

## Environment

# Designing our own downfall

By Md. Asadullah Khan

**S**WEDISH chemist Svante Arrhenius was the first to establish a link between global warming and greenhouse effect. Such human activities as driving cars, burning coal to heat homes and run factories, chopping down trees to build cities, etc., increase concentration of greenhouse gases like carbon dioxide, methane and nitrous oxide, which, in turn, results in global warming.

Available Environmental Protection Agency (EPA) reports suggest that since the beginning of the industrial revolution, atmospheric concentrations of carbon dioxide have increased by almost 30 per cent, methane more than doubled and nitrous oxide risen by 15 per cent. Scientists generally agree that these human-induced, heat-trapping gases hovering over Earth are to blame for the 0.5-1 degree Fahrenheit rise in average surface temperatures since the beginning of the industrial age. Most scientists also agree that if nothing is done to curb the emission of human-induced greenhouse gases, concentrations of these gases will eventually lead to greater calamities. One EPA model projects 30 to 150 per cent increase in carbon dioxide concentration by the year 2100, contributing to a further rise in global temperatures of about five degrees.

Since the late-19th century, EPA reports suggest global mean surface temperatures have risen by 0.6-1.2 degrees Fahrenheit with nine warmest years in the last century occurring in the last 14 years. The warmest year on record was 1995. But this summer may well go into the record book as one of the warmest ever. There has been an appreciable decrease in snow cover in the Northern Hemisphere and floating ice in the Arctic Ocean. Global sea levels have risen 4-10 inches and precipitation over landfall has increased by 0.1 per cent.

Many environmental scientists say that polar ice caps will melt causing sea levels to rise and swamping coastal communities. Increased precipitation due to higher rates of evaporation may produce stronger and more frequent storms and, at the same time, increased evaporation could suck the land dry in other regions of the world causing widespread drought and famine.

Warmer climate means decreased river flows. Consequently higher temperatures could harm the water quality of rivers and lakes. In areas where flows decrease, pollution concentrations will rise because there will be less water to dilute the pollutants. But in order to keep pollution concentrations from increasing, sewage treatment plants and other water pollution controls will have to be upgraded which will cost billions of dollars per year. Increased frequency of severe rainstorms could increase the amount of chemicals. Bangladesh has already begun experiencing ill-effects of global warming in the shape of frequent storms and floods, and degradation of water quality due to decrease in the flow of rivers. As reports from WASA suggest, chromium contamination in the river Buriganga has reached a near-danger level. Toxic metallic element chromium and cadmium, effluents from the tanning industries and other factories harmful to health can cause serious diseases like cancer, experts say. According to a study conducted by WASA, chromium level in Buriganga water goes up to 0.03 mg per litre during the dry season. The danger level is 0.05 mg per litre. The chromium is being drained into the water of Buriganga and Shitalakhiya along with effluent discharge by the tanneries at Hazaribagh and other areas in the capital city. Lack of proper waste treatment plants only exacerbates the situation.

Besides, indiscriminate dumping of waste into the rivers could also effectively deplete dissolved oxygen in water, effectively smothering the fish population in some areas. Higher water temperatures de-

crease solubility of oxygen in water and increase the rate at which organic pollutants degrade. This degradation exerts a "biochemical oxygen demand" (BOD). The combined effect of lower oxygen solubility and higher BOD will be to reduce the availability of dissolved oxygen, which is critical to existence of aquatic organisms. Reports pouring in from studies indicate that situation in the United States is also very alarming. One study estimated that throughout the south-western United States, warmer temperatures would push dissolved oxygen levels in most rivers to below 5 ppm necessary to sustain fish. In most places of Asia, regulators, reluctant to invest in waste treatment, sometimes argue that the toxins will be diluted to safe levels in the vast expanse of the region's seas. But the cleaning power of ocean has its limits. Researchers are discovering alarming levels of industrial poisons in sea fishes and dol-

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phins caught in Asian waters. Changing climate could also impair water quality in some rivers by reducing the flexibility of the existing water management system. Release of water during periods of low flow for environmental purposes would come at the expense of recreation, normal water supplies and hydro-power which benefit from higher levels. A 1992 study of the Columbia River Basin found that earlier snowmelt would have less water available in the summer. In absence of minimum release requirements, salmon fishery, a very prize fish world-wide, would be seriously threatened.

Climate change could also increase the salinity of water bodies. Rising sea level and reduced precipitation would increase the salinity of estuaries. Moreover, decreased river flows could lead to excessive concentrations of minerals that run off from farms in various rivers. Study conducted by Nash and Gleick, water experts in the US, reveals that salinity from

areas that do not become wetter leading to situations such as (a) earlier snowmelt could worsen spring flooding while diminishing summer water availability; (b) some climate models suggest wetter winters and drier summers; (c) the need to ensure summer/drought water supplies could lead water managers to keep reservoir levels higher, thereby limiting the capacity for additional water retention during unexpected wet spells; (d) warm areas generally have more intense hydrologic cycle and thus more rain in a severe storm; and (e) many areas may receive more intense rainfall.

Situations in case of the developed countries like the US may not appear to be that grave, itself a consequence of air pollution. However climate change is a slow and intermittent process, but in some parts of the world, a pattern seems to be emerging: summers that are hotter and drier than usual and winters that are colder and wetter, as we do now experience in Bangladesh. So says James E. Hansen, director of NASA's Goddard Institute for Space

A growing body of scientific evidence suggests that extreme weather - cold or hot wet or dry - is a result of global warming, itself a consequence of air pollution. However climate change is a slow and intermittent process, but in some parts of the world, a pattern seems to be emerging: summers that are hotter and drier than usual and winters that are colder and wetter, as we do now experience in Bangladesh. So says James E. Hansen, director of NASA's Goddard Institute for Space

tion structures, rely on land use regulations to prevent flood damages. Reports have it that thousands of communities in the US along rivers and lakes are part of the National Flood Insurance Programme which effectively precludes construction in most 100-year non-coastal floodplains. But as things stand today, changing climate may shift floodplain boundaries, as much as these became evident in the recent flood experience in Bangladesh.

The warming trend, calculates Jones, one of the world's foremost climatologists, may seem insignificant by ordinary people's standards but Jones also asserts that the net rise in the planet's temperature between 1900 and 1995 was only 1.1 degrees Fahrenheit. By 2050, it looks set to rise another 3 degrees. But small variations in overall warmth can make immense difference to life on Earth. According to scientists' best estimates, the world's average temperature was a mere 9 degrees colder than 19,000 years ago in the depths of last ice age. Jones has no doubt that most of the warming is the fault of greenhouse gases produced by fossil fuels. Rather than asking the industrialising nations like China to stop burning coal in their factories, industrialised nations should work on cutting their own production of greenhouse gases in hopes of making out cleaner paths to prosperity. The Global Climate Coalition asserts that given the way it goes, greenhouse world could "bankrupt the industry". Hurricane Andrew, the kind of storm a warmer world could see more of, produced 16.5 billion US dollars in damage claims.

At the 1992 Earth Summit in Rio de Janeiro, developed nations pledged to cut their releases of greenhouse gases so that emissions in the year 2000 would not exceed the 1990s. About the only country that has a chance of living up to its promise is Sweden. The United States is relying on industry to voluntarily reduce emissions & by using less energy and making more fuel efficient cars for instance. Rather than adopting tough measures like an energy tax which would cut energy use, the United States and other countries are hoping that technology will ride to the rescue.

Maybe solar power and hydrogen will replace coal and oil before greenhouse warming gets bothersome. In the mean time, because of continued research, fuel cell technology has shown wonderful promise though the initial premium is quite high. It is so much comforting to think that hydrogen based fuel cell technology, will have only hot water as waste product and no pollution at all. In the meantime, Ballard Power System Inc, Impeco Technologies, Energy Conversion Devices and United Technologies have achieved commendable success in fuel cell technologies especially in driving cars and small scale power generation (400 kW) projects in the US. But Hansen says there's less time than governments are counting on.

The climate system is being pushed hard enough that change will become obvious to the man on the street in the next decade.

The author is controller of examinations, BUET



Rivers ravaged ... reclamation of land actually condemns rivers to slow death



Mountains mutilated ... denuded it stands a testimony to human greed

# A victory over bio-piracy

By Farida Akther

**M**ORE than 200 organisations from 35 countries in Washington in September, 1995 filed a petition with the US Patent and Trademark office for revocation of a patent given to WR Grace to use a pesticide extract from the Neem tree.

Jeremy Rifkin of the Foundation on Economic Trends in the United States; Dr. Vandana Shiva of Research Foundation for Science, Technology and Natural Resource Policy in India; Martin Khor, Director of the Third World Network; Linda Bullard of IFOAM (International Federation of Organic Agriculture Movements); Dr. MD. Nanjundaswamy of Karnataka Rajya Ryota Sangha were on the global coalition against the US patent. They argued that the company wrongfully usurped an age-old biological process used by millions of farmers in India and other countries for generations.

In Brussels another legal petition was filed in June 1995 at the European Patent Office against a patent it had granted to WR Grace for a method that extracts Neem oil for use in controlling fungi in plants. The three opponents were Magda Aelvoet, former Green Member of the European Parliament and current Environment Minister of Belgium, Dr. Vandana Shiva of Research Foundation

After six years of legal battle, activists fighting against a controversial patent granted to the United States and the multinational corporation WR Grace for a fungicide derived from seeds of the Neem tree have earned a victory. The Munich-based European Patent Office (EPO) completely revoked the patent at the conclusion of a two-day Oral Proceeding from May 9 and 10, 2000.

For Science, Technology and Natural Resource Policy in India and IFOAM President Herve Praire. They argued the patent lacked novelty, inventiveness and clarity. The anti-fungus effects of Neem oil have been known in India for centuries and thus cannot be considered a discovery as claimed.

Following extensive testimony by expert witness Abhay Phadke from India, the panel decided that there was no inventive step involved. The patent describes the manufacturing process for certain oil extracted from the seeds of the Neem tree and used as a plant pesticide. The core issue for the EPO was the question whether it was a purported invention, as claimed.

In a statement given to the Times of India, published on May 12, 2000 Dr. Vandana Shiva said that the Neem patents are a clear case of piracy of Indian indigenous knowledge.

"We were certain from the beginning that the US patent did not satisfy the basic requirements for a patent. How could they say they invented something which has been in public use for centuries and on which modern scientific research has been carried out in the country for decades," Shiva added.

In a statement, Linda Bullard, the President of the International Federation of Organic Agriculture Movement, who also fought the legal battle, said,

"This is a great day not only for us but for all people throughout the world, especially for the Third World, who have been fighting to take back control of their resources and knowledge systems from the patent regimes of the north."

The Opponents submitted evidence to the EPO that the fungicidal effect of hydrophobic extracts of Neem seeds was known and used for centuries on a broad scale in India, both in Ayurvedic medicine to cure dermatological diseases, and in traditional Indian agricultural practices to protect crops from being destroyed by fungal infections.

Since this traditional Indian knowledge was in public use for centuries, it would seem that the patent application in question lacked two basic statutory requirements for the grant of a European patent, namely novelty and inventive step.

According to Linda Bullard, the patent violated Article 53(a) of the European Patent Convention, which prohibits patents to be granted for inventions that are "contrary to morality," in that it constituted theft of traditional knowledge which had heretofore been freely shared. The Neem patents are just one in a large catalogue of genetic resources originating in the South over which intellectual property rights are being asserted by a few multinational corporations originating for the most part, in the North. The Northern patent system was not intended to recognise or reward as inventive the products of community innovation processes such as those which created the various uses of the Neem today.

It is only when these uses are described in the terms of Western science and technology that an "invention" is deemed to have taken place and an individual "inventor" or a set of individual "inventors" are allowed to be rewarded with the monopoly property rights that make a patent worth having. This is the mechanism through which a massive transfer of biological and intellectual wealth is taking place -

from the Third World to the North.

The Neem Patent challenge was initiated in solidarity with the Neem Campaign, which was launched in 1993 by farmers in India who feared that their genetic resources and traditional knowledge were coming increasingly under foreign control through the legal mechanism of patents. They likened what they were experiencing to a modern form of "enclosure of the commons" - but in this case it was not public land which was being privatized, it was public knowledge. A delegation of Indian farmers and scientists delivered at EPO in Munich 500,000 signatures of Indian citizens demanding that the patent on Neem be withdrawn.

In Bangladesh, the Nayakrishi farmers have welcomed the decision and stated that this is just the beginning of our victory against the bio-piracy of the multinational corporations. The Bangladeshi farmers, through the Nayakrishi Andolan, have shown their solidarity with this campaign since the beginning. They have taken the position against patenting of life forms. In all the bio-diversity festivals held in Bangladesh, one of the important pledges is to fight against patent on life and bio-piracy.

Neem, or *Azadirachta indica*, has been used for many different purposes over centuries in many countries especially in South Asia. It is a tree, which is planted in almost every rural homestead for its use in medicine and in agriculture. Research has shown that Neem extracts can influence nearly 200 species of insects, many of which are resistant to pesticides.

Several extracts of Neem have been patented by US companies since 1985. Over a dozen US patents have been taken out by US and Japanese firms on formulae for stable Neem-based solutions and emulsions and even for a Neem-based toothpaste. At least four of these patents are owned by WR Grace, three by another US company, the Native Plant Institute, and two by the Japanese Terumo Corporation. Having garnered their patents and with the prospect of a licence from the EPA, Grace has set about manufacturing and commercialising their product by establishing a base in India. The company approached several Indian manufacturers with proposals to buy up their technology or to convince them to stop producing value-added products and instead supply the company with raw material.

The activists have legally challenged the two of Neem patents held by WR Grace, with the objective of highlighting the issue of biopiracy and the need to create a legal system that takes full cognizance of the innovation which has given rise to indigenous systems of knowledge and treat developments built on this knowledge.

The examples of challenges of patents of turmeric and Neem are setting precedence for positive actions. However, the multinational corporations are continuing their aggressive actions to patent life forms. People's organisations and environmental and human rights organisations must remain alert against the plundering of our natural resources through the patent regime.

as obvious steps, given the existing knowledge of the principles of utilisation of biodiversity and methods of processing. For example in the case of U.S. Patent No. 5,124,349 the processes described by WR Grace, to effect stable formulations, were well known at the time of patenting. As one reviewer of the patent commented, "I find it incomprehensible that WR Grace could have been granted a patent... claiming novelty on a process the whole world has known for years". Solvents mentioned in the patent and solvents similar to them have been used on Neem seeds and described in publications before the company's application.

The main reason such obvious steps are treated as novel is that the basic knowledge exists in non-western traditions and therefore not known to the patent offices in the west. While the knowledge of indigenous systems is used, it is not recognised. But the use of that same knowledge by tinkering in western labs is accorded recognition by adapting the definitions in ways that are based towards western science and western practitioners.

Under Sections 301 and 302 of the US Patent Code, any individual may file a request for the re-examination of an existing patent if the requester believes "prior art" would have a bearing on the patentability of any claim of the patent. Prior art includes knowledge that was

available at the time of patenting to a person of ordinary skill in the art. An invention is not patentable if the differences between it and the prior art would have been obvious at the time of patenting. Therefore, it was argued that Patent No. 5,124,349 (WR Grace's patent) should be overturned because: the company's method of extracting stable compounds has been widely used prior to the patent's issuance and because the extraction methods have been previously described in printed publications.

WR Grace's patent gives the company exclusive rights to methods of extracting stable chemical compounds for use in pesticides. Whereas, rural people in many South Asian countries have been using the tree's chemical for pesticidal uses for several centuries. Indian villagers used water and alcohol solvents years ahead of the company's patented processes. Even WR Grace itself acknowledges that India's traditional knowledge inspired the company's patent. This prior use is well documented and should invalidate the patent.

In addition to these prior uses, Indian researchers documented the use of the seed's compounds as a pesticide over 50 years ago. This prior use should also invalidate the patent. As early as 1928, Indian researchers published the value of the Neem seeds as a pesticide. Additionally, the Indian Agricultural Research Institute conducted formal scientific studies of the Neem tree for use in insecticides and insect repellents over a decade ahead of WR Grace's and Robert Larson's earliest efforts. This organisation had completed many studies, demonstrating the effectiveness of Neem tree seeds in pesticides, years before Larson and WR Grace even became interested in Neem seeds. This pre-existing body of knowledge and research generated by Indian scientists renders WR Grace's patent claims invalid.

The issuance of a patent is prohibited if the patent would have been 'obvious' in light of prior art. The standard for patentability requires that the differences between a patentable invention and its prior art must be great enough so that a person with ordinary skill in the art would not consider the invention to be obvious at the time of patenting. Patent No. 5,124,349 did not meet this standard.

WR Grace claimed that Patent No. 5,124,349 is non-obvious in the light of prior art because in contrast to the traditional chemical extraction techniques, the company's processes obtain storage-stable azadirachtin formulation. There are several reasons why this argument lacked merit.

First, several Indian scientists had developed stabilisation techniques prior to WR Grace's patent application. Stabilisation research occurred within India in the 1960s and 1970s. This pre-existing body of work alone should invalidate Patent No. 5,124,349.

Second, in determining whether an invention is obvious, it is necessary to consider the possibilities and capabilities of pre-existing technologies. Inventions are unpatentable if the possibilities raised by prior technologies would make the patent obvious to a person with ordinary skill in the art. This standard disqualified the validity of Patent No. 5,124,349. Because Indian researchers had already developed the knowledge and technology necessary to make storing stable azadirachtin formulation that was

possible, this pre-existing knowledge subsumes Grace's patent claims. Patents are not granted for trivial changes to known products and processes.

Moreover, it may be noted there is a very strong movement against patenting on life forms and agricultural products. During the WTO Ministerial Meeting held in Seattle, the third world countries took a very strong position against TRIPS Article 27.3 (b) which permits patenting of life. The activists groups in Asia and Africa proposed to WTO to amend this clause to exclude patenting of life. It was clearly proposed that "Members must exclude from patentability living organisms including plants, animals, micro-organisms and their parts as well as their biological, microbiological and non-biological processes. This position was also promoted extensively in South Asia by the South Asian Network of Food, Ecology and Culture (SANFEC).

The examples of challenges of patents of turmeric and Neem are setting precedence for positive actions. However, the multinational corporations are continuing their aggressive actions to patent life forms. The people's organisations and environmental and human rights organisations must remain alert against the plundering of our natural resources through the patent regime.