

Tropical Forests: Key to the Global Climate?

by Shane Cave

THE burning of tropical rainforests has long been recognized as changing the earth's climate by releasing CO₂ which traps heat in the earth's atmosphere while depriving the earth of a highly efficient carbon sink. The Amazon forest, for example, fixed 9 kg of carbon per hectare per day through photosynthesis. Tropical forests play a vital role in the global climate, especially in distributing heat away from the equator. At the heart of the process is the daily cycle of convective rain over the forests, with most of the evaporation coming not from the ground but from the trees themselves. The loss of these trees on a massive scale, such as has occurred in the Amazon basin, has long been suspected of changing the weather of the region and its periphery. The United Nations Environment Programme (UNEP) is now preparing to investigate the exact links between the global climate change and tropical forests.

UNEP's goal is to measure the difference in reflected solar energy between forested and cleared land in the Amazon basin, and any changes in

cloud cover, wind direction and intensity, and humidity and temperature that may stem from land clearance. Research done by the Brazilian Institute for Space Research has found that 80 percent of the solar energy that hits the region is used up in raising water vapour from the forest canopy. The water vapour comes from the evaporation of puddles in leaves and tree trunks, and from the leaves' loss of water through transpiration. Very little of the water at ground level is directly evaporated. The ground water is kept in balance by the trees taking water up through their roots to supply the rapidly transpiring leaves. There is considerable seasonal variation in this evapotranspiration with rainfall in some parts of the Amazon basin as low as 40 mm in August during the dry season, rising to 270 mm in March, during the wet season.

The water vapour from the trees rises, cools and falls to earth again, and represents 50 percent of the total rainfall in the Amazon basin, according to the Brazilian Institute's Louis Mollon. (The other 50 percent of the rainfall comes from

moist air dragged into the Amazon basin from outside, particularly from winds passing over the Atlantic Ocean.) As the water vapour rises, it condenses, giving off latent heat to the surrounding air. This warmed air, by this stage about 10 km above the earth, is dragged towards the poles and then descends to replace air which has been dragged over the Amazon area by the rising moist air.

In this circular fashion the heat from the equator is redistributed beyond the immediate equatorial zone (the same process occurs right round the equator, over the oceans and the world's other two main forested areas — the Congo basin and South East Asia/Northern Australia. This latter zone is generally the most powerful of these systems). Experimentation so far, particularly by Dickinson and Henderson-Sellers (1988), has indicated that large scale deforestation can reduce rainfall by about 20 percent in the Amazon. With less rainfall, less evapotranspiration and heat release in the upper atmosphere, there is therefore likely to be less heat transfer from the Amazon basin to the

areas immediately north and south.

With 80 percent of the solar energy in the Amazon basin used in this way, a decrease in the forest cover will see more energy go simply towards heating the air directly. Mollon suggests that this will lead to much greater extremes of temperatures than presently exist. Experiments on cleared land in Nigeria already indicate that the day-time temperatures are greater and the night time (temperatures are lower over the cleared land than in nearby tropical forest).

Ironically, however, run off and floods may increase despite the decreased rainfall, as the absorbency of the exposed soil is much less than that of tree-covered soils — in some cases only one tenth as absorbent. In the Amazon about 15 percent of the rainfall never reaches the ground anyway, being intercepted by the forest canopy.

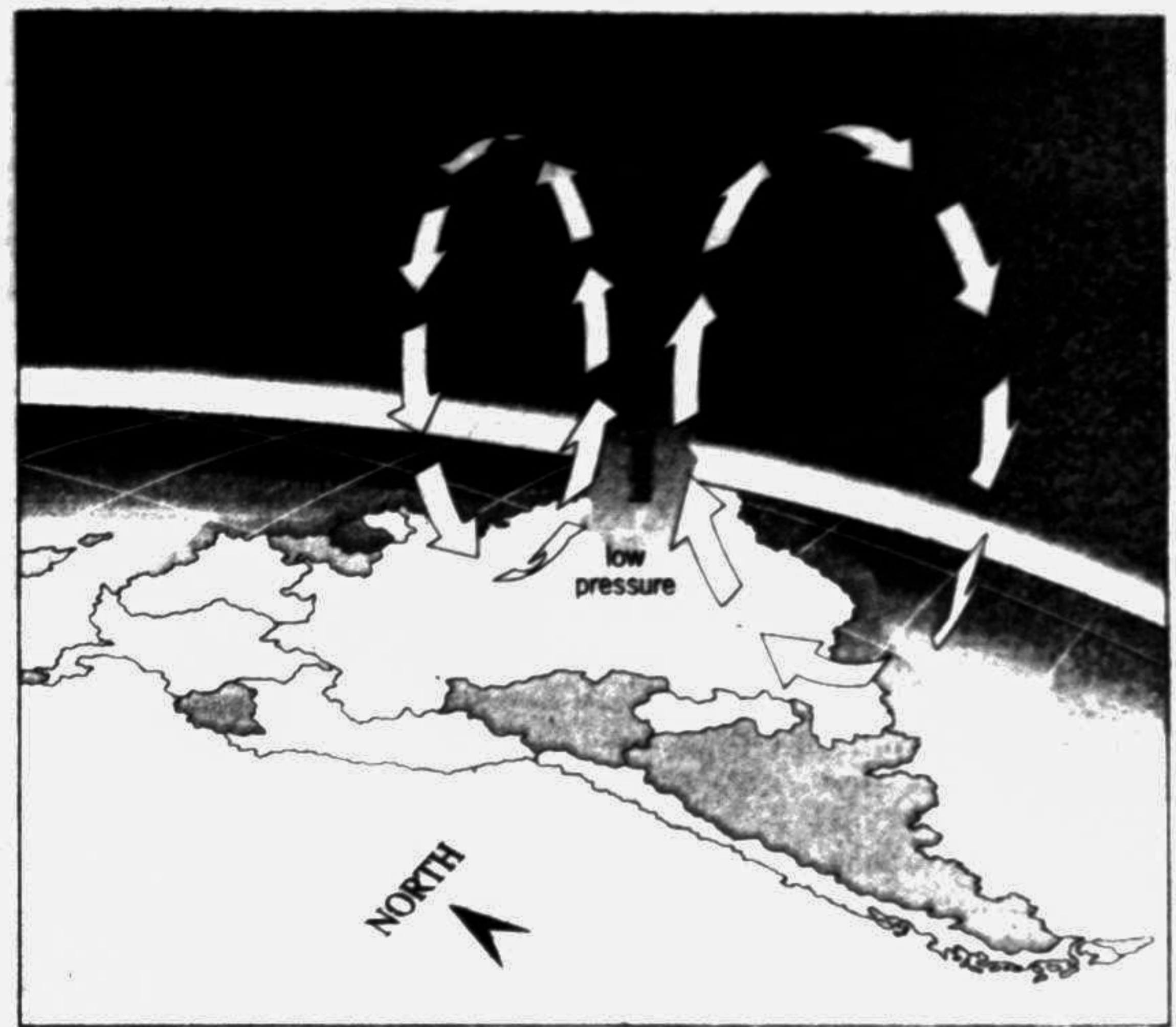
UNEP's goal is to test the extent of this change. Much of the experimental work done on the impact of land clearance has been very localized and model-based. The UNEP study, conducted in conjunction with Unesco and agencies

from Brazil and the United States, aims to establish the extent of the climate change that will come from this land clearance.

A crucial part of the study will therefore be wind velocity. To measure the wind strength and direction a 45-metre mast will be constructed in the forest and on cleared forest land in the same general region of Amazonia. The mast will house instruments to measure not only wind, but precipitation, temperature, humidity, rate of evaporation and the intensity of incoming and reflected radiation.

UNEP's officer responsible for the project, Joroslav Balck, says that they expect to find climatic influences extend 10 degree North and 10 degree South of the cleared land, which may in turn affect cloud cover and change weather patterns still further.

But only with such a study will it be possible to determine the nature of these changes and how significant they are when put together. Balck points out that much of the change in the distribution of radiation occurs because of the



Warm air over the Amazon basin rises, cools and falls to the north and south of the area, creating a perpetual circular flow of air from the Amazon basin and back again

different colours of the forest and the new land, with the cleared, drier land, often home to pastoral or arable farming reflecting more than the dark green forests. Mollon, in a paper for the Brazilian Space Institute, warns that much of the research into this phenomenon has been based on numerical models. Balck says that the UNEP research should go a long way to addressing that problem.

Eucalyptus Grows Amid 'Bad Press'

by Peyton Johnson

IN the forests of Asia, probably no tree has been so much maligned as the eucalyptus.

From China to India, and most of the lands between, the eucalyptus has been decried, at least at one time or another, as "detrimental to development."

The eucalyptus is detrimental to development when improperly used, but not when used right.

If planted for a purpose within its capacities, the eucalyptus tree is a major aid to development. If improperly used for ends beyond its means, the eucalyptus can be bad, even very bad, for rural development.

reach a height of 10 metres (about 34 feet) or better, in as little as five years. The tree's rotation cycle therefore is extremely short.

It can be planted, grown and harvested every six to eight years without replanting. The "coppice vigour", or re-sprouting from the original stump, of the tree lasts for at least three or four "cuts," or harvests. The eucalyptus is thus highly adaptable to the changing site and climatic conditions of many countries.

Eucalyptus also provides a vast number of often badly needed forest products. It can

planted in just such situations.

Eucalyptus is best grown in 'blocks', with the trees properly spaced, according to species in use, to assure maximum wood yields. The growing of eucalyptus does not acidify the soil, as is widely believed in Thailand, though its fallen leaves may do so where the tree does not receive enough water. This only happens when eucalyptus is planted where it should never have been introduced in the first place.

In Thailand such questions are too seldom asked, much less answered, before some enterprise or agency jumps with both feet into large-scale eucalyptus planting, as often as not with the wrong species in the wrong soil for the wrong reasons.

The results can be disastrous. No wonder eucalyptus has a "bad press" in Thailand. "But this is to blame a mute and innocent tree for entirely human folly," Dr. Rao points out.

Too often in Thailand, Dr. Rao says, eucalyptus, because they grow so fast, are planted in big commercial plantations with total disregard for their harmful effect on the agricultural and environmental needs of the locals.

Even commercial entrepreneurs, mesmerised by all the money they think they are going to make selling eucalyptus as fuelwood or charcoal or for pulp and paper stock, somehow manage to get it all wrong, in their anxiety to reap maximum wood yields per hectare they plant trees too close together and get not higher but lower average yields.

"We really can't do without (the eucalyptus)," says Dr. Rao. "In too many cases eucalyptus is the best possible, sometimes the only, choice for the forestry job to be done. Eucalyptus is the ideal tree, for example, for reclaiming wastelands."

— DEPTHNEWS

be used for pulp and paper, in meagre supply throughout most of the Third World. It can be a fuelwood, the shortage of which has already reached crisis proportions in most developing countries. It serves as poles and posts, or extracting oils and medicines, as well as the raw material for a host of reconstituted wood products. Few trees are as versatile as the hardy eucalyptus.

FAO foresters working in developing countries around the world report high success rates in projects based wholly or in part on eucalyptus. In Asia eucalyptus plays an important role in sustainable rural development projects in China, India, Bangladesh, Nepal, Indonesia, the Philippines and Vietnam, among other countries.

"In all these countries, though," Dr. Rao cautions, "the tree was not universally accepted at first due to misunderstandings about what it should and should not be expected to do. Unfortunately such misunderstandings about the eucalyptus is still rife in

If improperly used beyond its means, the eucalyptus can be bad, even very bad, for rural development

denuded and degraded sites with tree cover, using the species (usually eucalyptus) which has the best chance of survival and growth?

— Is eucalyptus to be planted in areas where agricultural crops are being grown and where it competes with them for water and nutrients?

— Is eucalyptus to be planted in areas where local people need lots of grazing land for their cattle?

In the first three cases eucalyptus holds a clear edge over most other trees as an efficient producer of wood and biomass. Because it grows so fast, however, its water and nutrient requirements are high and those planting the tree should always keep this in mind. At the same time, the eucalyptus uses less water per unit quantity of wood than other trees.

In the last two cases, the planting of eucalyptus is definitely not recommended as it deprives agricultural crops and grasses of water and its leaves are not palatable to cattle. Yet in Thailand it is too often

planted in just such situations.

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The eucalyptus controversy is particularly acrimonious in Thailand where some poorly informed journalists have launched a veritable war on the hapless eucalyptus. What seems to escape notice is that the brickbats aimed at the eucalyptus are never hurled by farmers who are actually growing the tree.

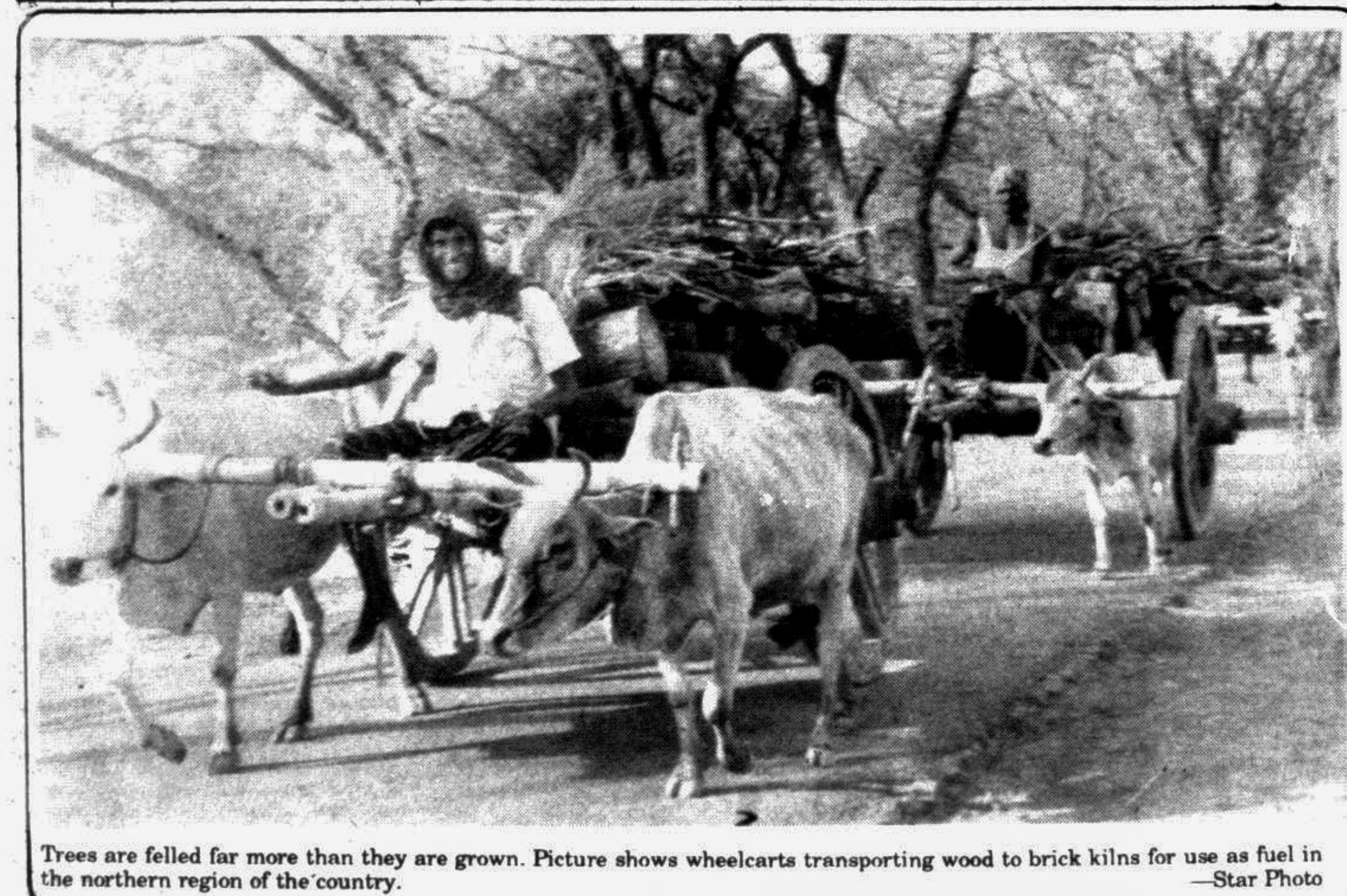
Now why is that? "Because farmers familiar with eucalyptus know better," says Dr. Y S Rao, Senior Forestry Officer for Asia and the Pacific of the UN Food and Agriculture Organisation (FAO). "The eucalyptus can be used well or badly like any other tree. Assaults on it don't stand up under impartial scrutiny."

"Hostility toward the eucalyptus is especially widespread and vociferous in Thailand because the tree is more often misused in this country than in most others," says Dr. Rao.

"If you plant the wrong species in the wrong place for the wrong reasons, you are going to be disappointed, possibly dismayed, with the tree's performance," he says.

The eucalyptus is originally an Australian tree but now grown in many varieties in more than 100 countries. It is a multi-purpose tree that performs more tasks than most trees found anywhere.

All eucalyptus species are fast-growing. Some mature and



Trees are felled far more than they are grown. Picture shows wheelcarts transporting wood to brick kilns for use as fuel in the northern region of the country. —Star Photo

Environmental Protection is a Vital Element in Britain's Growing Aid Programme for Developing Countries

This was emphasised by Britain's Minister for Overseas Development, Lynda Chalker, when she welcomed the Government's White Paper announcing its proposals for the environment.

She explained that it followed the policy document of the Overseas Development Administration (ODA), "Environment and the British Aid Programme", setting out an agenda for improving the world's environment.

Mrs Chalker said: "In particular the government will continue to support developing countries' own efforts to restrain population growth and will provide financial and technical help for them to join

Environmental Factors Vital to Aid Plan

by Alan Symes

international efforts on global warming."

She added: "We will contribute up to pound 9.4 million over the next three years towards the costs of developing countries of phasing out ozone-depleting chemicals."

"We are also providing generous aid for the conservation and management

of tropical forests and will continue strongly to support efforts to agree global conventions on climate change and on the world's biological diversity."

The ODA hopes to commit a further pound 100 million to tropical forestry conservation over the next three years. By the end of 1989 Britain was funding 115 forestry projects.

with 50 more in preparation.

In the case of India, the ODA has agreed to provide pound 40 million for mainly forestry projects and, under a 1989 environmental memorandum of understanding with Brazil, discussions were launched on eight new forestry schemes, the first of which has started.

Britain will be playing a leading role at the second World Climate Conference in Geneva in November and has undertaken to work towards the stabilisation of present levels of carbon dioxide emissions by the year 2005, as part of an international response to climate change.

Commenting on the White Paper, Mrs Chalker said it would prove a great step forward in clarifying people's thinking on the environment. (LPS)

Regional Environment Strategy Adopted

ENVIRONMENTAL protection must be viewed as an integral part of the development process," the report of the United Nations Meeting on Environment and Development says.

The Meeting formally adopted a regional strategy for environmentally sound and sustainable development (ESSD) which had been endorsed in principle at the Ministerial-level Conference on Environment and Development in October 1990.

The five-day Meeting was held in Bangkok in February 1991 and attended by Member Governments of the Economic and Social Commission for Asia and the Pacific (ESCAP).

The regional strategy provides a common framework for action by national governments, international organizations and citizens to devise local, national, sub-regional, regional and global measures to achieve economic development without harming the environment.

It responds to the main Environment Report published in 1990.

Financial resources in the

amount of more than US \$ 5 million per annum were needed, the Meeting said, to translate the regional strategy into action.

The Meeting elaborated an "inventory of actions" for implementing the regional strategy. It recommended, for instance, to integrate population issues with national development concerns, to establish development policies which create employment opportunities, to augment the administrative authority of

local governments, to review environmental legislation and to introduce environmental education in school curricula at all levels.

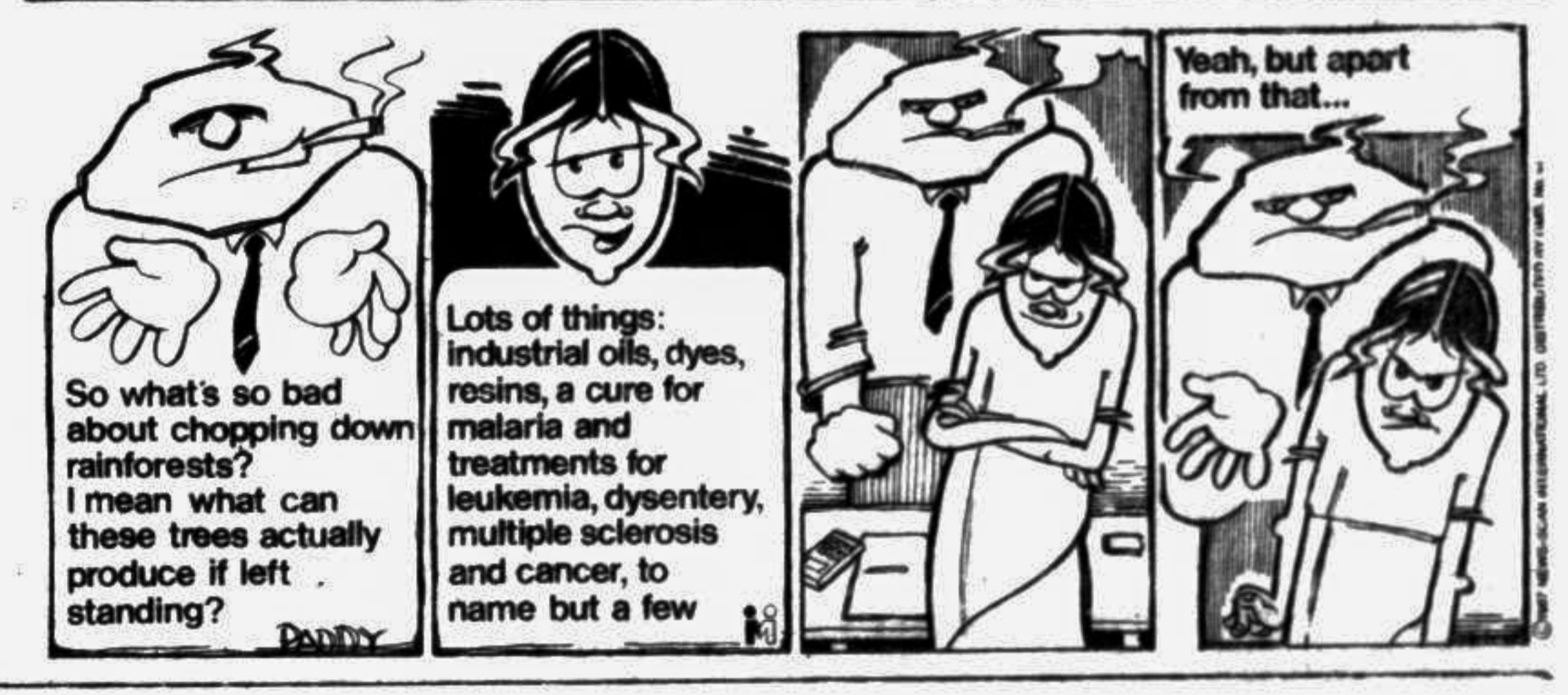
The Meeting further suggested to transfer environmentally benign technology from developed to developing countries and between the developing countries.

The regional strategy is an "important building bloc", as the Meeting called it, for formulating the Asia-Pacific

1992. UNCED is expected to serve as a forum for environmental co-ordination at the global level.

The Meeting called to attention the interaction between poverty and environmental destruction.

Poverty alleviation was therefore vital for the Asia-Pacific region where more than 800 million people were surviving on less than US \$ 1.00 per day.



Environment Initiative Sparks Debate on GATT Role

AUSTRIA, on behalf of the European Free Trade Association (EFTA) members, proposed that the Council convene as soon as possible the 1971 Working Party on Environmental Measures and International Trade (see below). It noted that environmental policies varied considerably from country to country and the resulting differences "could set the stage for trade disputes". Austria called for clear rules to ensure that the GATT dispute settlement system was properly equipped to deal with these disputes.

The discussion of rules should be based on a solid understanding of the impact of environmental policies on trade and vice-versa, Austria said. Noting a "rising tide of environmental measures and international environmental agreements," it suggested that GATT should consider making a contribution to the 1992 UN Conference on Environment and Development, also known as the "Earth Summit". It added:

"To day, no one can say with any certainty exactly what the interlinks between environ-

mental policies and trade are. A great deal of technical work needs to be done before we can say with certainty that we have a reasonable appreciation of the problems that may arise from a trade policy point of view.

Only then can we start discussing what conclusions to draw, to strike a balance between different interests in this area. Understandably, therefore, we feel that it is important to start studying the complex issues in the field of trade and environment as soon as possible."

Brazil, host of the 1992 UN Conference, agreed that members should start thinking about GATT possibly undertaking research and studies to gain a better understanding of the interlinks between environmental policies and trade but full consultations must precede any actual work. It said GATT should take a positive approach based on "the identity now being solidified between the dimensions of development and the environment."

The proposal by the EFTA countries was supported by

several delegations, including Canada, New Zealand, the European Community and Australia, Poland, Hungary and Yugoslavia. The United States believed more time was needed to study the proposal; it doubted that the mandate of the 1971 Group was sufficiently broad to address the full range of environment-trade issues.

A number of delegations stressed their commitment to environmental protection but questioned whether GATT was the right forum considering that several international organizations were already dealing with this issue. They also emphasized that environmental measures should not be used as disguised forms of trade protectionism.

Thailand, speaking on behalf of the ASEAN contracting parties, agreed that environment policies could impinge on trade practices and lead to trade disputes. GATT could use rules and disciplines as preventive measures if there was clear evidence of trade practices that could endanger

health, safety or the environment.

However, it was inappropriate for GATT to address environmental problems as a general policy issue. It pointed to the current work on domestically-prohibited goods as a clear example of the appropriate role of the GATT with respect to environment policies.

India drew attention to the danger that GATT might become over-extended if it tried to deal with non-trade issues like the environment, health, education and others. Chile stressed that Article XX of the General Agreement, which provided a cover to certain environmental measures, should not become a general rule because it was itself an exception to GATT rules.

The Council agreed to request the Chairman of the Contracting Parties, Ambassador Rubens Rieuperio (Brazil), to conduct informal consultations on the proposal by the EFTA members.