Acid rain blights our woodlands

by Md. Asadullah Khan

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 aluminium. 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 tree that result in discoloration and premature ageing.

Acid rain is destroying the rainforest at an alarming pace

IN Asia and much of the Third World, trees are destroyed the old-fashioned way: they are cut down for fuel and cropland. But in Europe there is a new and potentially more deadly culprit known as "dying forest syndrome". Now, this mysterious malady, first observed in Germany back in 1980, has raced across the world blighting woods in countries as far apart as Sweden, Germany, Italy, the Philippines, Indonesia, India and Bangladesh. In all parts of Europe, needle trees such as fir, spruce and pine as well as leaf trees such as beach and oak have been affected. Europe now faces one of the most serious environmental catastrophes of modern times. Reports available till the end of 1990 reveal that in France 5,000 hectares of woodland have been seriously damaged, but 30,000 hectares are showing signs of deterioration. The problem is especially dramatic in West Germany. About 7.7 per cent of 7.4 million hectares of forest were visibly damaged till 1990. At the same time 34 per cent of its trees had suffered some needle and leaf loss and discoloration. In Southwestern Germany, home of the Black Forest, 75 per cent of the trees have been killed or damaged. In East Germany, an estimated 86 per cent of three million hectares of woodland has been visibly lost. In Czechoslovakia, now split into the Czech Republic and Slovakia, approximately 960,000 hectares of woodland, more than 20 per cent of the total, are now irreversibly damaged. The epidemic of dying trees has swept all parts of the world, especially Europe quite mercilessly and in ways that are just as mysterious.

World geographical records show that forest occupy about 32 per cent of land area and encouragingly Asian countries account for 14 per cent of the total woodlands in the global map. The forest covering in Bangladesh is not however, anything at all encouraging. The Sunderbans covering a total area of 10,000 square kilometres, making it the largest block of mangrove forests that exists in the world today, is on the verge of extinction. Most of the trees there have been affected with a strange plague known as "top dying disease."

Explanations for such epidemic range from a cyclic change in the environment to a baffling form of tree cancer. But the most convincing evidence points to air pollution, especially sulphur dioxide and oxides of nitrogen which are spewed into the air by the tonne from the electrical generating plants, industrial boilers, smelting plants and automobiles. The problem of free-floating pollution, largely a scientific phenomenon, now wreaks havoc. One country may have only a handful of factories that emit culprit chemicals, but it could nevertheless suffer forest blight because of a neighbour's pollution. It is now known that trees in the Netherlands, for example, are no less tainted than those in Germany, where smokestacks tend to be taller. Likewise Italy gets more pollution than it gives. Some two million tonnes of sulphur dioxide drift into the country from Switzerland, Austria and France while Italy in exchange sends those nations 1.7 million tonnes of pollution over the Alps. Whether a nation is a sinner or a victim tends to dictate its position on international pollution standards. Those are sinned against, notably the Scandinavian countries, have worked for years to make acid rain an international issue. The sinners, like Britain, have resisted putting teeth into pollution control regulations since they must bear the costs but enjoy few of the benefits.

Acidity is measured using pH scale with the number 7 being neutral. 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 areas 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 more acidic than table vinegar which has a pH of about 2.9. It is worth mentioning that the pH scale is logarithmic, that is, a substance of pH of 6 is 10 times more acidic than another with a pH of 7. The pH of 5.6 has been used as the baseline in identifying acid rain.

One of the main causes of acid rain is sulphur dioxide. Natural sources which emit this gas are volcanoes, sea spray, rotting vegetation and plankton. However, the burning of fossil fuels, such as coal and oil, are largely to be blamed for approximately half of the emissions of this gas in the world. When sulphur dioxide reaches the atmosphere, it oxidises first to form a sulphate ion. It then becomes sulphuric acid as it joins with hydrogen atoms in the air and falls back down to earth. Oxidation occurs the most in clouds and especially in heavily polluted air where other compounds such as ammonia and ozone help to catalyse the reaction, converting more sulphur dioxide to sulphuric acid. However, not all of the sulphur dioxide is converted to sulphuric acid. In fact, a substantial amount can float up into the atmosphere, move over to another area and return to earth unconverted.

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Nitric oxide and nitrogen dioxide are also components of acid rain. Its sources are mainly from power stations and exhaust fumes. Like sulphur dioxide, these nitrogen oxides rise into the atmosphere and are oxidised in clouds to form nitric acid. These reactions are also catalysed in heavily polluted clouds where iron, manganese, ammonia and hydrogen peroxide are present.

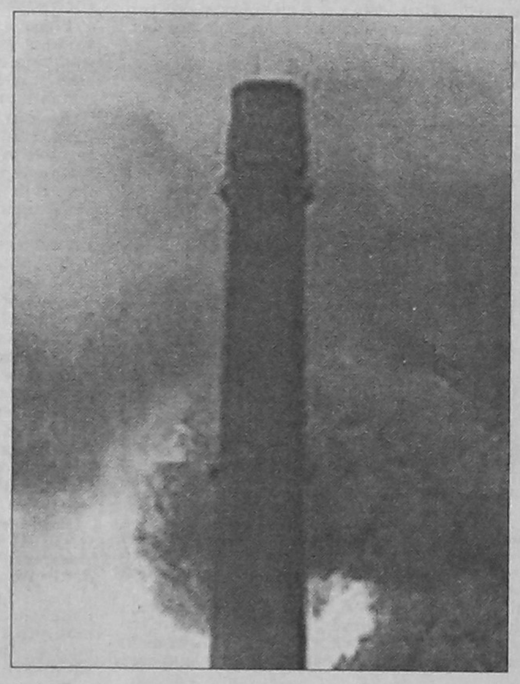
It is now beyond any debate that sulphur dioxide can sap the vitality of trees, so can oxides of nitrogen. But the real trouble seems to begin when the two gases work in combination with each other in the atmosphere. Hurled into the air by tall smokestacks, the substances mix with water vapour to form sulphuric acid and nitric acid -- 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 aluminium. 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 tree that result in discoloration and premature ageing. 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 crippled. When death comes, it is often due to natural causes -- insects, high winds, frost and drought.

Most of this pollution is due to disastrous energy profile of the western world which includes fuels like coal, relatively little hydroelectric power and an uncertain supply of low sulphur-oil. East Germany, for example uses low grade ignite, commonly called brown coal which when burned, emits heavy amounts of sulphur dioxide. This explains why East Germany having almost one third the population of West Germany spews out about 95 tonnes of sulphur dioxide per square mile per year, compared with 40.5 tonnes per square mile in West Germany and only 6.6 tonnes in the US (population 240 million).

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 the wind-formed "skyways" that can carry them hundreds of miles, even beyond the country that produced them. That explains the fact why countries like Bangladesh must feel concerned even if the country is not a polluter. A report in the early 1990s by the environment committee of the House of Commons estimates that 28 per cent of the 5.1 million tonnes of sulphur dioxide belched from British smokestacks each year are wind-borne to other countries, principally in Scandinavia. According to *Friends of the Earth*, an international environmental group, British emissions account for 14 per cent of the pollution in Sweden and seven per cent in both Norway and West Germany. Scientists claim that the resultant downpour of acid rain has already caused a 15 per cent decline in timber growth.

Among one of the serious side effects of acid pollution on humans is respiratory problems. The sulphur dioxide and nitrous oxide emissions give rise to respiration problems such as asthma, dry coughs, headaches, eye, nose and throat irritation. An indirect effect of acid precipitation on humans is that toxic metals dissolved in the water are absorbed in fruits, vegetables and the tissues of animals. Although these toxic metals do not directly affect the animals, they have serious effects on humans when they are being consumed. For example, mercury that accumulates in the organs and tissues of the animals has been linked with brain damage in children as well as nerve disorders and last of all death. Similarly, another metal aluminium, present in the organs of the animals has been associated with kidney problems and recently was suspected to be related to Alzheimer's disease.



Industrialisation... our own Frankenstein

The traditional idea about increasing industrial activities without looking into pollution menace and environmental degradation has, in recent times, changed. Long opposed to tough emission controls, Germany and Britain are now leading the charge for stricter emission standards. The impetus: doomed forests. So great is the concern that in a recent poll West Germans mentioned trees as being more important than their own health. Despite the predominance of heavy manufacturing and a high population density, woods cover a third of West Germany's 96,000 square miles.

In Bangladesh, forest and forest wealth are under assault. Other than the acid rain that is killing trees expansion of agricultural activities, colonisation of the forest land to meet the demands of burgeoning population, over fishing, and over-exploitation of plant and wildlife species are placing increasing amount of stress on the viability of this delicate ecosystems. The country is now left with six per cent of forest covering in place of 14 per cent it had in the year 1996. Reports have it that at the present moment out of 26 lakh hectare forest covering in the country about nine lakh hectares have been illegally grabbed by musclemen well-armed outlaws.

One of the direct effects of acid rain is on lakes and its aquatic ecosystems. There are several routes through which acidic chemicals can enter the lakes. Some chemical substances exist as dry particles in the air while others enter the lakes as wet particles such as rain, snow, sleet, hail, dew or fog. In addition, lakes can almost be thought of as the "sinks" of the earth, where rain that falls on land is drained through the sewage systems eventually making their way into the lakes. Acid rain that falls onto the earth washes off the nutrients out of the soil and carries toxic metals that have been released from the soil into the lakes.

Another harmful way in which acids can enter the lakes is "spring acid shock" most prevalent in winter countries. When snow melts in spring rapidly due to a sudden temperature change, the acids and chemicals in the snow are released into the soils. The melted snow then runs off to streams and rivers, and gradually make their way into the lakes. The introduction of these acids and chemicals into the lakes causes a sudden drastic change in the pH of the lakes -- hence the term "spring acid shock". The aquatic ecosystem has no time to adjust to the sudden change. In addition, springtime is an especially vulnerable time for many aquatic species since this is the time for reproduction for amphibians, fish and insects. Many of these species lay their eggs in the water to hatch. The sudden pH change is dangerous because the acids can cause serious deformities in their young or even annihilate the whole species since the young of many of such species spend a significant part of their life cycle in the water.

Subsequently, sulphuric acid in water can affect the fish in the lakes in two ways: directly and indirectly. Sulphuric acid directly interferes with the fish's ability to take in oxygen, salt and nutrients needed to stay alive. For freshwater fish, maintaining osmoregulation is key to their survival. Osmoregulation is the process of maintaining the delicate balance of salts and minerals in their tissues. Acid molecules in the water cause mucus to form in their gills and this prevents the fish to absorb oxygen as well. If the build up of mucus increases, the fish would suffocate. In addition, a low pH will throw off the balance of salts in the fish tissue. Salt levels such as the calcium levels of some fish cannot be maintained due to pH change. This results in poor reproduction -- their eggs produced would be damaged; they are either too brittle or too weak. Decreased calcium levels also result in weak spines and deformities. Another type of salt N' also influences the wellbeing of the fish. As nitrogen-containing fertilisers are washed off into the lakes, the nitrogen stimulates the growth of algae, which logically would mean an increase in oxygen production, thus benefiting the fish. However, because of increased deaths in the fish population due to acid rain, the decomposition process uses up a lot of the oxygen, which leaves less for the surviving fish to take in.

Indirectly, sulphuric acid releases heavy metals present in soils to be dissociated and released. For example, aluminium is harmless as part of a compound, but because acid rain causes aluminium to be released into the soils and gradually into the lakes, it becomes lethal to the health of the fish in the lakes. Aluminium burns the gills of the fish and accumulates in their organs, causing much damage. So, although many fish may be able to tolerate a pH of approximately 5.9, this acid level is high enough to release aluminium from the soils to kill the fish. Fish, being one of the primary members of the food chain, is food for many other life foms, including humans. Because toxic materials such as mercury are deposited in the fish due to acid rain, it is dangerous for humans to consume the fish. Amphibians are also affected; like the fish, they cannot reproduce in an acidic environment. The amphibian embryos have membranes that are too tough because of the acids, such that they are unable to break through at the proper time. So, they continue to grow, only to have deformed spines.

Many countries in the world are trying to equip automobiles with pollution reducing catalytic converters and push for adoption of lead-free fuel these cars require. In most cases when decision or legislation flow from the top, none can be apathetic to such laws and regulations. Germany sought legislation that made it impossible to register a new car without catalytic converters as early as 1986. To persuade citizens to purchase cleaner cars, the government developed a dazzling tax-incentive plan designed to offset the cost of catalytic converters. Under the programme owners of high-pollution cars were penalised for their indulgence. At the same time tax on lead free gas was reduced.

Even in Bangladesh, let alone other countries, most people seem however willing to pay more for products and services if they can be assured of healthy trees and clean air. The spectre of devastated woodland coupled with a spate of pollution related illnesses like respiratory-tract infections, malignant tumours and congenital deformities have set off a flurry of protest. That has hardly worked. Something more is needed and this could better be done by school children to shame adults and people at the helm of the state affairs as it was done in Poland in the early 90s. Poland's Nature Protection League, composed mainly of schoolchildren, meticulously documented the effects of pollution on the country's air, water and health. These activities have slowly had an effect elsewhere, even though it has failed to sensitise the Bangladeshi car owners and governments. East Germany has cut its use of sulphur rich fossil fuel and now gets 12 per cent of its electrical power from nuclear reactor. Hungary has devoted an amount equal to two per cent of its gross national product to reducing pollution, and gradually converting residential heating systems to cleaner burning natural gas.

To preserve an environment, whether it be wetlands or forests or African game parks, there must be an acceptable and rising level of economic wellbeing for the humans who live in and around it. That means, we must pay the people who own the utilities. This puts questions of foreign aid and Third World debt into a new perspective. Indeed saving the rapidly deteriorating forests either in our own country or elsewhere will probably require a two-pronged strategy: an offensive campaign that includes the breeding of pollution-immune trees if possible and a defensive scheme that calls for reductions of toxic emissions through controlled use of fossil fuel. Both will require money than is currently being spent on such measures, as well as a singular commitment to protecting the environment. But the question is how far and how much the poor Third World Countries can mobilise their efforts towards achieving an emerald success? The problems of the Third World -- its poverty, its ignorance, its debt -- never really seemed to affect the Europeans and the Americans. On the other hand, we have been very slow to react to our environmental imperatives and our actions, if any, have so far failed to make much of an impact. But the fact is environment should receive our foremost attention, for our environment and existence are synonymous.

Bananas split US-backed growers from EU

The European Union has pitched its latest proposal to end the seven-year trade dispute over bananas, but US-backed banana producers condemn the plan. Instead, they offer what they consider a more palatable answer backed up by the threat of US sanctions. Gemini News Service looks at the latest development in this ongoing dispute.

by Ken Laidlaw

THE 'Banana War' between the United States and the European Union (EU) is facing a decisive turning point. It could end the seven-year dispute or ignite a new phase in the battle of the bananas.

The problem started in 1993 when the US giant Chiquita which owns banana plantations in Latin America began lobbying Washington to challenge the EU's banana regime. This restricted the number of Latin American bananas allowed into European markets through a quota system. The EU gave former African, Caribbean and Pacific (ACP) colonies, which were at a disadvantage because they were smaller, a quota of tariff-free imports so they could compete.

The US government took the case to the World Trade Organisation (WTO), which ruled in September 1997 that the EU regime was illegal because it discriminated against Latin American producers. The EU agreed to review its tariffs after the US briefly imposed sanctions in March 1999.

In October 2000, the EU advanced a fresh proposal "with the objective of ending the long-running dispute with the US before the year's end," according to David Jessop, executive director of the UK-based lobby group, the Caribbean Council of Europe.

But this deadline is unlikely to be met given the sharp reaction from banana producers and the US.

The proposal would allow ACP countries to pay no tariffs on bananas exported to the EU market for an interim period. (All imports, regardless of origin, face tariffs as of 1 January 2006). Latin American exporters would pay 75 euros a tonne on some 2.5 million tonnes, and a tariff of 300 euros a tonne on a final quota of 850,000 tonnes.

But quotas for all producers would be allocated on a first-come-first-served basis a decided disadvantage for the smaller and poorer Caribbean producers.

Both the Latin American and the Caribbean banana producers reject the proposals.

Following a meeting of Latin American producers in Panama City in late October, Panama's Trade Minister Joaquim Jacome announced: "All the countries here reject (the EU proposal), which would have disastrous social and economic consequences." The new proposal would see a substantial increase in tariffs for Latin American producers.

The Caribbean Banana Exporters Association argues that "the new system would depress prices and destroy the market."

The Caribbean Council for Europe says the EU scheme would devastate fragile Caribbean economies.

Jessop notes that the system "will, in time, result in the industry's demise in some parts of the Caribbean".

Caribbean producers say this would lead to major job losses, loss of foreign exchange earnings and growing inability to service foreign debt.

The banana industry is the backbone of some ACP countries. For some Eastern Caribbean nations the crop accounts for up to 90 per cent of primary exports, 70 per cent of foreign exchange earnings and 60 per cent of agricultural employment. Bananas are the one year-round crop that can be viably cultivated throughout the Caribbean to produce a regular weekly income to small farmers, and are often the only source of income in rural communities.

Latin American producers have more money and more resources than the small-scale Caribbean banana growers and are better prepared to enter the European markets under a first-come, first-served scheme.

The EU proposal is also rejected by Chiquita, which controls 25 per cent of the world's banana market, and by the US government.

Chiquita spokesperson Steve Warsham says the EU proposals are "patently illegal" while Greg Frazier, US special trade negotiator for agriculture, states: "The level of tariff is prohibitive and is a problem."

Meanwhile, the seven Latin American producers (Colombia, Venezuela, Costa Rica, Guatemala, Honduras, Panama and Nicaragua) and the Caribbean banana growers have pitched their own joint proposal the first time producers have agreed on a solution to this dispute.

The proposal, backed by the US, allows the first 2.7 million tonnes to be imported with equal tariffs for all. A second tier of about 850,000 tonnes would enter tariff-free for the ACP producers, with tariffs for Latin American producers.

If the EU goes ahead with its proposal the US is likely to put in a fresh WTO challenge.

"The tea leaves are certainly pointing that way," Frazier said.

There is now talk of renewed US sanctions against a host of EU goods from cashmere jumpers to hand bags and Italian cheeses as retaliation against the EU banana regime.

The strong US stand even though the country does not grow a single banana is widely viewed as political. Chiquita is a $3 billion American conglomerate that is a leading contributor to both US political parties the Republicans and Democrats. Even Sir Leon Brittan, EU Trade Commissioner, commented last year: "The whole process is driven by politics in the US. It is driven by the fact that Chiquita is a company that gives money to political parties..."

But even EU member states Belgium, Germany and Italy have only reluctantly agreed to the proposal on condition that the Commission approaches the WTO "a soon as possible" to adjudicate whether the EU's scheme is compatible with WTO rules, which state there should be "no discrimination" based on where the food is produced.

The Geneva-based trade organisation says it is still too early to take a position on the EU proposal.

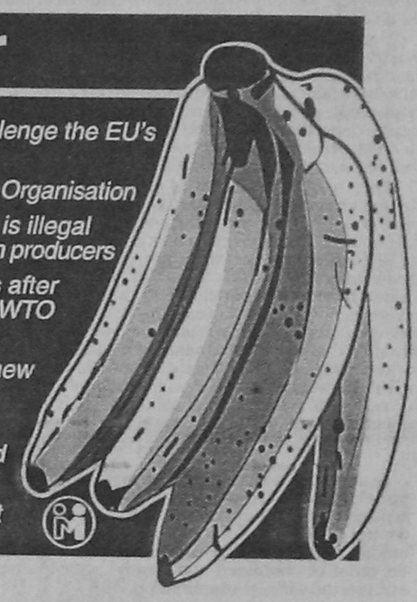
"At the moment the EU has not implemented its plan and we don't know when it will be put into place," WTO spokesperson Lucy Giroux said.

Washington's rumblings on sanctions show that if the EU presses on with its proposed banana regime there is little doubt that a protracted trade dispute will ensue.

The producers' proposal offers a glimmer of hope in ending the 'Banana War' but whether the European Union will endorse it remains to be seen.

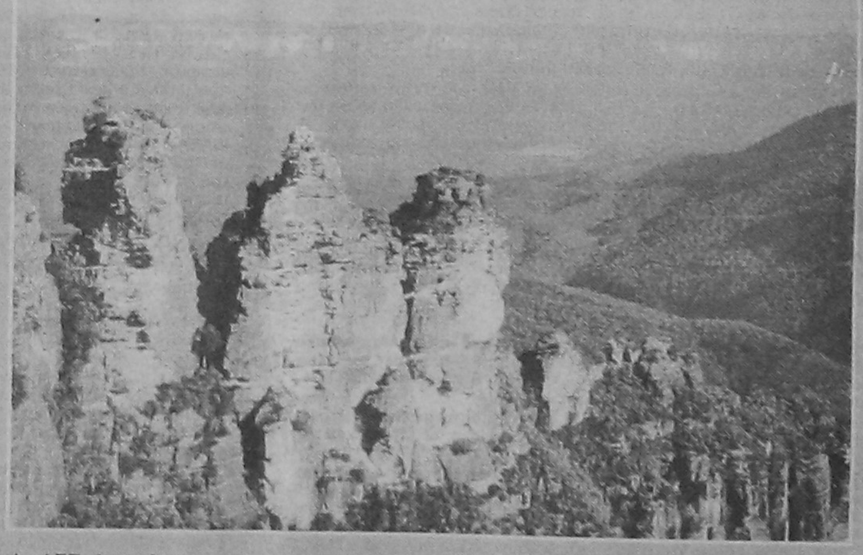
The author is an Edinburgh-based freelance journalist who specialises in world trade and development issues.

The banana war



- **1993** *US giant Chiquita lobbies US to challenge the EU's banana regime*
- **1996** *US takes the case to the World Trade Organisation*
- **Sept 1997** *WTO rules that the EU regime is illegal because it discriminates against Latin American producers*
- **March 1999** *US briefly imposes sanctions after repeated attempts to get EU to comply with WTO ruling*
- **Oct 2000** *European Commission makes new proposal for banana scheme*
- **Oct 2000** *US-backed Latin American and Caribbean producers reject EU proposal and come up with counter proposal*
- **Nov 13 - 14** *EU Council of Ministers meet*

The Three Sisters



An AFP photo shows a rocky outcrop called the "Three Sisters" in the Blue Mountains which has become Australia's 14th natural wonder to gain World Heritage recognition joining the likes of Kakadu National Park, the Great Barrier Reef and Ayers Rock (Uluru) in Sydney. The Blue Mountains, named so because of the the blue haze formed by sunlight shining through vapour released by eucalyptus trees, is home to 132 different species found nowhere else on the planet. The Wollomi pine, thought to be extinct for two million years, was rediscovered in the Blue Mountains four years ago.