S ince the end of the nineteenth century, when radioactivity was first discovered, we have learned a great deal about its effect on human beings. One of the most important lessons is that continuous exposure to kiwlevel radiation can be just as dangerous as exposure to a single high dose. Low- level radiation, absorbed in sufficient dosage over time, can seriously impair and even destroy an organism's capacity to maintain and reproduce itself. In particular, it may cause genetic defects that can be transmitted to later generations - much later, in some

The radiation from radioac tive elements is caused by the disintegration of unstable atoms. Stable, nonradiactive: atoms emit particles of four kinds: protons (hydrogen atoms), which are the simplest atomic nuclei and carry a positive electric charge; neutrons, so named because they are neutral electrically, though they are about as heavy as protons; alpha particles (helium nuclet), which consist of two protons and two neutrons; and beta particles, which are the so- called free electrons that escape from the radioactive

The Hazards of Radioactivity in Human Environments

Mohammad Ahsan Kabir

nucleus as it decays. These types of radiation are known as particulate radiation. A radiactive substance also

emits gamma rays, a high-frequency type of electromagnetic radiation, or vibrating waves of electron. Gamma radiation penetrates clothing. ordinary containers, and most walls or partitions. But not all radiactivity is equally dangerous or dangerous in the same fashion. For example, although alpha radiation from a source outside the body is relatively harmless, even a tiny amount can do severe damage from a source inside the body, as when a radiactive substance is inhaled or ingested.

Workers in many different occupations other than scientific research also suffered discase or death from exposure to radioactivity before its dangers were realized. Before World War II factory workers painting watch dials with radium paint moistened the tips of the

paintbrushes in their mouths. The radium they took into their bodies in this way settled in their bones, causing a high incidence of cancer. Likewise, miners in uranium mines breathed in particles of radon and other radioactive products of the disintegration of uranium. These miners suffered from a high rate of lung The hazards of radiation be-

come much more severe whenever a nuclear weapons is exploded above ground. And there is always a certain amount of fallout; that is, descent of radioactive debris through the atmosphere. Fallout is of two kinds: immediate fallout (the larger and heavier particles) comes down within a few hours of the explosion and is highly radioactive; long term fallout may drift around the upper atmosphere for days, weeks, or years, like the debris from volcanic eruptions, until it slowly settles.

There have been cases of radiation sickness from immediate fallout after weapons testing. It emits certain radionuclides like radioactive isotopes, or alternative forms of the same chemical element, having been produced as fallout by the nuclear fission pro-'cess, tended to enter the human food chain and so accumulate in various parts of the body. The way in which radionuclides enter the foodchain may be illustrated by strontium- 90. When strontium- 90 is released into the atmosphere as fallout from a nuclear explosion, some of it may land grass. The grass is eaten by cows and then strontium - 90 accumulates in the cows' milk, which is ingested

late in their bones. Another fear raised by aboveground nuclear testing was that it would increase the level of background radiation; that is, the radiation that peo-

by human beings, to accumu-

ple absorb from their environment whether they like it or not. Most of this comes from cosmicwaves, which have an even higher frequency than gamma rays. Astronauts and others whose occupation takes them to the lonosphere might conceivably suffer from the effects of cosmic rays.

Now- a- days fission reactors like liquid Metal Fast Breeder Reactors (LMFBR) are posing great threats to the human existence, emitting plutonium an extremely poisonous one -one millionth of a gram of which, inhaled, is enough to kill a person. The worst type of accident that could happen in a nuclear power station would be a so-called meltdown of its core, which could be caused only by failure of both its regular and its emergency cooling system.

The hazards of exposure to radiactivity are now better understood and persons who work with radiactive materials are no longer permitted to be exposed to annual doses of radiactivity above a certain level. Essentially radiactive materials should therefore be carefully shielded and the surrounding areas monitored continually for any rise in radiation levels.

NCE considered a cost ly nuisance by big ma nufacturers in the industrialised countries, strict pollution-control measures have actually begun helping some of them to improve their competitiveness increase their profits.

But as rich nations make tentative steps toward cleaning up their act, corporations from the industrialised North are shifting their filthiest operations to developing countries, delegates to the Conference on **Ecologically Sustainable Indus**trial Development were told.

Ambassador Yoshifumi Matsuda, Japan's representative at the October meeting, told the 600 delegates from 90 countries who gathered in Copenhagen that strict pollution-control measures need not have an adverse effect on international competitiveness.

"On the contrary," he said, "Japanese industries such as the automobile and iron and steel came out even stronger," as a result of such measures. "Expenses from the damages which would have occurred without pollution control would have been far higher than the cost of such expenses.

Pollution control in the early Seventies increased Japan's Gross National Product by nearly one per cent as of 1975, he said. Japan's experiences clearly demonstrate that strict control measures often result in the development of new technologies.

The ambassador's remarks were echoed by other conference participants. Delegates learned that several industrialised countries - including the United States - have had similar experiences: Although initial costs are high, environmental protection can produce bigger profits in the long run.

Yet the five-day conference also learned that while improvements are being made at home, rich countries have been shifting the most environmentally-damaging parts of their leather industry to developing countries in recent

The observation came from * Dr A. Tchcknavorian-Asenbaver, a senior official with the United Nations Industrial Development Organisation. which sponsored the

conference. She also revealed that 150 million tonnes of harmful photogypsum waste have been created by the world's phosphate industry. Most of that industry - which produces 163 million tonnes of phosphates a year - is located in China, Morocco, the Soviet Union and the United States.

The finger of blame was pointed at the 25 counfries including India, Jamaica, Brazil, China, Guinea and the East European nations which produce 42 million tonnes of aluminium annually.

"Both the phosphate and aluminium industries make heavy demands on energy and water resources and discharge large volumes of pollutants into the atmosphere and water bodies," TcheknavorianThe Earth Summit? As the US stonewalls a Rio meeting, activi-

Hot Air at

Over the next few months, delicate negotiations will de termine whether the world's largest environmental meeting will produce real progress in saving the planet from manmade ruin. Or whether the session will merely add to global warming with hot-air cmissions from about 100,000 parliamentarians, religious problems?" leaders, environmentalists and He might ask the Bush heads of state.

The occasion is the United Nations Conference on Environment Development, to be held in Rio de Janetro next June. For two years, international committees have been hashing out a declaration of principles for the so-called Earth Summit The bureaucrats have also been negotiating an ecologically sound agenda for the 21st century and a series of proposed agreements on the control of climate change respect for biodiversity and a slowing of deforestation. But as the final negotiating sessions approach, US intransigence on key issues means the summit may turn into little more than a biodegradable photo opportunity for heads of state.

carbon dioxide levels in the atmosphere 25% above those in the 18th century, many environmentalists fear that the world is already too late in coming to grips with the still unknown effects of global climate change caused by emissions of so-called green-house gases. Says Maurice Strong, secretary general of UNCED: This conference is an oppor tunity that may not occur again

The stakes are high. With

sts offer a planetsaving proposal

in our lifetime. When, if not at Rio, will we address these

Administration. The US is resisting pressure from the European Community and Japan to use the Rio conference as a forum to set targets and timetables for the reduction of warming gases, among other things. It has also resisted pressure to commit new funds so that developing economies can grow without destroying precious ecosystems. Washington's posture stands in contrast to the leaderships the US exercised in 1972 at the UN Conference on the Human Environment is Stockholm, which first established the environment as an area of international cooperation. Now, says James Gustave Speth, president of the Washington-based World Resources Institute, "our government is not accepting the responsibilities that come with

the world's largest economy." Speth's finstitute recently published a "Compact for a New World," a proposed model for a way rich and poor nations might come to mutually beneficial agreements in Rio on the environment and development. Meeting in Washington last June, a group of activists, businessmen and politicians agreed that poorer southern

nations would have an easier time accepting unpalatable initiatives on population stabilization, climate change and deforestation in return for a substantial quid pro quo. Its elements : debt forgiveness, direct financial aid to help end poverty, and technical help to reduce the poor nations' role in global environmental prob-

This type of north-south bargain is also what the Rio conference should be all about But while the US seems to treat Rio's emerging suite of agreements as a threat, other industrial nations see the Earth Summit as an opportunity. MITI, Japan's powerful Ministry of International Trade and Industry, is developing a 100-year plan to make Japan dominant in eco-technologies Tokyo is also said to be pondering ways to become the world leader in environmental Many conservationists be-

lieve the prospect of lost opportunities in the global mar ketplace will eventually per suade the Bush Administration to be more forthcoming. But what will emerge from the Rio deliberations is still very much up in the air. Barbara Bramble an official at the National Wildlife Federation, argues that even if the Earth Summit produces toothless principles, it will still have the effect of shaping environmental agendas for everybody, from the UN to ordinary citizens groups. The question is whether the bureaucratic timetable and that of the biosphere will match up.

Hot-Spot Turning Glacier into Wasteland

tract of ice, Asia's A largest glacier, is falling prey to pollution by humans. The Stachen Glacter - 76 kilometres long and 2-8 km wide - in the divided state of Jammu and Kashmir, is in

Thousands of soldiers from India and Pakistan stand muzzle-to-muzzle all along the glacier, a disputed ice-chunk between their two countries. Their presence is the root cause of widespread environmental damage.

India controls about twothirds of the glacier. It also commands two of the three passes - Bilafond or Saltaro pass being the highest which are defended by artillery and anti-aircraft batteries.

Pakistan occupies the Gyong La Pass which overlooks the Shyok and Nubra river valleys, and India's access to the glacier from Leh, capital of Leh district in Ladakh.

Hostilities between India and Pakistan over ownership of Stachen glacier broke out nearly eight years ago and have claimed hundreds of lives. The war stopped pending diplo-

doned snow truck buried deep under the snow, or an old kerosene metal can, a bag of clothing, food packets or parcels. Worst of all, you may ettep right into a pile of human faeces covered with freshly

As the helicopter hover

army security reasons. Even non-biodegradable articles are being dumped in the open. The gravest effect of all this

is the gradual melting of the glacier. Until a couple of years ago huge columns of ice at the glacier were used as helipads

uneconomical and risky for

Years of confrontation between Indian and Pakistani troops in the vast lonely wilderness of the Siachen Glacier have caused such serious pollution that the glacier is slowly melting. Environmentalists are vvorried, but there is little sign of real concern in the ministries concerned. And the soldiers, reports Glemini News Service, just say: "We are not environmentalists." by A.J. Singh

above the glacier before landing, you can see patches of dirt on the huge white desert. The dirt, brought by soldiers and of the glacier.

by army transport choppers. Since than, many columns have disappeared.

A constant shifting to newer columns is taking place. Twenty-metre high columns are down to just seven metres in three years.

military and food supplies dropped on the glacier, is polluting the streams flowing out The coldest war

GASHERBRUM (INDIAN-CONTFIOLLED) **ADMINISTRATION BILAFOND LA PASS (INDIAN-CONTROLLED)** KARAKORAM PASS Disputed areas-Chinese control AFGHANISTAN

matic talks, but after two years nothing tangible has come out. Both armies are in a state of constant alert, expecting gunfire to break the snowy silence

any time. Landing on the Stachen glacier is akin to setting foot on the moon. "Walk slowly, as if you were walking in space or on the moon. Otherwise you may collapse due to exhaustion," advises a signboard to

new arrivals at the helipad. You are cautioned to walk slowly for other practical reasons. Your foot may hit the protruding edge of an aban-

Scientists at the Jawarhlal Nehru University School of Environmental Studies are gravely concerned. They say that in other high-altitude areas bio-degradable items like urine and faeces can be disposed of maturally. In Stachen it does not happen that way due to the extremely rarified

atmosphere. And the pollution levels grow each day as the army has to be provided with military and food supplies. When the supplies are consumed the waste is not taken out of the Stachen area because it is

Because the entire glacier is a war zone, the army's first priority is to defend it. Environmental concern is the

Retired army officer Arjun Singh, who served at Siachen, says: "Crossing the glacier is a big problem for the troops. It is filled with bottomless crevasse and gullies interspersed with hugh ice pinnacles and seracs."

Besides the war hazards, soldiers have to be extra alert about their safety. With changing temperatures, fast glacial streams swell and bring down moraine, scree and boulders. Avalanches, frostbite, mountain sickness and cardio-vascular ailments are other dangers and killers. Critics say that even the

Environment and Forest Ministry at New Delhi is not worried about the polluting of the Siachen. An official said To the best of my knowledge there is no Stachen file in the ministry.

Reports from Islamabad paint a similar picture on the onethird of the glacier that the Pakistani army controls. "Soldiers are not environmentalists," said one Indian retired major.

Warnings have been sounded that any further disturbance to the glacier-forming process at the Stachen could even change the region's monsoon pattern. At 5,472 metres above sea

level, the glacier is located in the Karakoro mountain range. The area has some to the highest peaks in the world, like Saltoro Kangri, Sia Kangri, and the Apsaras.

The glacier's northern mountain marks the watershed between Central Asia and the Indian sub-continent. Bereft of vegetation, the glacier is one of the most inhospitable regions in the world.

Temperatures hover around minus 40 degrees centigrade in winter. If bare skin touches metal, it "bonds" as if with glue and can be torn off. In winter, gale force winds from central Asia can bring down the tem-perature to minus 50 degrees centigrade.

Siachen glacier is like a wedge between Pakistan-controlled Kashmir (area: 79,000 sq. km), the area (4,500 sq. km) ceded by Pakistan to China (north and north-west of Siachen) and the Aksai Chin area (38,000 sq. km) of Ladakh occupied by the Chinese in their 1962 border war with India.

The governments of Pakistan and China are close and Pakistan's desire to occupy Stachen seems intended to secure a common border with China to facilitate a closer military link.

India is determined to keep Stachen since its northern mountains divide Central Asia and the Indian sub-continent. Whoever owns the Stachen glacier controls the Shyok and Nubra valleys, as well as the region bordering China. India thinks Pakistan's control of the Siachen glacier will endanger the security of Ladakh in particular, Jammu and Kashmir state in general.

Further, de facto occupation of Stachen by Pakistan would weaken India's position in any future talks on the border issue with China. Although many rounds have taken place between India and China, no outcome is in sight.

Meantime, until the glacier is declared a zone of peace the pollution goes on.

- GEMINI NEWS

Opium Growers also Need 'High' for Development

Nations Peer into the World's Cesspit of Waste

Asenbayer said.

Nevertheless, there were rays of hope. Technological advances, she said, have yielded commercially-attractive processes which could substantially cut chromium waste from the leather industry. The industry has become a significant source of foreign exchange — \$5.5 billion dollars annually - in Third World countries.

The conference heard confessions of wrongdoing, largely from Eastern European countries and particularly Czechoslavakia. Even China, which

1,000 kilometres from our borders, is from Czechoslovakia," he said.

the North Sea, more than

"Every tonne of coal we burn sends a kilo of arsenic into the atmosphere. And our industry spreads much more radioactivity than our five unclear power plants. Half of the sulphuric acids we send up goes to surrounding countries, some 5 per cent of it to distant Norway to add to their envi-

ronmental problem," he said. The country's massive arms industry, which under communist rule, ranked among the

reduce emmisions of sluphur dioxide - one of the country's worst pollutants - by 60 per

Conference participants were adamant that the industrial expansion — which adds billions of tonnes of industrial waste to the mess every year would continue. But it was agreed that global action is urgently needed to make industrial activity ecologically acceptable and to clean up the global cesspool their industries have created.

While richer countries were able to demonstrate in varying



normally boasts of what it has achieved over 40 years of rapid industrialisation, admitted it has paid a high environmental price for industrial development.

Czechoslovakia's Environment Minister, Joseph Vavrousck, declared that his country has overtaken the former east Germany as the world's highest per capita

"We send 3 million tonnes of sulphur dioxide into the air each year and 40 per cent of the cadium which flows into

world's top ten producers of weapons, had employed 80,000 men and women.

"We must diversity and produce other steel products in these factories, but it is not easy," Vavrousck said. The task will be difficult, since unemployment has soared in the country since the new noncommunist government initiated a programme of economic

Czechoslavakia, he added, has adpoted preventive measures: Within the next five years the country plans to

degrees how they were cutting pollution, developing nations could generally only demonstrate their concern: a lack of financial resources has prevented them from implementing programmes for a cleaner environment.

Major blame for world pollution was placed squarely on the developed countries in the conference's final. declaration, but no specific promises of financial aid or help to the developing countries were made.

VIENTIANE: Ironically, the drug war may prove to be a

strange awakening. Too often the developed world has viewed the problem of Third World rural hunger and poverty as a distant issue, a matter of impersonal

But the drug war reveals one clear link: poverty in Laos - and dozens of other developing countries - is helping to kill people in the developed

Lao farmers, in need of cash crops, grow opium. And until poor farmers have an acceptable alternative, they will continue to grow plants that cripple rather than nourish.

Xieng Khouang is one of Laos's most mountainous and impoverished provinces. It was the site of prolonged and bitter fighting between 1954 and 1973 that decimated the area and drove most of the people

Since theri, farming families have trickled back, trying to reclaim their land and lives.

Two ethnic groups who together make up over a third of the area's population - the Khmu of the Lao Theung (Lao of the mountain slopes) and the Hmong of the Lao Soung (Lao of the mountain summits) - practice shifting cultivation in the uplands. There they grow rice, matte - and opium

Desperately poor and employing primitive farming

methods that result in low crop yields, they depend on the income earned from the sale of the poppies to buy food.

A recently approved project for Laos aims to substitute cash crops for opium poppies. The project is designed and largely financed by the International Fund for Agricultural Development (IFAD), with cofinancing by the UN Fund for Drug Abuse Control (UNFDAC), Japan and Laos.

The project hopes to tackle the problem of eliminating the cultivation of optum popples. The challenge is how to eliminate the cultivation of

poppies and, at the same time,

improve the food supplies and incomes of these people. A research programme will test and introduce improved varieties of cash crops as alternatives to the opium poppy. Extension services will train farmers in more effective farming methods.

Since most families in the province raise some poultry. pigs and cattle, increasing the contribution of these animals to family welfare is basic. A cattle bank will supply bulls and heifers. Veterinary services and training in forage crop development and range management will help improve animal

A rural development fund will help by making credit available for land improvement and agricultural inputs. Half of the loans will go to women to enable them to increase family food supplies through gardening and income through rice marketing and the production and marketing of silk.

The war against illicit drugs is being fought - and often lost - in homes, on city streets and in remote fields around the world. It is not a new war.

Just over 150 years ago, the British Empire fought the Opium Wars with China to ensure that the lucrative trade would continue. More recently,

of course, is the ongoing battle in Colombia between the government and the "Extraditables," and the gang warfare that is making so many cities' unsafe.

The victims are legion and their numbers are growing. Addicts, so many of them young, are trapped in a prison of need that warps the mind, maims the body and ruin lives. The only winners in this war are the drug lords.

A wide arsenal of weapons had been employed to fight the spreading menace of drugs. In an attempt to reduce the number of consumers, education and rehabilitation programmes

have been established, along with strict laws against possession, purchase and use.

Border patrols, seizures of shipments, confiscation of bank accounts, and prosecution of traffickers and money launderers are all efforts to limit supplies and thwart sellers. The results so far have been, at best, uneven.

Recently, another front has been launched, one which is just beginning to receive serious attention. This is the climination of the supply of some of the most dangerous drugs at

the source. It has been established that in 1988, three South American

countries alone - Bolivia, Colombia and Peru - produced over 200,000 metric tons of coca leaves. Afghanistan, Bolivia, Iran and Laos together delivered more than 2,600 metric tons of opium to the world market. If the cultivation of coca plants and optum poppies can be halted, then the production of their derivatives - cocaine (from coca), heroin and optum (from poppies) will

less obvious perhaps, but no less crucial: those of millions of small farmers in Asia, Latin America and the Middle East, who grow the coca bush or the opium poppy.

There is another demand

Their need is not for a drug "high," not for billion dollar profits, extravagant houses and sleek cars and not for power.