# Poachers Killing Sundarban Deer Indiscriminately

**by Inam Ahmed**

Want to have a feast with deer meat? Then go to the Sundarban area, visit a village bazar and buy it cheap, not more than take 30 a kg. You can buy as much meat as you wish, provided you have money in your wallet.

Khasru Chowdhury, a former architect who has now turned an environmentalist, says there are now about eight hundred to one thousand poachers in the four ranges of Sundarban. While working on a project to study the socio-biology of tigers in Sundarban, he found that these poachers illegally kill or trap between 75 to 100 deer in a month. Most of these animals are trapped while the rest are gunned down.

"These poachers kill indiscriminately", says Khasru Chowdhury, "They don't bother to find out if the animal is grown up or just a kid or a pregnant one."

These poachers have ingenious ways of hunting the deer. In Shora, Koyra, Bedkashi, Bantakhali, Sutarkhali, Gorukhali, and Sharankhola, they use shotguns to kill the animals. But in Gyanpara, Chhoto Tangra and Patharghata area, the poachers use a kind of rope net, called "doa" in local dialect, to trap them. The "mathal" or the hunters on foot shoot the deer. They are usually less successful because deer have a sharp sense of smell and hearing. But they have a very bad eyesight and a sense of perspective. A deer cannot differentiate between size of objects at different distances. The hunters take this chance and approach the dear. If the wind blows from the opposite direction, the dear will not have any smell. "When the dear drops its head to munch food, the hunter takes a few steps forward avoiding the deer's eye. This way the hunter goes near enough to get the animal within shooting range. The hunters also ambush the trail of the deer. Deer usually travel in a line like train. The hunters track the trail and examine the foot prints to find out when they went this way.

They also examine the "shulo" or breathing roots of different trees. If the deer had gone by earlier, they would have left fresh marks on the roots. From these signs the hunters determine when the deer will come back. They ambush and shoot them on their way back.

Some hunters also climb tall trees and mimic the call of monkeys. The deer come to the trees in the hope of finding some fruits spilled by the monkeys. The hunters then get a very good chance to shoot them as deer do not look upward.

There is another way of hunting called "baon". On some hot and humid nights, the antelope cannot stay in the jungles due to excessive mosquito bites. They come to the bank of the rivers. On such nights, the hunters come hunting on boats. They spot the deer with spotlights and shoot them.

According to Khasru Chowdhury, who spends most of his time in the forest tracking the footprints of tigers, the number of such hunters is about 150. "The hunters are not the main killers. The main poachers are the trappers". He said, "There are about five to six hundred trappers."

The trappers with their "doa" net go to different islands. These nets are about 150 to 200 yards long. They hang it across the middle of the island. Then start beating "golpata" (a kind of leaf) with saplings of sundari trees. This makes a loud noise and the frightened deer start running. Some of them get entangled in the net.

The trappers usually visit the islands twice a month. They stay in the forest for about six days and perform this ritual throughout their stay. Each night they hang the nets and in the morning they catch the trapped animals.

"The trappers enters these islands through Supati river and through the Tiger Point", said Khasru, "Each group of trappers consists of about 15 youngmen."

The deer do not die when trapped in the net. So, the trappers break the animals' legs and hide them in the hold of their boats. The trappers first put a layer of banana trees in the hold and then put the lame animals on the layer. They do it so that the injured animals cannot make any noise with their hooves. If luck is good, the trappers can catch 15 deer a night. Some of the trapped animals get strangulated also. After six or seven days, the trappers go home with their boat full of prey. They keep the animals hidden in their houses and slaughter them for the market. With their legs broken, the animals can survive about ten days. "The poachers carry on their business in collaboration with police", says Khasru. Killing and selling dear is illegal and one can be punished up to seven years for the illegal trade. "Police know the poachers very well", he claimed. "From each group of trappers, police take 2,500 taka as bribe." Besides selling meat, the poachers also carry on the trade of dear skin. These skins are sold to different shops in the country. The shop owners also play tricks to legitimise the sale of the illegal skins.

Government at times auctions dear skins seized from the poachers. The shop owners who buy these are provided certificates for each skin. "These certificates are the tricks of the shop owners," Khasru says, "They buy the illegal skins and sell them against the certificates. This way, a owner can sell hundreds of skins against one single certificate." Tiger skins are also sold this way. Between 12 and 15 tigers are killed by the poachers each year. At present, the Forest Department does not have enough manpower and equipment to stop poaching. The department does not have any trawler to guard the forest. "Moreover, these forest people do not have enough incentive to protect the wildlife", says Khasru.

"But this illegal poaching must stop immediately for the sake of the great Royal Bengal Tigers".

Poaching has already made population of the deer thin in the Sundarban. In the Sarankhola range, the deer population has almost come to zero.

"As deer become fewer, the food supply of the tigers becomes squeezed. And soon, the Royal Bengal Tigers, pride of the Bengal, will also vanish", Khasru said ruefully.

# Building Boom Choking Kathmandu

**Frenetic construction activity in Nepal's capital city is destroying the fragile ecosystem of the Himalayan state. Binod Bhattarai of IPS reports.**

Nepal's fragile mountain ecosystem has paid dearly for the building boom in this capital city.

As new hotels, commercial complexes and residential blocks sprout up in Kathmandu, brick kilns that have mushroomed to keep pace with the construction are burning the topsoil, devouring huge mounds of firewood and polluting the clean mountain air.

In winter this urban sprawl where temperature drop to three degrees centigrade is shrouded in smog. Scientists explain it is largely smoke from kilns, trapped in the high valley by the cold wind sweeping down from the surrounding snow-clad peaks.

The 'temperature inversion' is choking this city's over one million people. Health workers say many of Kathmandu's poor suffer from chronic chest ailments, made worse by the bitter cold as the sun rarely penetrates the polluted mist.

A recent study by the Mrigendra Medical Trust revealed an alarmingly high concentration of carbon in the air in the valley.

Suresh Raj Chalise of the International Centre for Integrated Mountain Development (ICIMOD) says the fog in the valley has been measured between 100 to 200 metres by meteorologists.

"The smoking chimneys (of kilns) are creating problems since most of them do not rise above the smog which means that the particles in the smoke are not well dispersed and remain in the fog," he explains.

According to Nepal's rural and cottage industries department, there are roughly 250 brick factories in Kathmandu Valley. The government has, however, not been able to keep track of the large numbers of chimney-less hearths in operation.

The brick kilns are also destroying the topsoil in this fertile valley which, according to popular legend, was once a lake that was drained by a saint, Manjushree.

Chalise is convinced that the kilns which have sprouted on the floor of the bowl-shaped valley over the past few years, was "roasting forever" the topsoil.

A Nepali energy economist, Suresh Prasad Sharma, has calculated that two million tonnes of topsoil are used to bake bricks every season.

A source of living for many poor peasants, a moderately large kiln employs some 400 people who dig the soil, mix in water and press the earth into moulds which are sun-dried before being fired in furnaces.

A single-shaft kiln produces 1.6 million bricks during the brick-making season which stretches September to late May.

Every season, kilns this size consume 22 truckloads of firewood, 13 truckloads of coal imported from neighbouring India, and 20 truckloads of lignite mined locally.

Environmentalists say the frenetic construction activity in the valley's wiping out Nepal's forest wealth already under tremendous pressure from a rapidly growing population.

Besides, the level of dangerous polluting gases, particularly sulphur dioxide, has increased, threatening Nepal's vulnerable Himalayan ecosystem with acid rain, they add.

The Mrigendra Medical Trust report has discovered that the overall concentration of trace elements — sulphates, nitrates and carbon — in the valley is comparable to those in the world's industrial cities.

Three years ago, the government made brick kilns an unlicensed trade. The operation was classified a rural industry and encouraged as a means to generate rural employment.

Officials say the number of kilns in the Kathmandu Valley quadrupled in two years after deregulation.

Almost overnight private entrepreneurs began invading the countryside to lease uncultivated land to set up factories.

Today under pressure from rapid urbanisation and farmlands shrink, the once fertile valley which exported grains and vegetables to other parts of Nepal now survives on imports.

Peasants complain of low yields on farms that a decade ago produced abundantly even without chemical fertilisers.

With the demand for bricks only growing, planners will have to take drastic measures to resuscitate the valley.

# An Icy World Full of Life

WHAT was once considered a cold and hostile desert has been revealed as being in reality the environment for a multitude of ingeniously adapted species, which are of vital importance for the food chains of the polar seas. It is only in recent years that researchers have been able to come to grips with this fascinating ecology, which had hitherto remained more or less concealed in the fine clefts and hollows of the ice of the polar seas. Scientists from the Federal Republic of Germany are playing a significant role in the study of this ecology.

Ice covers more than seven million square kilometres of the North Polar Sea; by the end of the Northern winter, this figure can even approach 14 million — enough to cover the entire area of the Federal Republic almost 40 times over.

In the South Polar Sea, around the continent of Antarctica with its over 14 million square kilometres, the area covered by ice is subject to even greater changes. There, life occupies the numerous cracks, small channels and hollows of this icy armour. At Alfred-Wegener Institute for Polar and Marine Research in Bremerhaven, an interdisciplinary working group has for many years been researching the Antarctic environment in particular.

According to biologists Dr. Michael Spindler and Dr. Gerhard Dieckmann of the Institute, reporting in the well-known scientific journal Spektrum der Wissenschaft (2/91) and elsewhere, the variety of species ranges from bacteria and algae to invertebrate animals. In the polar regions, the greatest in number are the diatomae.

In some places they are so numerous that the bottom side of the ice is dark brown, and the interior contains brown streaks. Although the German explorer and biologist Christian Gottfried Ehrenberg (1795-1876) first drew attention to such organisms in the ice precisely 150 years ago, until the beginning of the nineteen-sixties they were regarded as more of a curiosity. With the German icebreaking research ship Polar-stern, which was commissioned in 1984, scientists from the Alfred-Wegener Institute were able to investigate marine ice as an environment for the first time.

Around 300 species of diatomae have been found in the Arctic to date. Several hundred million of these single-cell organisms may be counted in a single litre of melted ice, of which the rod-shaped variety is the most frequent. Further common organisms are the flagellate algae, or also the armoured or dinoflagellates. They too may be found in the millions in a litre of marine ice, while other algae groups, such as yellow-green or green algae, occur with much less frequency or species variety. Bacteria are also plentiful, but their distribution, as that of fungi, has not yet been studied in detail.

These hosts of organisms are in turn an important food source for other single-cell creatures such as flagellates, ciliates and foraminiferans.

More highly organised multicell organisms, such as flatworms, rotifers, nematodes, chaetopods, copepods, amphipods and slugs several millimetres in size, also live in this icy undersea world. However, the environment of ice makes hard demands on its inhabitants; they must not only be able to stand relatively high salt contents and low temperatures, but also, in the case of green plants, be able to make do with an extremely low ration of light.

While the marine ice gradually "freshens out", the salt content in the cracks increases as the temperature drops. Scientists have measured concentrations of 70 per thousand at minus four degrees Celsius, and as high as 145 per thousand at minus ten degrees. At the same time, laboratory experiments have shown that diatomae, for example, can still multiply at minus 5.5 degrees and salt contents up to 95 per thousand, and can survive for longer periods under even harder conditions.

Certain diatomae are protected against freezing within the cell by "antifreeze", such as the amino acid proline; in other organisms, inorganic ions or glycerine prevent such life-threatening freezing. A further survival problem for the flora in particular is the lack of light under the pack ice, which the algae seem the master without any apparent difficulty. They achieve their highest photosynthesis performance with just a fraction of the light intensity which is measurable on the surface of the earth.

The researchers found the greatest algae concentrations in the lower range of the Antarctic ice ecology. "In summer, the chlorophyll values there reach a level of more than 2,000 milligrams per cubic metre," they report. In the more productive North Sea, the comparison values are just 20 to 50 milligrams, even during the spring algae blooms.

— GRS

Current low market prices for tropical hardwoods have led to over-cutting and degradation of the world's rainforests.

# First CFC-Substitute Production Plant Comes on Stream

**by James Lock**

THE world's first commercial plant for the production of a new, ozone-friendly chlorofluorocarbon (CFC) substitute has opened in Britain at ICI chemical & polymers' site in Runcorn, northwest England. Such is the importance attached to it, that the official opening ceremony was performed by Prime Minister John Major early this year.

The replacement chemical is KLEA 134a ("klea" is Greek for green and verdant), the first CFC substitute developed by ICI for use in refrigeration and air-conditioning systems. The new £30 million plant actually started production in October 1990.

At the launch, company chairman Sir Denys Henderson said the exciting product, which was brought on-stream in less than half the time normally required to develop a new chemical, provided a solution to a pressing environmental problem.

The Prime Minister emphasised the United Kingdom's strong commitment to protecting the ozone layer in the Earth's atmosphere. He recalled that it was a British scientist — Dr Joseph Farman of the British antarctic Survey in 1982 — who discovered the hole in the ozone layer at the South Pole.

It was the United Kingdom's ozone conference in 1989 that actually brought the issue into higher profile and led to the strengthening of the internationally agreed Montreal protocol of 1987 to phase out CFCs. The Protocol was further strengthened at the succeeding ozone conference in London in 1990, and a large number of countries now support it.

Mr Major said there was agreement in the more technologically advanced countries to cover the costs of developing nations as they become signatories to the protocol.

**Effective Teamwork**

ICI has been producing its wide range of Arcton refrigerant gases for more than 40 years and is a leading supplier to the industry. Under the terms of the Montreal Protocol, CFC gases are to be phased out by the year 2000. ICI has undertaken a £100 million fluorocarbon research programme for the development of a family of ozone-friendly CFC alternatives. KLEA 134a is the first of these.

The completion of the first KLEA 134a plant three months ahead of schedule was achieved largely by effective teamwork and a clear understanding of the project philosophy by all involved. A project task-force comprising process, project, functional and commissioning personnel was set up at ICI's chemical and polymer research headquarters at Runcorn.

The proximity in northwest England of the company's other chemists and engineers speeded up decision-making and problem-solving, which also involved close cooperation with Snamprogetti Ltd (SPL) of Basingstoke, near London, several of whose engineers were seconded to the ICI team.

The task force at Runcorn prepared a front-end design package, comprising process specification, process and instrumentation diagrams, hazard studies, equipment mechanisation, plant layout and project standards. The centre of activity then moved to Basingstoke, where detailed engineering was carried out. Equipment procurement was by SPL, which also carried out day-to-day construction management and supervision under the control of ICI's engineering construction group.

**New Techniques**

During the project a core team, comprising project, process, construction, commissioning, project control and SPL personnel, regularly reviewed the tight programme to check that the project remained on course and the rest of the team was aware of any changing requirements.

Meanwhile, work is in progress on a pilot plant at Widnes, northwest England, to improve KLEA 134a.

At the same time, ICI has set up a fluorochemical technical team in which 100 scientists are actively involved, and some 200 engineers will be working on the construction of the new plants.

ICI's research aims to identify a family of environmentally acceptable alternative chemicals to replace CFCs in vital applications. New techniques have been developed to cut development time to a minimum.

The company is working on the ones most urgently needed. KLEA 134a is a chlorine-free replacement for R12, the general purpose CFC coolant used in domestic refrigerators, air-conditioners and small commercial chillers, but it is not suitable for larger industrial systems or for low-temperature supermarket freezers.

Having started up the 134a plant in Britain, ICI's design of a larger, £90 million 10,000 tonnes/year pant to be built at St Gabriel, Louisiana, in the United States, is at an advanced stage, and the plant is scheduled to come on stream in 1992.

**Likely Replacement**

The development of a range of alternatives to CFCs is extremely important but will take time. Two fast solutions have been found — butane and HCFC 22 (R22) are being used as propellants for the aerosols currently advertised as "ozone friendly".

For the longer term, however, it seems likely that CFCs will be replaced by hydrofluoroalkanes (HFAs), of which HFA 134a is the first example. HFAs arise either by eliminating the chlorine completely from a CFC—for example $CF_3CCl_2F$ would become $CF_3CH_2F$ (tetrafluorethane) — or by substituting a hydrogen for one or more of the chlorines in a CFC.

In the first instance, because there is no longer any chlorine in the molecule, it no longer poses an environmental problem. In the second, the hydrogen introduces instability into the molecule and reacts with the OH (hydroxyl) naturally present in the lower atmosphere, forming water and leaving behind the rest of the molecule, which itself reacts with water and oxygen. Pilot Plant.

Having made the substitution, it is a matter of finding the right HFA for each application. Individual HFAs do not possess all the properties possessed by the CFCs, so there will be no "drop in" substitutes as such. The product most closely matching the needs of an application will be specially developed for it.

**Synthetic Lubricant**

ICI explains that, for example, in an automobile air-conditioning system the temperature needs to drop to a comfortable level in a few seconds whereas, in a building, the need is for a less dramatic drop, though it is desirable to hold the temperature constant for many days. User industries may need to re-engineer their existing equipment and in some cases introduce new processes.

A great deal of work has been done already in cooperation with those industries to ensure new products will perform properly in refrigerator compressors, for example. ICI's own lubricants business has developed a new synthetic lubricant specifically to work with KLEA 134a in refrigeration applications.

ICI now has a pilot plant at Widnes for HCFCl23 and is exploring the use of both it and HCFCl4lb as repiacements for various uses of CFC11 in applications such as polyurethane foams and in air-conditioning, centrifugal chillers and centralised systems for shops, hotels and offices, while various mixtures are being considered to replace R502.

Another CFC manufacturer, the ISC division of Rhone Poulenc Chemicals (formerly ISC Chemicals of RTZ Group) of Bristol, southwest England, has developed its new refrigerant, Isceon 69-S, as an immediate replacement for R502, the main refrigerant used in supermarket freezers, cold stores and food transportation. R502 is itself a blend of R22 and (fully-chlorinated) CFC115, which is a major component of R502, and has an ozone depletion potential (ODP) slightly less than R22.

Isceon 69-S itself is a mixture of R22, R218 and R290 and has an ODP much lower than that of R502, which is scheduled to be phased out over the nest five or six years under the terms of the Montreal Protocol.

Dr Forbes Pearson, technical director of star Refrigeration of Glasgow, Scotland, who carried out the comparative trials, comments : "This refrigerant is an exciting find as it is so close in performance to R502 that it can be considered as a drop-in replacement. It is compatible with conventional mineral oil lubricants."

R22, a hydrofluorocarbon, has an ODP five times less than R502, but compressors designed to run on R502 do not work with R22. Sainsbury, the British supermarket group, which is testing Isceon 69-S, is planning to use HFA 134a as a coolant in its chiller cabinets (kept just above freezing point) and R22 for the frozen food cabinets.

The price will be three times that of R502, but much less than the cost of replacing compressors.

**Environmental Effects**

Elsewhere, tests with particular significance for the success of the ventures are being carried out. Under the umbrellas of alternative fluorocarbons environmental acceptability studies (AFEAS) and the programme for alternative fluorocarbon toxicity testing (PAFT), the former manufacturers of CFCs — who will now produce the HFAs — have pooled the resources of 14 laboratories to speed up assessment of the toxicology of the new products and their environmental effects.

AFEAS looks at the effects of new chemicals on the environment — their effect on the stratosphere, the troposphere, their contribution to global warming, how they break down and how their breakdown products affect the environment. PAFT is conducting a two-year carcinogen programme, as well as assessing single high-level exposure, the potential to affect living organisms in the environment, the risk of birth defects, the effect on reproductive capacity, and long-term toxicity.

In addition, ICI has funded the work of independent scientists at a variety of institutions, including Professor Sherwood Rowland and Dr Mario Molian of the University of California, the original identifiers of the problem in 1974. The result is that there is going to be a significant toxicological database relating to these chemicals, including details of their environmental safety.

ICI's research aims to identify a family of environmentally acceptable alternative chemicals to replace CFCs in vital applications. New techniques have been developed to cut development time to a minimum.