to pay for electricity.

To calculate the potential sales of electricity is the most important part of the feasibility plan for each project and will determine what capacity of equipment is included. If there is a small market for electricity at the actual site, the plant will be small and the system may produce less water than desired, but water production can be augmented by solar power or heating from biomass.

Water: The water produced will be completely free from arsenic but it will also be free from any other (known and unknown) contaminants. This will be a strong marketing point in an area that is afflicted by arsenic, but also in any other market.

Small plants will sell their water locally to villagers in the neighbourhood. Larger also to neighbouring towns. In very destitute areas we would expect that the water is initially purchased for the villages by NGOs and possibly by international Aid agencies. However, no project should be financed unless it has a clear long term commercial viability.

Site specific feasibility

Although there would be standard models for the operations, each unit would have to be evaluated in its own context. A bankable feasibility study will have to be prepared by the aspiring entrepreneur. Scarab Development will of course assist with figures and calculations, but in the end, the viability of the project will have to be the responsibility of the person, company, team or community that runs it.

SAFETY AT STAKE

Unnecessary death of a tanker

GOLAM KIBRIA

THE recent demise of a ten million dollar oil tanker, *Banglar Shourav*, along with three of its crew, including Chief Officer Mr. Zahiruddin, has left many with haunting questions regarding fire safety. The massive explosion, a fortnight ago, onboard Danish made *Banglar Shourav* was considerably more graceful than a similar explosion in Chittagong drydock back in the late 80's. Then, a much smaller barge under repair exploded and 14 people were killed, including some who were working far away. A dead body was hurled and got stuck in the jib of a 50 tonne crane. Another body fell through the roof of an adjacent workshop, landing on another worker and killing him a well. These sorts of explosions can and should be avoided if fire safety is strictly followed.

The sheer enormity of the potential outcome of the tragedy of *Banglar Shourav* is overwhelming. Half the ship's complement could have been killed. Luckily, the explosion happened during lunch time, when most of the crew were inside their accommodations, so only a few remained in the danger zone.

Before going into further details on the *Banglar Shourav* incident, explosions and how they occur in tanker vessels should be addressed. Explosions are basically fires (an exothermic reaction of fuel, i.e. hydrocarbon with oxygen) taking place in a confined space. The reaction propagates so rapidly that a large amount of pressure accumulates, which eventually breaks the confinement, such as a container or cargo tank. This creates shockwaves, triggering successive layers of air surrounding the epicentre to rapidly expand. As a result of these shockwaves, steel structures are torn apart, heavy metal pieces are flung about like thin paper, and human bodies are shredded into unrecognisable heaps of flesh, bone, and blood.

Fire is always described using a triangular model, with each corner representing heat, fuel, and oxygen. A hydrocarbon compound is composed of the two elements carbon (C) and hydrogen (H). The simplest hydrocarbon is found in the form of methane (CH4), which has one atom of carbon and four atoms of hydrogen. As the molecule becomes longer and heavier, methane moves to a liquid state. In crude oil, the bulk of the hydrocarbon remains a liquid, although the lighter parts are vapourised and remain trapped in the ullage space of the cargo tank as gas.

Heavier, longer chains of liquid hydrocarbon are less susceptible to heat because their flash point, or the temperature at which they create enough vapour to ignite, is

usually high. Heat causes the liquid fuel to ignite, since it vapourises and increases the temperature of the air-fuel mixture. After the initial ignition, a chain of exothermic reactions takes place, which release enough heat to ignite the remainder of the liquid fuel, and an explosion ensues.

Fires and explosions are usually controlled by any of the three following processes: (1) starvation: depriving fire of fuel, (2) smothering: depriving fire of a supply of oxygen, or (3) cooling: depriving fire of heat.

While extinguishing, cooling, and smothering are widespread practices, fire prevention is more important. That is why a small spill is mopped up quickly, flammable liquid is separated from a heat source, and other techniques are practiced in industries.

For any fire to occur, hydrocarbon vapour needs to be in an exact proportion to the air and this range is called "The Range of Flammability," which varies depending on the nature of the hydrocarbon. The upper limit of this range is called the Higher Explosive Limit, and the air to vapour ratio is 9:1. On the other hand, the lower limit of flammability, or the Lower Explosive Limit, is likewise defined as the ratio of air to vapour at 99:1. Most hydrocarbons will burn within these limits.

Cleaning the cargo tank is one of the most hazardous activities in which fires and explosions are high risks. While cleaning a tank, a lot of oil vapour is released as the high pressured jet of air comes into contact with the oil residues and sludge that stick to the walls of the cargo tank. Ignition is highly likely, as micro sparks are emitted at the area of impact, and the availability of air is difficult to cut off.

Due to this risk, operation manuals deal with tank cleaning in a most thorough manner. A thorough description of the process is included in the Tanker Operation Manual, as well as the pros and cons of various techniques and the nitty gritty of safety practices. Under the compulsory implementation of a ship's International Safety Management Code (ISM Code), this TANK CLEANING PROCEDURE is the first line of defence against fire and explosion disasters. It encompasses every aspect of this procedure-- the type of atmosphere the ship-staff must maintain, the do's and don'ts, checklists, work instructions, emergency preparedness and contingency plan, notices and notifications, etc.

It is astonishing to learn, via the investigation report,that three electric blowers, instead of water-powered blowers, were used for carrying out a gas-freeing operation onboard Banglar Shourav. On the deck of any tanker vessel, even the use of mobile phones is prohibited. Ordinary torch lights are prohibited, as well as shoes with nails, in case they produce sparks while rubbing the steel deck. Match boxes are searched and retained at the gangway. All electrical and electronic equipment used on deck are made INTRINSICALLY SAFE. This means any spark produced while using this equipment would be incapable of ignition.

An electric blower found on the deck of a tanker vessel is in direct violation of mandatory Tanker Safety Procedures. On *Banglar Shourav*, three electric blowers were used and were connected with ordinary cables and multi-plugs. This was simply suicidal.

It was revealed that the Second Officer was not aware of the safety procedures, and therefore unfit for the job. He even failed to report to the Master a small explosion prior to the one which killed three people. It was also said that the incompetent staff were hired unfairly, despite not meeting the required qualifications.

The responsibility of safety on board any ship, let alone a taker, is clearly defined through the implementation of ISM Code. The master of the vessel is given both the responsibility and authority to ensure the safety of staff, cargo, and ship, and he takes precedence over all other staff in discharging safety commands. Did the Master report the unacceptability of particular staff, or did he decline to accept them onboard on account of their incompetence? Did anyone assess the competency of the staff before delegating such a serious job as cleaning the tank? Did not anyone notice that open electric blowers were being used instead of water driven blowers? Who authorised their use? Was the level of hydrocarbon vapour measured in the tank? Was a checklist followed? Was there a permit to work? Did any senior staff supervise? This series of question is long; nonetheless, they need to be answered in order to prevent similar tragedies.

There is no question that the incompetence of the staff, as described in the investigation report, was the cause of this tragedy, but it is also clear evidence of a total failure of the Safety Management System, as well as everyone who was linked in the safety chain. Everyone onboard shares the responsibility of a disaster.

It is always easy to cite human error as the cause of disasters, but it is more difficult to identify and correct the underlying lacunae in the system. If this is not carried out, further explosions are probable, and they may not always occur during lunch time. Due to a few people's carelessness, three lives were lost, and a ten million dollar ship, which had generated significant revenue for the Bangladesh Shipping Corporation during its service,was destroyed.

Our grief is for the loss of such a prized tanker, and for the loss of three lives, including the young and promising Chief Officer, and the utter disrespect the ship's corpse received by way of looting and the stealing of its fixtures and interiors while it was waiting to be scrapped. By all means, Banglar Shourav deserved a more dignified departure.

Banglar Shourav was a valuable asset to this nation, and due to carelessness, it died an untimely death. Safety lessons can and should be easily learned, yet they continue to be learned the hard way. Until safety procedures and guidelines are followed, this sort of disaster will continue to plague industries for the years to come.

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