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About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

Sr. Cortés Luis - 2211

Auclair Sugar Dist.

Talk: T. 12 - III. - 7 PM

Ecological impact of Land Reform Progr. in Brasil.

(Desertification) "Green Hell" → Red Desert

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With
Deepest
Sympathy



Com
Votos de
Simpatia

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MURDER IN THE RAINFOREST

Chico Mendes was murdered for his efforts to save the Amazon rainforest and its native peoples' way of life.

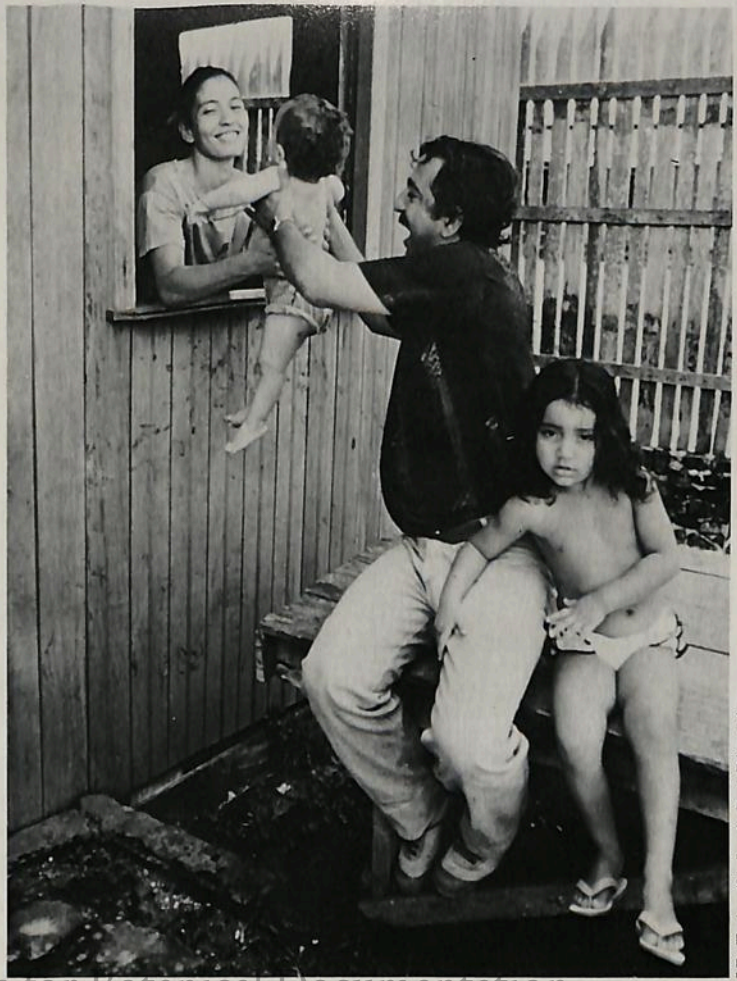
Chico is seen here at home with his wife and two young children only a few feet from the spot where he was gunned down by killers, men believed to have been hired by land speculators whose own selfish interests were threatened by his efforts.

Brazil, with the help of major international lenders, has for years encouraged destructive development, land speculation and marginal farming and cattle grazing in the Amazon.

But Mendes and the movement he led proved that perpetual harvesting of natural rubber, Brazil nuts, and other rainforest resources would preserve the Amazon and its peoples' traditions. He was able to create a dozen "extractive reserves" -- areas to be harvested perennially, safe from destructive development.

In his memory, EDF has established the Chico Mendes Fund to carry on his vital work for the Amazon and its peoples, and to aid his grieving family.

Please join us in extending our deepest condolences to Chico's family by signing the enclosed sympathy card and returning it in care of EDF.



J.B. Forbes/St. Louis Post-Dispatch

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19-V-1989

Brazilian Leader Gets Latin Plea on Amazon

By LARRY ROHTER
Special to The New York Times

MEXICO CITY, April 4 — A group of Latin American intellectuals has called on President José Sarney of Brazil to put an immediate halt to "massive deforestation" and other "acts of barbarism" in the Amazon rain forest.

In a statement issued here on Monday, the intellectuals accused Brazil of carrying out "a policy of ecocide and ethnocide" in the Amazon.

"Mr. President, we Latin American writers and artists believe that the historical responsibility for the destruction of the Amazon jungle is enormous and that future generations of Latin Americans will not pardon your not having done everything within your reach to avoid it," the statement said.

The document was signed by 28 of the region's leading novelists, painters, poets and actors, who come from nine countries. The Nobel laureate Gabriel García Márquez and the painter Fernando Botero, both of Colombia, and the novelist Carlos Fuentes and the painter Rufino Tamayo, both of Mexico, were among the signers. No Brazilians appeared on the list.

The Peruvian novelist Mario Vargas Llosa also signed the document, which specifically rejects Brazilian plans to build a highway from the western Amazon through Peru to the Pacific coast. Mr. Vargas Llosa is one of the leading candidates in next year's presidential election in Peru and, if elected, would have the authority to block construction of the road.

In recent months, as international criticism of Brazil's management of the Amazon has grown, Mr. Sarney has sought to cast the issue in nationalist terms. He and other Government officials have accused the United States and other industrialized nations of coveting the Amazon and of "intervention" in Brazil's internal affairs.

The intellectuals rejected that argument in unusually strong terms. "To invoke national security to justify crimes against nature seems to us to be puerile and dishonest," their statement said.

"Ecocide and ethnocide cannot be excused with chauvinist, jingoist words and sentiments," the statement continued. "We, as Latin Americans, would like to see you, with your love for national sovereignty, defend the Amazon from local and foreign predators."

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Letters

National Parks Are Not Just for Backpackers

To the Editor:

You report that the Wilderness Society has urged the Government to "move all hotels and other concessions out of the national parks" (news story, May 26) — the society's latest attempt to make our national parks the private preserves of its members.

George Frampton, the society's president, is quoted as saying, "Motels and hotels and that kind of thing should go outside the national parks." Apparently, the Wilderness Society believes that more than 100 years of national park tradition to provide for the needs of visitors should be overturned; that every director of the National Park Service, from Steve Mather in 1916 to Bill Mott in 1988, who has striven to insure that the public could obtain a clean bed and hot meal has been wrong, and that hundreds of millions of United States citizens who have sought a place to sleep and something to eat in our parks have been guilty of desecrating national treasures.

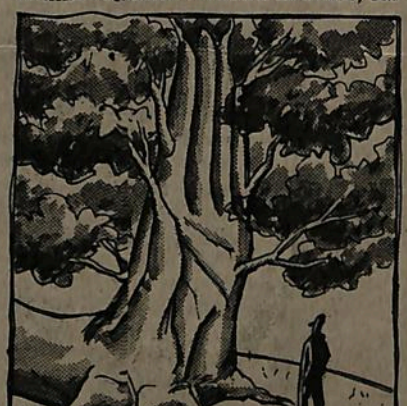
The Wilderness Society forgets that parks are for people — all the people — not just those who backpack.

Mr. Frampton also lists his 10 most threatened national parks and further engages in the Wilderness Society's now ritual criticism of this Administration's record in protecting our national parks. Judging from the parks he picked as most threatened, he has not been watching very carefully what this Administration has done. For example, he lists the Everglades — where the Administration has pushed for 120,000 acres to be added to the Federal conservation estate in south Florida and is part of a task force established by Gov. Bob Martinez of Florida to improve conditions even more.

He lists Manassas National Battlefield Park in Virginia, where, according to the National Park Service, the real threat is traffic on two roads through the park and not adjacent development. The Administration is negotiating with Virginia and county officials to have the road rights-of-way ceded to the National Park Service for eventual restoration to their Civil War condition, while requiring the developer to relocate the potential mall where it will be invisible to the park visitor.

Finally let's look at Yellowstone National Park. Largely because of this Administration's emphasis on cooperation among land managers, an interagency grizzly bear team was formed to coordinate efforts to protect the grizzly. Thanks to its work, the outlook for grizzlies at Yellowstone is the best it has been in decades.

The Wilderness Society's approach to solving national park problems is to keep the public out. As long as this Administration remains in office, our national park system will continue to be administered for everyone who wishes to visit and not just for an elite few.



Tim Bower

WILLIAM P. HORN
Asst. Sec., Fish, Wildlife and Parks
Department of the Interior
Washington, June 1, 1988

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Federal Tree Assault

To the Editor:

The United States Forest Service is running roughshod over the wishes of citizens, and it needs to be brought under control. I live in an area of southwestern Colorado where the Forest Service is trying to force two expensive road-building projects down the throats of people who don't want them. One project involves the paving of a road in a sparsely populated, pristine mountain valley, and the other is the proposed logging of fragile alpine forests at Sheep Mountain, south of Telluride.

In both cases, citizens living in the vicinity are virtually unanimous in opposition to these projects. Since both projects are within just 15 miles of my home, it makes me wonder how many other unwanted projects the Forest Service is undertaking across the United States.

Take Sheep Mountain, for example — one of the more scenic spots in the Rocky Mountains. The Forest Service acknowledges that its original justification for logging Sheep Mountain was not appropriate; that the Government will lose many thousands of dollars on the project because of the high costs of building roads through marshlands, and that the trees will take hundreds of years to regenerate. Furthermore, the lumber will be low grade, unsuitable for uses such as home construction.

Still, the Forest Service is determined to cut trees because it feels it has a mandate (from whom I don't know) to cut trees. If the Forest Service has enough money to finance unproductive and unpopular projects such as this, it has too much money.

The Forest Service already maintains a national system of logging roads eight times larger than the interstate highway system, and the Forest Service has lost $2 billion on timber sales since 1982. Let's demand a little common sense. The Forest Service budget goes before the House Appropriations Subcommittee on the Interior this month. I urge interested citizens to join the Wilderness Society and myself in asking their Federal representatives sharply to curtail funds for Forest Service road building projects.

MIKE MAXWELL
Rico, Colo., June 5, 1988

Property of the Ronald Reagan Presidential Library for Political Documentation

Our National Forests Are On The Chopping Block

Working Together, We Can Save Them ...

Join the Campaign to Save Our National Forests

November 1986

Dear Friend,

Do the National Forests exist to serve the needs of the timber industry? Does the Forest Service?

Outrageous questions, but to see and hear the industry in action you'd think the answer to both is yes.

To ensure that the public's forests are preserved for the public's benefit, I am writing to ask that you join in the work of the Sierra Club Legal Defense Fund.

As a matter of fact, based on recent experience, the questions aren't quite so outrageous as they sound. The timber industry has enjoyed a very cozy relationship with the Forest Service for many years, being allowed to operate pretty much as it wanted to, reaping large profits from public resources.

But as forest lands began to dwindle, as bad forest practices became more and more apparent, as trout and salmon streams became ever more choked with silt from road-building and clearcutting, and as wildlife retreated further and further back into the wilderness to avoid bulldozers and chain saws, the public began to demand that its government do something to slow the destruction of their forests.

This increased public awareness resulted in the National Forest Management Act of 1976. It ordered the Forest Service to write long-range plans for all its forests ... and to let the public help decide what would happen to the forests over the coming decades.

So the Forest Service has had to draw up plans for America's 125 national forests, plans that will determine how

(over, please)

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PARTIAL SUMMARY OF
SIERRA CLUB LEGAL DEFENSE FUND VICTORIES
1985-1986

Sierra Club Legal Defense Fund attorneys have scored major victories on a variety of critically important issues after months -- and sometimes years -- of hard work against larger, wealthier opponents. Here is a list of just some of our recent achievements:

Mining in Alaska's National Parks: Stopped all further mining in Alaska's national parks until the Park Service enforces its entire regulatory program.

Alton-Warner Valley Energy System: Prevented stripmining adjacent to Bryce Canyon National Park.

BLM Wilderness Preservation: Overturned the single most destructive public land policy of James Watt, who had ordered that 1.5 million acres of wilderness study areas in 11 western states be deleted from a Bureau of Land Management wilderness inventory. The lands would have been turned over to private interests for mineral leasing.

Channel Islands Marine Sanctuary: Defended the island's designation as a sanctuary when the Western Oil and Gas Association filed suit in order to open the islands to oil and gas exploitation.

Berners Bay Roadless Area: Prevented the Forest Service from awarding a road-building contract and beginning logging operations in the Berners Bay roadless area near Juneau, which is a prime wildlife and recreational area.

Protection of Southern Wilderness Areas: Stopped the Forest Service from clearcutting trees in wilderness areas in Arkansas, Louisiana and Mississippi.

International Acid Rain Control: Imposed a deadline upon the Environmental Protection Agency to require states in the Midwest to cut emissions of sulfur and nitrous oxides that are producing acid rain in the northeastern United States and eastern Canada.

Little Granite Creek: Prevented Getty Oil Company from building a road and drilling for oil and gas in the Little Granite Creek drainage of what is now the Gros Ventre Wilderness.

Orcas: Stopped Sea World from capturing 100 of these whales in Southeast Alaska until the impact of such harrassment is studied.

Forest Service Land Sales, Michigan: Stopped the General Services Administration from auctioning off parcels of National Forest System land to private developers in Michigan. By law, such lands can only be exchanged for other conservation lands or sold to public entities.

Given the tireless effort of the Reagan Administration and giant corporations to undo the environmental gains of the last 20 years, there simply is no substitute for vigilant and persistent litigation. The Sierra Club Legal Defense Fund has earned -- and deserves -- your support. Please lend our new Campaign to Save Our National Forests all the financial support you possibly can today.

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8:00 **GOLD LUST** This special chronicles the true story of a modern-day gold rush drawing thousands of men and women prospectors to a small mountain in the rain forest of Brazil.

← 6-II-'85 Pres. Tancredo takes office 15-III IDES OF MARCH! News. 1985.

Amazonia = Basic considerations — Misunderstandings vs Facts

most complex ecosystem

The largest biomass of natural forest left on earth.

± 1.5 x 10⁶ sq. mi ± 6 x 10⁶ sq. km., ± ½ in Brasil; rest in Colombia, Venezuela, Guyana, Suriname, Fr. Guiana, Argentina, Paraguay, [Uruguay] Bolivia, Peru. [only Ecuador + Chile not contiguous w. Br.]

China: ± 3.7 x 10⁶ sq. mi. pop. ± 980 x 10⁶

Canada: ± 3.8 x 10⁶ sq. mi.

USSR ± 8.6 x 10⁶ sq. mi pop. ± 266 x 10⁶

US ± 3.6 x 10⁶ sq. mi. pop. ± 230 x 10⁶

*Brasil: ± 8.5 x 10⁶ sq. km. (± 3.2 x 10⁶ sq. mi)

T. Population: ± 120 x 10⁶ [São Paulo ± 12 x 10⁶; Rio ± 9 x 10⁶]

Terras: ± 260,000 sq. mi.
Lit. ± 45,000 " "

~~Problems~~

± 40,000 sq. mi of forest lost annually; ± ⅓ lost since ± 1945, end of WW II.

Brazilian govt. sells land at "valor da terra nua" — value of naked earth; it does not + other vegetation not considered.

Generally ± ½ nutrients, minerals are in soil. in tropical rain forest ± 90% nutrients in living plants. Soil extremely + fragile, in a closed ecosystem with recycling constantly.

Amazonia not mostly inundated; ± 90% is terra firme, well drained above flood level; is most prominent forest type. 2nd type: Várzea: flood plains, periodically flooded in immediate vicinity of main course of river. 3rd igapó: swamp forest (heavily flooded). 4th liana forest, predominantly woody vines; 5th caatinga, shrubby savannahs. Or Acre: ± 85,000 sq. km bamboo forest.

200 m or less alt.

Forests of Amazonia heterogeneous: large number of tree species/unit area, eg Manaus: 1 hectare (± 2.5 acres) forest 235 tree spp. By contrast: 1 hectare forest in Appalachia has 20 species. Less than ½ Amazon flora described; rest unknown!

→ Effects of burning forests.

① Nutrients lost forever to soil: washed away by rain; in smoke.

land converted to cattle ranching, but soil can not sustain

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plant growth for long (± 3 yrs.) unless costly fertilizers added. Barren ground then abandoned and new deforestation cycle begun.

(2) > CO_2 into atmosphere → greenhouse effect: CO_2 trapped in upper atmosphere acts as shield to prevent heat loss & reflected from earth. Consequence is elevated temperature. CO_2 ↑ → Bet. 1958 - 1982 CO_2 increased from ± 315 ppm Million of air to ± 345 ppm. Natnl Acad. Scis estimate: by 2065 CO_2 may double resulting in 2-3°C temp. increase at earth surface. Over centuries temp. increase of 3°-4°C → melting polar ice → rise of sea level by ± 20 ft. ∴ burning coal, gas, oil, wood → > CO_2 which cannot be removed from atmosphere: Bio T. Long range effects in doubt.

(3) Effect on indigenous populations

Forced resettlement to genocide now practised throughout Amazonia. Tribal peoples disappearing through contact with diseases unknown to them: measles, colds, pneumonia. Road builders, prospectors seeking mineral wealth, short-term gains → permanent loss of old cultures. A high price to pay for questionable "progress"!

(4) Genetic Potential of Amazonas.

Plant & Animal populations living in equilibrium have produced multitude of products useful to man (rubber, cacao, coffee, timber, cassava, etc. Destruction of habitats ends possibility of genetic change.

(5) Positive Aspects:

a) National Parks established in Brazil for relocating Indian populations - 2b denigré. (Mixed blessing)

b) Research - botanical/zoological speeded up. 2b Projeto Flora Amazonia for inventory of Amazonian life.

(6) Jari Project failure. Ludwig etc

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(1)

#66-4182

Review for Talk on Brazil. Amazon

Discussion points:

① Reasons for "fragility" of forest soils vs richness of soils in temperate forests: in Amazon, nutrients largely in vegetation; in temperate areas, nutrients > in soil; ∴ when Amazon trees & other vegetation destroyed by burning, most of nutrients are lost ("go up in smoke"), small amount in ash but this too washed away by tropical rains. Amazonian nutrients quickly absorbed by vegetation to sustain growth.

② Greenhouse Effect and its long-range consequences for world environment: Infrared radiation reflected to CO_2 layer above stratosphere, then returned to earth as heat (as in greenhouse). Result is increase in surface temp. which becomes significant when ± 4°C elevation of temp. reached. Ice caps begin to melt → rise of ocean level sufficient to endanger low-lying regions by inundation. Dispute is over amount of rise: Wigner estimates ± 2ft., others (Sagan) ± 20 ft. or more! Time interval critical: it ± a century for significant, irreversible (!) change.

③ Burning of Forests: release of CO_2 exacerbates greenhouse effect; also fossil fuels. Chief reason for burning Amazonian forests: conversion of land for cattle grazing (estimated 6×10^6 head in Amazonia do Brasil); land becomes unproductive in a few years (3-5?), then abandoned; restoration not possible.

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(4) Demise of indigenous population: Although govt. (Brasil) has set aside some land as Indian Reservations (Xingú +), tribal people rapidly diminishing, facing extinction (like plant/fungus life); FUNAI (Fundação Nacional do Índio) often responsible for exacerbating tribal disasters by "relocation" or overt action against people occupying land rich in mineral deposits etc. Estimated 100,000 population (tribal) in Brazilian Amazon.

(5) "Hamburgerization" of Amazon: cattle for export to U.S. (via McDonald, Ruy Rauch etc); short-term financial gain by great corporations (profit from cattle breeding) motive for continued destruction of forest; also in Central America.

(6) Road building extensive Throughout Amazonas (esp. Brazil) ie Transamazonica etc → Thousands miles of roads to allow access to forest; also connecting large population centers: Manaus → Porto Velho → Rio Branco → Cuiabá → Brasília. Project: Cruzeiro do Sul → Pucallpa, Peru. etc.

(7) Basic statistics Amazonas: River 2nd to Nile in length (±4000 mi.), but > output H2O; compare Mississippi (Amazon ± 11× greater output!).

(8) Conservation Program needed to halt forest destruction; utilization of wood products; stop waste! "False Paradise".

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(1) 12-III-1985. Coates Hall. 209. ± 35.

[talk outline]

[Rain forest inspires rhetorica exuberance.]

AMAZONAS * BASIC DATA

{ Rainfall ± 100"/yr. temps humidity

*chlorophyllous walls.

LARGEST NATURAL FOREST LEFT ON EARTH: 1.5 X 10^6 sq. mi. area of forest

but: 2.7 X 10^6 sq. mi. drainage area (Amazonia).

Amazon 1100 tributaries (major): ± 20% total volume fresh water reaching oceans

contributed by Amazon R. ± 5°N lat. - 18°S × 40°W - 70°W long.

ource: Mt. Huagra, Perú. 2nd in length to Nile (4,145 mi.) vs 4,007 mi. Amazon (some doubt still!)

FORMATION OF AMAZON BASIN : TERTIARY PERIOD; MIOCENE ERA

ggest:
ttle (Titanus giganteus) 6" QUARTERNARY ...Recent.....
t: (Dinoponera 1.5") "Tucandera" Pleistocene
Pliocene
TERTIARY: MIOCENE..... ± 20 X 10^6 yrs. ago: ANDES MTS. / AMAZON R. BASIN
Oligocene
Eocene
Paleocene

econds: ± 30'

ut: Capybara ± 4' l. Agouti & Brasil Nut

Fish: Arapaima gigas ± 6' l. Plantations → no fruit: Pollinating bees absent

Victoria regia

EARLY EXPLORATION Amazon R.

o Cabral — 1500. Vicente Yañez Pinzón. Entered mouth; ascended ± 50 mi. "MAR DULCE"

1541. Francisco de Orellana. 1st Descent from Ecuador (Rio Napo). "RIO MAR"

1638. Pedro Teixeira. (Portuguese). 1st Ascent: Belem-Quito via R. Napo.

odown Explorers

Bates. 1848-1859.
Spruce. 1849-1864.
Wallace. 1848-1852.
e of ...."

1863. "The Naturalist..." AMAZONAS IS BURNING

"Notes of a Botanist...." 1908 [Wallace]

Nature of Problem(s)

The Forest v "Contents"

MAPS. GEOGRAPHICAL ORIENTATION

SLIDES. BURNING FORESTS: MANAUS - RIO BRANCO (1980) → Manaus → Belem.

end

MAJOR FOREST TYPES BRAZILIAN AMAZON: (short classification)

Alex. Humboldt (COMMON PARLANCE: "JUNGLE") ie Forest heterogeneous

Casiquiare

mazon-Orinoco

vs

TERRA FIRME (± 90 %) = Hylaea (Gr. wood)

VÁRZEA. FLOOD PLANE (Periodically flooded)

IGAPÓ. SWAMP FOREST (Heavily flooded)

CAATINGA. SHRUBBY SAVANNAHS

LIANA. WOODY VINES

cerrado

caa = mato
tinga = branco
tuna = negro

[Tupi] [Tupi]

Manaus - Porto Velho ± 485 mi

Completed: 1974

ADA - 3.8 X 10^6 sq. mi. ± 25 million
A - 3.7 X 10^6 " 980 "
A. - 3.6 X 10^6 " 230 "
IL - 3.2 X 10^6 " 125 "
ão Paulo: ± 12 million
io: ± 9 "

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High Rainfall >100"/yr. vs ± 30-40"/yr.

CONTRAST TROPICAL LOWLAND FOREST vs TEMPERATE FOREST

1)	ABUNDANCE OF SP./ UNIT AREA NO CONIFERS * HARDWOODS	..... SMALL # SP. / UNIT AREA CONIFERS + Hardwoods
	ie ± 235 spp/hectare (± 2.5 acres) (Manaus)	± 20 spp/hectare (Appalachian Mts)
1a	Temp. & humidity high	vs Low
2)	± 90% NUTRIENTS BOUND UP IN TREES NOT IN SOIL	MOST NUTRIENTS IN SOIL
3)	± 50% spp IDENTIFIED	FEW UNIDENTIFIED
4)	SOIL EXTR. FRAGILE	SOIL MORE RESILIENT
	∴ Nutrients easily washed away	Nutrients more tenacious

ABUSE

CONSEQUENCES OF EXTENSIVE BURNING TROPICAL FOREST

Fungi, bacteria on leaf litter → reduced

1) Nitrogen & Sulphur up in smoke with trees;
soil nutrients washed away; lost forever.

After burning, plant growth sustaind for few years, then barren unless fertilizers added.

Barren ground then abandoned to begin new cycle of destruction.

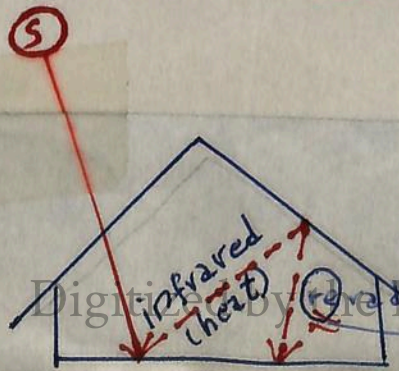
2) GREENHOUSE EFFECT

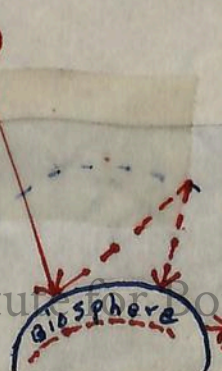
Burning forests contribute to CO_2 accumulation in atmosphere.

NORMALLY .03% (N_2=79%; O_2=20%); Natnl Acad Sci. estimates: by 2065 CO_2 may double ? resulting in + 3°C temp. rise at earth surface. ie CO_2 trapped in upper atmosphere acts as shield preventing heat loss reflected from earth. Cumulative effect over a century or more if unchecked ....> 4°C increase ...>melting ice caps...> rise sea level 20 ft or more; ie devastating floods. But long range effects extrapolated and not certain.

OZONE O_3
CFC (Chloro-Fluorocarbons)
Propellents
aerosols

C. SAGAN's estimate et al





CO_2 in atmosphere
infrared absorbed
reflected to earth
∴ > temp.

CO_2 ↑ burning fossil fuels; wood; coal

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3

3 EFFECT ON INDIGENOUS POPULATION

"Acculturation" destroying tribal ways; population decreasing yearly. AMNESTY INTERNATIONAL has documented decimation of tribes in Amazonas & elsewhere, often aided & abetted by government decree. Estimated population Amazonas ± 1900: 10^6 or more; NOW: ± 100,000. EXAMPLE: FUNAI (Nat. Found. Indian Affairs) instrumental in eliminating some tribes. ALSO: No resistance to common diseases (colds, measles, pneumonia).

With loss of tribes, FOLKWAYS vanish & vast fund of knowledge about forests lost.

* INDIGENOUS TRIBES ARE THE TEACHERS OF: BOTANISTS, ZOOLOGISTS, ANTHROPOLOGISTS etc

KNOWLEDGE OF:

EDIBLE & POISONOUS PLANTS & ANIMALS:
- Brasil Nut
- Chocolate
- Cashew
- Papaya
- Manioc

MEDICINAL PLANTS: Diosgenin (Mex. Yam; for Cortisone) ..... Anti-carcinogens
- Pesticides
- Contraceptives
- HALLUCINOGENS

PLANTS OF INDUSTRIAL USE
- Guarana
- palm oil
- Rubber } Dothidiella ulei

zb: Dyes, oils, gums, waxes, resins. Wood.

Discovery of : QUININE (Cinchona sp. of Perú)

RUBBER (Hevea sp. of Brasil)

* IF PRESENT TRENDS CONTINUE: BY 2000 WORLD's TROPICAL FORESTS LARGELY DESTROYED.

SINCE 1950: FAO ESTIMATE. (Food & Agriculture Organiz.)

LATIN AMERICA LOST 37% TROPICAL FORESTS → * ± 40,000 sq. mi forest lost/yr. [world-wide]

SOUTHEAST ASIA: 38%; CENTRAL AFRICA: 52%

Satellite Survey →

.....

another consequence:

4 GENETIC POTENTIAL OF AMAZONAS DESTROYED

Forest is a dynamic source of genetic change & evolution. ELIMINATION OF SPECIES DEPENDENT UPON EACH OTHER FOR SURVIVAL (zb insects & other animals as pollinators of flowering plants) LEADS TO EXTINCTION OF SPP. MANY ALREADY ELIMINATED EVEN BEFORE TAXONOMISTS CAN IDENTIFY THEM. EXTINCTION IS FOREVER.

* SUMMARY OF CAUSES OF DEFORESTATION & Remedies (if any!)

1 INDUSTRIAL CLEARCUTTING / LOGGING

THOUSANDS OF SP. IN AMAZON BASIN; ± 50 spp. HARVESTED, BUT commercial LOGGING PRACTISES EXTREMELY DESTRUCTIVE. 30-65% of RESIDUAL TREES RUINED.

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FIRST ROAD COMPLETED 1964 BE[illegible]EM-BRASILIA.
1973 Paved.
• (BRASILIA EST. 1960)
1970 - CUIABA - SANTAREM
1972 - TRANAMAZONICA: TOCANTINS - TAPAJOS
• 1974 - MANAUS - PORTO VELHO

PERMANENT LOSS OF ANCIENT CULTURES in name of Progress.
zb YANOMAMI, WITOTO (BRASIL)
SHIPIBO, CONIBO (PERU)

(2) WORLD PAPER CONSUMPTION (WASTE) → Jari Project

DEVELOPED COUNTRIES USE 160 MILLION TONS PULP/YR. PER CAPITA: 155 kg/YR
DEVELOPING " " 20 " " " " : 5 kg/yr
USA: 325 kg/yr

ESTIMATED THAT IF USA RECYCLED ONLY 20% OF 46 MILLION TONS WASTEPAPER LOST YEARLY, NO TROPICAL RAIN FOREST WOULD NEED TO BE CONVERTED TO PULP.

3rd cause

(**) (3) OWNERSHIP OF LAND (GREED) INEQUITIES BASIS FOR LAND REFORM PROGRAMS (FAILURES)

Brasil: ± 4% own ± 80%!

LATIN AMERICA: 7% LANDHOLDERS OWN 93% ARABLE LAND (zb SOMOZA FAM. owned 25%) !
USA: -.....7% " " 20% " "

(4) COLONIZATION

Pop. ± 18 x 10⁶

Population Pressure

RURAL POOR (zb NORDESTINOS DO BRASIL) DESTROY MCH TROPICAL FOREST AIDED & ABETTED BY GOVERNMENT SUBSIDIES." BUILDING OF ACCESS ROADS INTO FOREST ALSO FAVORS DESTRUCTION OF LAND.

over population of forest → (world-wide & Zaire)

— Aided & Abetted by rancher.

(5) CONVERSION of forests TO PASTURE LAND

large (± 20,000 small ranches).

Timber wasted (burned) ± 20 tons/acre, estimated loss ± 10 x 10⁹!

CATTLE RANCHING RESULTS IN + 40% LATIN AMERICAN FOREST LOSS. LARGEST SINGLE CAUSE OF FOREST DEMISE. ± 330 cattle ranches in Brazilian Amazon; SUDAM (Superintendancy for Amazonian Development); 6 x 10⁶ cattle encouraged of forest!; used 32,000 sq. mi.

90% LATIN AMERICAN BEEF EXPORT GOES TO USA: FOR EACH 1.5 MILLION POUNDS OF BEEF EXPORTED, 75,000 ACRES RAIN FOREST CLEARED.

Mc Donald's (largest): ± 3 x 10⁹ hamburgers/yr equivalent of 300,000 head cattle.

1978: AVERAGE AMERICAN CONSUMED 123 POUNDS BEEF.

in U.S. TODAY: OVER 80 MILLION POUNDS BRAZILIAN COOKED, FROZEN, CANNED BEEF IMPORTED YEARLY.
FRESH BEEF FROM BRASIL NOT ALLOWED BECAUSE OF HOOF & MOUTH DISEASE PREVALENT.
MUCH OF THIS TO FAST FOOD RESTAURANTS: HAMBURGERS.

(**) BRAZIL GOVT SELLS LAND: VALOR DA TERRA NUA. ie naked earth; trees, other veg. not considered.

Acre 1980: 50 cruzeiros/hectare. (60 Cr. = $1.-)
1980. → 1986: 1000 Cruzeiros = 1 Cruzado
13.77 : $1.-

Finally: CAN DESTRUCTION & WASTE BE STOPPED ?
THEORETICALLY, YES. BY

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The New York Times

Founded in 1851

ADOLPH S. OCHS, *Publisher 1896-1935*
ARTHUR HAYS SULZBERGER, *Publisher 1935-1961*
ORVIL E. DRYFOOS, *Publisher 1961-1963*

17-V-1986

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The Last Great Rain Forest

The Tongass National Forest, the last great rain forest in the United States, is being destroyed, pointlessly, by the Government that professes to care about preserving the nation's environment. Why?

The forest, which covers most of the southern panhandle of Alaska, is bigger than the state of West Virginia. The value of this land of centuries-old spruce is aesthetic and ecological rather than economic. Access is hampered by harsh weather, difficult terrain and distance to market.

During the development mania of the 1950's, however, two timber companies were induced to build pulp mills in the area by guaranteeing them the right to log the forest at a profit for 50 years. Then, in 1980, when Congress was debating the status of Alaska's public lands, Senator Ted Stevens fought successfully to lock in their deal.

A provision of the new land law set a goal of harvesting 4.5 billion board feet of timber each decade, roughly 1 percent of all U.S. production. The Forest Service was authorized to spend whatever was necessary to meet the goal. Since then, world prices for timber have fallen sharply and are likely to remain low for decades. That has made Tongass lumber almost worthless, even with the heavy subsidies.

Yet the pulp companies, which have made substantial investments in the region, see no reason to let Uncle Sam off the hook. And in spite of the inevitable environmental damage, the Forest Service seems happy to oblige.

Between 1982 and 1985 Washington spent $253 million to build roads through ancient forests populated by the continent's heaviest concentration of bald eagles and grizzly bears. One-third of the timber land opened drew no bids at all. The rest sold for peanuts — less than $10 million in total.

The pulp companies and Alaska's Congressional delegation justify continuing Federal outlays as a means of saving some 1,500 logging jobs in the region. It would be cheaper just to pay each logger $36,000 a year — and it would protect the environment besides. In the end, moreover, the subsidy may cost more jobs than it saves. Soil runoff caused by lumbering threatens the river breeding grounds of salmon, the largest source of income in the panhandle.

•

The House Interior Committee is working to scrap the permanent subsidy for Tongass, and halve the current $50 million annual expenditure. That would be far preferable to logging as usual. A better — and ultimately cheaper — reform would be to suspend logging indefinitely and offer compensation to the workers and businesses affected.

There might come a day when the forest's value for wood, minerals or recreation exceeds the intangible benefits from preserving the wilderness. But that day is a long time off. To cut Tongass now, and at a loss underwritten by the taxpayer, amounts to theft of the national heritage.

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Cultural Survival Quarterly. Spring 1982. Vol. 6(2). [Harvard]

Deforestation: The Human Costs

INTRODUCTION

"Of all the environmental impacts of the study projections, deforestation probably poses the most serious problems for the world, particularly for the developing world."

Global 2000

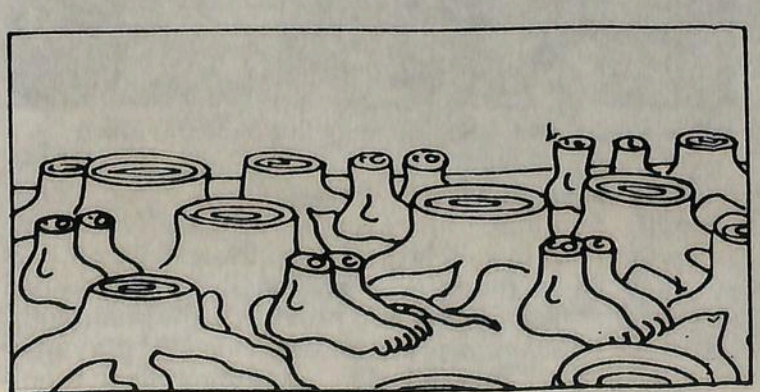
"It has been predicted that within the next 25-30 years, most of the humid tropical forest as we know it, will be transformed into unproductive land, and the deterioration of the savannah into desert will continue at ever-increasing speed."

As you read this sentence, 50 to 100 acres of primary tropical forests will be eliminated, disrupted, degraded or impoverished. Yearly, an area of tropical forest the size of Great Britain is "converted" from an area equal to the size of Europe.

If present trends continue, by the year 2000, all tropical forests, with the exception of two areas — the western Brazilian Amazon and Central Africa — will have been destroyed. Since 1950, according to the U.N. Food and Agriculture Organization (FAO), half of the world's forests have disappeared. Latin America has lost 37 percent of its tropical forests; Central America, 66 percent; Southeast Asia, 38 percent; Central Africa, 52 percent. Nearly 20 million acres are destroyed annually.

As areas of tropical forests are destroyed or degraded, tribal groups are forced to change their resource base. In some cases they move into areas occupied by other groups, straining the area's resources. In other cases they are forced to relocate outside of forests, permanently altering their way of life by converting to agriculture or to cash employment. Rarely are the rights of these groups to the lands they occupy recognized. Further, their intimate knowledge of the area's resources and how to manage them are nearly always ignored.

Millions of indigenous people live in tropical moist forests which cover some 3.6 million square miles in 70 countries. More than 80 percent of these forests are found in Bolivia, Brazil, Colombia, Gabon, Indonesia, Malaysia, Peru, Venezuela, and Zaire, while 30 additional countries contain sufficient tracts to have significant ecological and biotic values. If these areas are to be managed effectively into the next century, the indigenous peoples that inhabit them should be consulted.



© POGROM

BENEFITS FROM TROPICAL FORESTS

Forests are vital to human existence in the tropics. In addition to providing habitats for hundreds of indigenous groups on five continents, they probably contain more than 3 million species of plants and animals. In Indonesia alone, 4000 species are thought to have been used by native peoples. The following are some of the valuable functions and products provided by tropical forests:

- **Wood** — Construction materials, fiber and manufactured products all depend on tropical forests. Most families and many industries in the tropics depend upon the forest for fuelwood. The export of wood provides some $4.7 billion annually.
- **Indirect forest products.** Latexes, resins, oils, nuts, arts and crafts are exported in increasing quantities.
- **Agriculture** — Some 40 percent of developing world farmers live in villages that depend upon the sponge-effect of forests to absorb and slowly release water. Many agricultural exports, some $36 billion a year, are dependent upon forest-generated soils and water. Yet, in Southeast Asia the green revolution is faltering in part because it is no longer possible to plant two or three crops per year. In some cases, water flow, due to rapid runoff, is deeper than .5 meters which kills many high-yielding rice varieties.
- **Food** — Aside from slash-and-burn agriculture and gathering, forests also provide meat. Some 70 percent of animal protein consumed by people in the forest areas of southern Nigeria is wildlife from the forests, worth $27 million a year. In Cambodia, fish yields of swamp forests can be 10 times higher than some of the best fishing grounds in the Atlantic.
- **Fodder** — In Nepal, tree leaves account for 25 percent of all cattle feed and 40 percent of all buffalo feed.
- **Genetic diversity** — There are millions of species in the tropical forests, many potentially useful to man, but only 15 percent have even been catalogued. One strain of annual corn recently discovered in Mexican forests would revolutionize corn production by eliminating the need to plow and replant.
- **Climate** — Forest cover. Essential for safe, reliable water supplies, forest cover also influences ground temperature, soil mixture and rainfall, regional weather patterns and global climate.
- **Reduction of erosion/flooding** — Forests benefit all who live downstream by reducing erosion and flooding. Floods and erosion will cause severe constraints on food production throughout the world before the end of the century by eroding topsoil, flooding rice fields, and filling in irrigation canals. Energy production has been reduced from many reservoirs because of siltation. For example the energy produced by the Mangla Reservoir Dam in Pakistan is reduced because of 100 million tons of silt each year, four-fifths coming from the deforested Jhelum River watershed. In Thailand, waterways that once provided energy efficient transportation are choked with silt and no longer navigable. In 1979, India suffered $2 billion in property damage and numerous lives in the Ganges Valley in part because of deforestation in northern India and Nepal.

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Protecting the Ozone Layer

Public Information Series

United States Department of State
Bureau of Public Affairs
Washington, D.C.

January 21, 1985

Following is a statement by Richard E. Benedick, Deputy Assistant Secretary for Environment, Health, and Natural Resources, before the UN Environment Program Working Group of Experts on Protection of the Ozone Layer, Geneva, Switzerland, January 21, 1985.

The issue of ozone layer depletion has been with us for over a decade. Not too long ago, it almost seemed as if this problem was going away. As scientists improved their models by adding in the effects of other ozone-modifying perturbants, the net depletion estimates were lowered.

Unfortunately, however, more recent analysis indicates that substantial risks do exist, particularly when realistic estimates of future growth in atmospheric pollutants are considered.

Our concern is based on a number of factors, two of which I would like particularly to call to your attention.

One, even those models which predict only a small depletion in total ozone nevertheless also show a substantial change in the vertical distribution of ozone, which could significantly affect climate patterns.

Two, the most recent models indicate a most disturbing phenomenon—namely, that the atmospheric response to increasing concentrations of chlorine may not be linear. In other words, when the chlorine concentration in the atmosphere exceeds a threshold level, the rate at which ozone is depleted may increase dramatically.

This nonlinear effect is discussed in a recent article in *Nature* magazine [Vol. 312, November 15, 1984, pp. 227–231] by scientists from Harvard University. The Harvard results estimate ozone depletion of 15% or more if CFC [chlorofluorocarbons] use grows by as little as 3% annually—an estimated future growth rate which is not unreasonable in light of recent experience and prospective worldwide demand. Moreover, the composition of the ozone layer appears to be highly sensitive to even relatively minute changes in emissions of CFCs and other gases over time—as little as one or two percentage points in annual growth rates can make an enormous difference in ozone depletion. This means that the margin of error between complacency and catastrophe is too small for comfort.

The costs of the precautionary measures that we support are not high compared to many other environmental controls. But the benefits to the fragile chemical balance of our atmosphere—and, ultimately, to human and economic well-being—may be great.

Despite the complexity of the forces determining future changes in the ozone layer, one thing appears clear to a prudent and impartial observer: if CFC use continues to grow over time, some depletion of the ozone layer is likely to occur.

Unlike some other more localized environmental issues, ozone layer depletion is a phenomenon which affects the well-being of every country represented here—indeed, of the entire planet. If even one country, or a few countries, pursue policies which damage the ozone layer, we are *all* affected.

We acknowledge that the scientific evidence concerning CFCs is not entirely unequivocal. But, due to the nature of the science and our capability for stratospheric measurement, the uncertainties are likely to remain for many years. We must soberly ask ourselves: what are the consequences of delay if we insist on 100% certainty and fail to take actions now?

We do know that CFCs have a long lifetime in the atmosphere—unlike many other gases, they are not readily broken down and removed from the atmosphere. Rather, they build up; they accumulate. And the models indicate that, unlike other forms of pollution, there may be no early warning of serious damage to the ozone layer; when the chlorine buildup reaches a critical point, the ozone decline may be rapid and precipitous and not reversible through short-term human actions.

In a real world of imperfect knowledge and uncertainty, we, as policymakers, nevertheless have the responsibility to take prudent actions for the benefit of generations yet to come. The U.S. Government thus believes that, while cooperation on research—as provided for in the convention[1]—is necessary, it is not sufficient in light of the potential risks we all face from ozone layer depletion. For this reason, the United States joins a number of other countries in urging this group to adopt a protocol[2] to the convention which would effect meaningful near-term reductions in CFC emissions.

We believe it is entirely feasible to eliminate the least essential CFC uses. While, admittedly, it is not always easy to distinguish essential from nonessen-

[1]Draft Global Convention for the Protection of the Ozone Layer.

[2]Draft Protocol To Protect the Ozone Layer by Controlling Certain Uses of Chlorofluorocarbons.

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tial, there is one application of CFCs that stands out as an obvious choice. The use of CFCs as propellants in aerosols still constitutes 30%–35% of the total CFC–11 and –12 consumed in the world.

The United States and several other nations have already successfully limited the use of CFCs in such aerosols, thus demonstrating that it is practicable. In fact, by substituting hydrocarbons as the propellant, significant cost savings have been achieved without reducing consumer satisfaction. Nor have concerns about flammability hazards proved warranted. We recognize that some situations will exist where CFCs are needed as propellants, and the text allows for these special situations.

An important aspect of the protocol text that we support is the "multioptions" format, which should permit acceptance of a protocol by countries with a wide range of differing individual circumstances. This approach also recognizes past actions by governments to reduce CFC use, since these actions should be rewarded and not ignored. We are not wedded to any particular formulation of a multioptions approach and would be prepared to consider variations of the proposal now on the table, provided that they would offer meaningful near-term CFC reduction.

The United States acknowledges that the proposal offered by the European Economic Community (EC) at the last working group meeting is a sincere attempt to confront the ozone depletion issue. The EC proposal, as I understand it, corresponds essentially to what the EC has already accomplished. However, with due respect to my EC colleagues, I believe that their "single option" approach would be less practical in a global context, for the following reasons.

- The production capacity cap is set so high relative to current production that it would not bind for at least 20 years, during which time irreparable damages to the ozone layer may well be occurring.
- When the cap is reached, countries will have to curtail greater quantities of CFCs, including more essential and less easily substitutable CFC uses.
- By allowing CFC emissions to continue to grow in the short run, the EC proposal does not take account of potential changes in the vertical ozone profile which can affect climate.
- The EC proposal does not restrict exports or imports—unless all countries become party, the protocol would be ineffective in limiting global emissions.
- By capping present capacity and locking in current production and market shares, the proposal is prejudicial against developing countries, as well as certain others, which currently have little or no surplus production capacity.

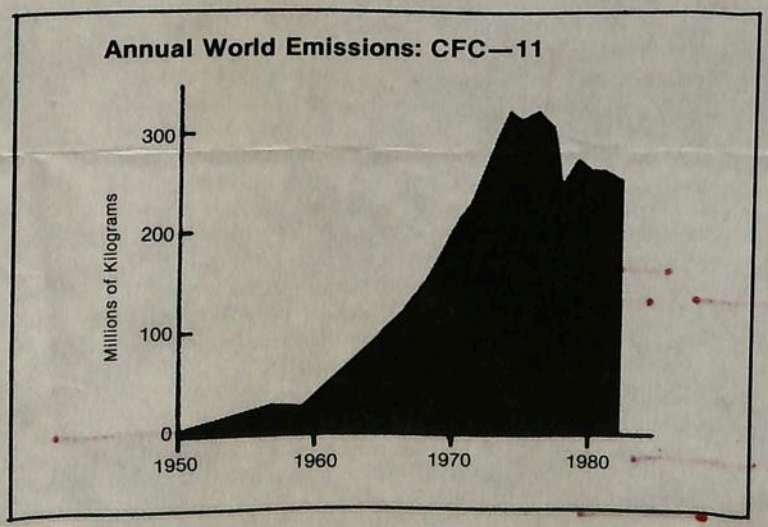
In sum, I find it difficult to envision how the EC proposal could effectively function or be enforced. In contrast, the multioptions approach can accommodate a diversity of national regulatory approaches, thus allowing more countries to join in international controls. We believe it is a pragmatic and responsible proposition which in no way precludes future additional actions. Indeed, it buys time for scientific research to provide us better guidelines, while prudently safeguarding the environment for the near term.

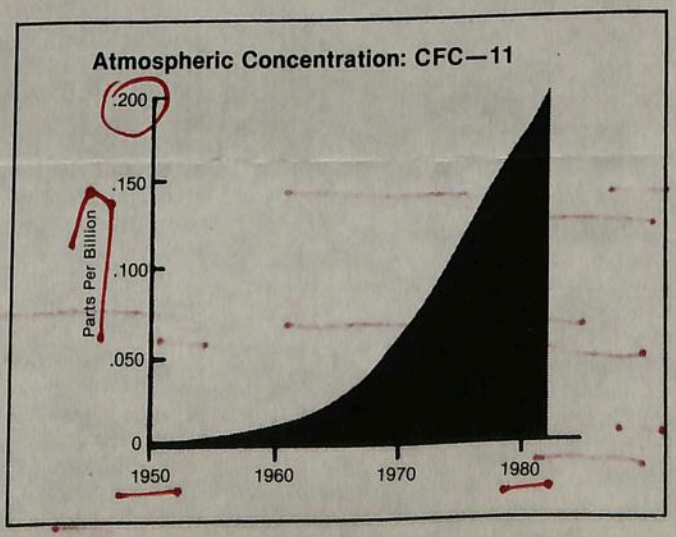
If the world can at least reduce less essential uses in the short run, we may be able to avoid much more costly measures in the future. All that we ask is that interested nations be allowed to have this measure available in March for adoption at the diplomatic conference [3] if they desire. This would be a clear signal to our constituencies that, even in the real world of scientific uncertainties, we are still able to take some modest precautionary steps to safeguard future human welfare against important risks.

In conclusion, by continuing to load the atmosphere with CFCs and other pollutants, mankind is, in effect, performing a gigantic experiment on the atmosphere—one that is reversible only over decades or centuries. Prudence dictates that we reduce the size of that experiment until we better understand its results. The costs of the precautionary measures that we support are not high compared to many other environmental controls. But the benefits to the fragile chemical balance of our atmosphere—and, ultimately, to human and economic well-being—may be great.

---

[3] Conference of Plenipotentiaries on Protection of the Ozone Layer, Vienna, March 18–22, 1985.





Because CFCs are almost indestructible in the lower atmosphere, concentrations will build up even if emissions do not increase yearly. Thus, although several countries reduced CFC use in aerosols sufficiently to level off world emissions growth temporarily, concentrations have continued to climb.

Source: Chemical Manufacturers' Association, 1983.

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Pertinent Quotes

Features and News

ees with Wasteland: Tropical Moist Forests

An aerial map of the island of Hispaniola shows a neat line across the island, Haiti on one side and the Dominican Republic on the other. But the boundary was not marked by surveyors; it is the line where the forests of the Dominican Republic end and the deforested wastelands of Haiti begin. For several hundred years, first the French and then the Haitians have been cutting the forests for fuel and cropland. Now, as boatloads of Haitians flee to the United States, the map illustrates very literally that deforestation and conversion of forests, particularly when combined with overpopulation, are matters of more than academic interest.

It has been widely known for several decades that tropical moist forests are being destroyed. Two recent reports from the National Academy of Sciences—"Research Priorities in Tropical Biology" and its companion study by independent researcher/conservationist Norman Myers, "Conversion of Tropical Forests"—conclude that the rates of destruction are accelerating: Each month, an area of undisturbed forest the size of El Salvador is being converted to other uses.

The true urgency of the situation, however, is not that the forests are vanishing, but that we know of no sustainable use for the land after the tropical moist forests have been destroyed, nor are we making a significant attempt to find any. Moreover, very little effort is being made to catalogue the five out of six tropical species that remain unclassified. The genetic resources of tropical forests, which might be used in various ways to increase food, fiber, and fuel production, will be lost forever. And as they disappear, the forests take with them the livelihood of hundreds of thousands of small farmers and carry to extinction a large number—some investigators place the figure as high as one species per day—of the estimated three million species that inhabit them.

"Everyone who reads the popular press nowadays is aware that the tropical forests are being destroyed rapidly," Peter H. Raven, chairman of the academy Committee on Research Priorities in Tropical Biology and director of the Missouri Botanical Garden, told the House Subcommittee on International Organizations in a recent hearing on tropical deforestation. "There is, however, a general attitude that the destruction of these forests is warranted, since it is thought that it will lead to the implementation of productive forms of agriculture, which in turn will help to feed the hungry people of the world—much as the clearing of the forests made possible the widespread development of productive agricultural systems over the centuries. Unfortunately, the comparison is totally without basis in fact." It isn't like cutting down a forest in the temperate zone, Raven says, where removing trees can result in more efficient land use. Temperate zone forestry technology cannot be transferred to the tropics, according to James S. Bethel, dean of the College of Forest Resources at the University of Washington.

Raven and other researchers agree that the process of tropical deforestation is "essentially irreversible." Much of it occurs because there are too many people and not enough land in developing countries, so population pressures continually push the frontiers deeper into the forest. Development in these countries, as it is practiced by multinational corporations, is extremely profitable in the short run, but devastating in the long run. "In Southeast Asia, the wholesale exploitation of forests for timber by foreign-owned corporations without more than a gesture toward the replacement of the forests is a major factor," Raven told the subcommittee.

Beyond these direct agents, however, the causes of deforestation extend worldwide. Tropical hardwood furniture is very popular in the United States and Japan. An average citizen of a developed nation consumes 155 kg of paper and paperboard per year (1 kg equals roughly one-half of one issue of the *Sunday New York Times*). In South America, cattle ranchers clear huge tracts of forest and sell the beef they raise there to North American fast-food chains. "Everyone's hand is on the chainsaw," remarked Norman Myers on a recent visit to Washington.

The overlap between science and society is almost total in this case. Both academy reports make recommendations and suggestions; "Research Priorities in Tropical Biology" highlights the most urgent needs in biological research, and Myers' "Conversion" report points out the few alternate systems available. But, Raven emphasizes, there is a serious lack both of trained biologists and funding. "Against this background, it is literally an embarrassment to catalogue the tiny effort that is being undertaken to learn more about tropical plants and animals and the natural communities in which they live," Raven told the congressional subcommittee. The academy report estimates that worldwide, there are about 4000 scientists who are competent to undertake taxonomic studies in the tropics and only about two dozen who are competent to supervise and undertake large-scale studies of tropical ecological systems involving experimental modification. "Notwithstanding this

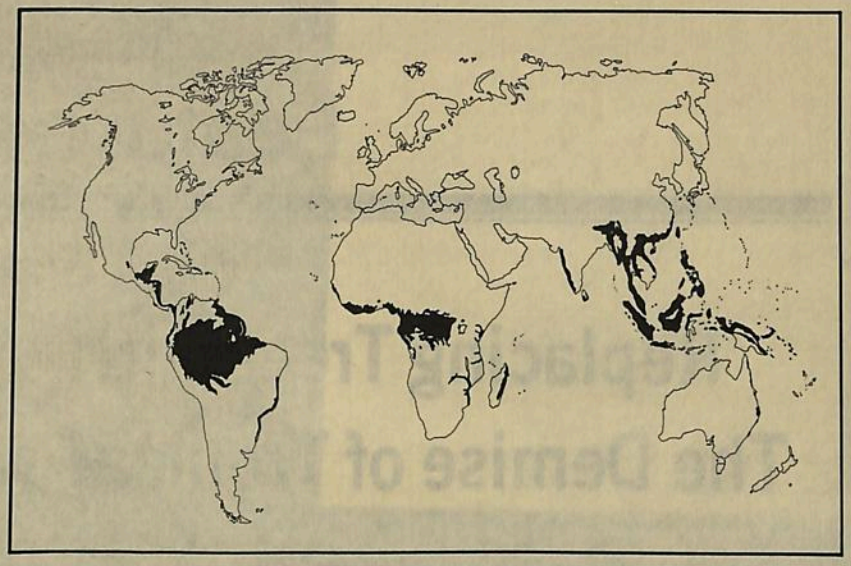
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great lack," Raven told the congressmen, "every single one of the forestry and agriculture systems that is being proposed for the tropics rests for its ultimate success on an understanding of the function of undisturbed ecological systems in the tropics."

What is a Tropical Moist Forest?

There is no standard definition of a tropical moist forest that can be applied uniformly from region to region across the biome; the term can mean drastically different things depending upon who's using it. In his report to the academy, Myers adopts a general, composite definition, detailed enough to be useful but broad enough to avoid excluding endangered areas: "evergreen or partly evergreen forests, in areas receiving not less than 100 mm of precipitation in any month for two out of three years, with mean annual temperature of 24 degrees C and essentially frost-free; in these forests some trees may be deciduous." Myers adds that "the forests usually occur at altitudes below 1300 m (though often in Amazonia up to 1800 m and generally in Southeast Asia up to only 750 m), and in mature examples of these forests, there are several more or less distinctive strata." Two other major characteristics, biotic diversity and limited seasonality with respect to temperature and precipitation fluctuations, also help to define the forests.

Reliable information on the size and ecology of tropical moist forests has always been hard to find; it was mostly the advent of remote sensing devices like LANDSAT that allowed researchers to gather enough data to estimate conversion rates. Today, enough is known to say that there are great differences in the rates at which forests in different countries are being destroyed. Some are in immediate danger: the lowland rainforests of the Philippines and Malaysia; the coastal forests of Ecuador; the remaining blocs of forest in Central America and Mexico, coastal southern Bahia and Espirtu Santo in Brazil, western and southern Cameroon, and those parts of the forest that extend into nearby Nigeria and Gabon; Hawaii, Madagascar, Sri Lanka, Borneo, Celebes, New Caledonia, and the east African montane forests. Some forests, about which relatively little is known, are classified as "Areas Undergoing Moderate Conversion at Intermediate Rates": parts of Burma's lowland forests; much of Papua New Guinea's forests; parts of Brazil's Amazonia lowland rainforests; much of Peru's Amazonia forests; and parts of Cameroon's forests.



Tropical moist forests of the world. (Courtesy of NSF)

Other areas—a distinct minority—Myers classifies as "Areas Apparently Undergoing Little Change": much of Brazil's western Amazonia, where the climate is unusually wet and markets are prohibitively distant; much of the forest of French Guiana, Guyana, and Surinam, where population pressures are low; and much of the Zaire basin (Congo, Zaire, and Gabon), where there are extensive mineral resources that remove some of the economic pressure from the forest. These rates of conversion to nonforest are estimates at best; data collection proved a substantial problem for Myers, as it has for previous investigators.

Research Priorities

The dearth of information about the forests, coupled with their increasingly rapid extinction, is a matter of both practical and scientific concern to biologists and other researchers. The forests have yielded raw material for hundreds of pharmaceuticals, and their fragile ecosystems contain potential sources of food and energy. The academy—trying to make good use of the time left—suggests a research program directed both at increasing biological inventories of the forests and at undertaking detailed tropical ecosystem studies of designated areas. Within the biological inventory category, the academy recommends that research and policy planners:

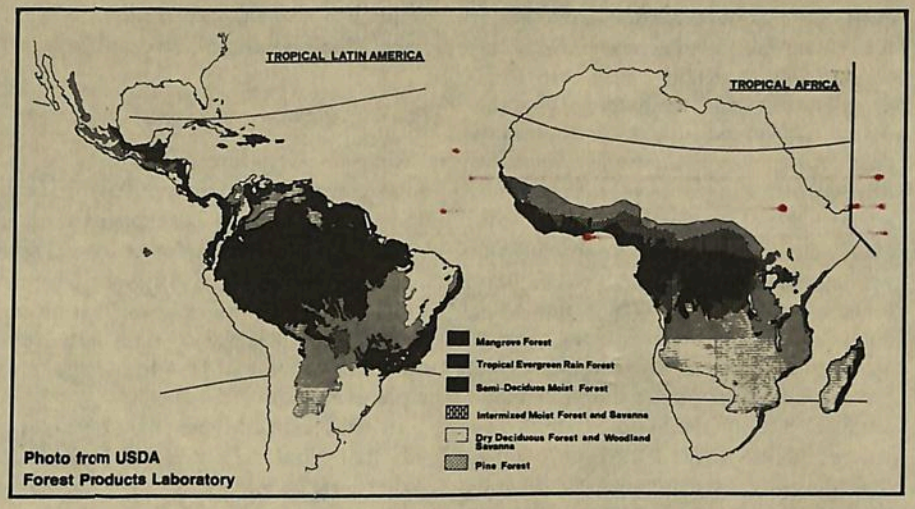
- greatly accelerate the pace of biological inventory in the tropics, combining regional studies of relatively well-known groups or those of economic importance with detailed local inventories of others;
- increase the pool of taxonomists studying tropical organisms to four or five times the present level of about 1500 people worldwide, emphasizing the development of local institutions and the support of local trained personnel in the tropical countries themselves;
- emphasize collecting specimens, partly by "unusual" methods such as freeze-drying or preservation in fluids;
- increase the conservation of genetic diversity in reserves and through the systematic organization of collections in botanical gardens, zoos, seed banks, tissue culture banks, and whatever other means may be found suitable;
- emphasize the biosystematics and evolutionary biology of a representative sample of tropical organisms by comprehensive multidisciplinary approach; and
- give priority to areas containing the richest and most highly endemic biota, the least known biota, and biota in immediate danger of extinction.

Tropical ecosystem studies on both land and water are equally important, the academy says: "The studies help in establishing the factors involved in creating continuously productive ecosystems in the tropics, and in indicating baseline conditions in many areas of ecology and population ecology." The committee suggests in-depth studies at representative locations that cover a broad range of tropical environments. These include New World moist rainforest sites with relatively high fertility, New World tropical deciduous forests, Asian lowland moist tropical forests, and examples of tropical inland ecosystems, grasslands, and savannas.

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Biology, population, and culture are tightly interwoven in the tropical forests; a disruption in one leads to a disruption in the others, and research on their interactions is needed. The academy committee, however, was faced with the usual constraints of time, money, and resources; it was impossible to assume the task of suggesting "research priorities" in all areas of tropical research. The committee does acknowledge the need for other research: "In addition to purely biological questions, there exists a wide spectrum of connected research topics, ranging from processes of destruction themselves to the complexities of human perception and behavior that provide the rationale for conversion." The human ecology panel of the group notes that "the investigation of such topics is conducive to the discovery of viable alternatives, capable of mitigating, halting or reversing the ongoing process of environmental degradation."

Although the academy recommends no specific research projects in this area (nor was it instructed to do so), it suggests that multidisciplinary efforts "unfold" on at least two levels: "the investigation, in the tropical domain itself, of socioeconomic dysfunctions, such as produced by transplanted models of development," and "the investigation of such dysfunctions, in the broader perspective of national and international linkages: historical, political, social and economic." These matters, as well as anthropological studies in general, have the "highest priority" ranking from the committee although they are not specifically biological.



Farming the Forests

No one group is totally culpable for the forests' predicament. Most estimates place overall responsibility more on forest farmers than on developers, although there are big regional differences in the amount of forest cleared yearly by small farmers. Raven estimates that the farmers cause two-thirds of the damage.

About 140 million persons scattered throughout the tropical forest biome survive by practicing slash-and-burn agriculture: They clear an area of forest, cultivate it for a few years, then move on when the soil is depleted. They occupy about two million km²—close to one-fifth of the tropical moist biome. "According to preliminary reckonings," Myers writes in his report, "they are believed to eliminate at least 100,000 km² of forest each year."

These estimates have a wide margin of error—data collection is exceptionally difficult—but Myers arrives at an even larger figure by approaching the matter from another direction. If there are 140 million forest farmers and each family has an average of seven members, then there are about 20 million families of forest farmers. If each family must clear a minimum of one additional ha per year, then the estimate rises to 200,000 km² per year. Some farmers may clear secondary, not primary, forests, or population pressures may be minimal—as they are in parts of South America—so that the cultivated areas might have ample time to recover. Either of these factors may be reducing the amount of forest lost to the famers. But overall, Myers says, "It is not unrealistic to suppose that forest farmers are converting at least 100,000 km²," which accounts for more than 1% of the tropical moist forest biome each year.

Just as the forests are disappearing at different rates in different nations, they are also being destroyed for different reasons. Anthropologist Shelton H. Davis of the Anthropological Resource Center in Boston notes that slash-and-burn agriculture is far more destructive as it is practiced in parts of Africa, where the population explosion forces farmers to reuse the same land too soon and the rapidly advancing frontier is pushing further into primary forests. In contrast, South America—particularly parts of Brazil—still has a population of indigenous peoples (rapidly being displaced by developers), who practice a sustainable form of shifting cultivation.

Betty J. Meggars of the Smithsonian Institution Department of Anthropology agrees: "In South America, the forests are being destroyed more by commercial activity, not by the indigenous population. They're being pushed out and destroyed." There, Davis adds, far more damage is wrought by cattle ranchers and lumber companies, although the indigenous peoples are still blamed. "It is an incredible problem of blaming the victim," he says. Meggars points out that many indigenous peoples have built-in cultural mechanisms that prevent population growth beyond what the land can support.

Slash-and-burn agriculture is not an inherently destructive system of forest use. As it was practiced originally, it was one of the few sustainable ways of using infertile tropical soils. But now, in areas where too many people are using too little land, the soil doesn't get the 10-year respite it must have between cultivations. Tropical soils are fragile; heavy rains and deforestation make them unusually susceptible to erosion and the leaching of nutrients. The system of "shifting cultivation" or slash-and-burn agriculture holds up as long as no more than five cultivators are working each km² of ground, according to Myers' report. After that, the farmers must move into the primary forest.

In recent years, the forests have been under more pressure, since a substantial number of persons turned to forest farming as a last resort, after leaving the cities that could not feed them. Writes Myers: "These recent arrivals, possessing little cultural adaptation to forest environments, tend to advance upon the natural forest in waves: They operate as 'pioneer fronts,' pushing ever deeper into forest tracts, leaving behind them a mosaic of degraded croplands and brush growth where there is no prospect of a natural forest reestablishing itself even in impoverished secondary form."

Modernization on a scale that would support larger urban populations is far

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away for most of the nations involved. In the meantime, many governments are encouraging "surplus" urban residents to migrate to the frontiers, sometimes with disastrous results. At least one Brazilian forest has been transformed into desert following a government-sponsored "development" plan. In some areas, population pressures are so compelling that there is an overwhelming temptation to grasp at such immediate solutions in spite of their long-term effects. In Indonesia, for example, which has a population of more than 140 million persons, 82% of the people live on Java where, Myers says, they are "exerting unsustainable pressures on the island's life support systems." The government, in response, has set up a transmigration program to shift the population to the outer islands. This will ease the situation on Java a little, but will put more heat on the forests at the islands' frontier.

Solutions like this—often characterized as short-sighted—suggest that the tropical forests that escape the developer will be ravaged by an army of invaders. Populations are doubling rapidly in these countries, and, according to Raven, there is no system that will allow sustainable agricultural use by so many people. "It might be all right to develop the forests, if they could be sustained," he says. But since populations double so fast, the forests do not have a chance to recover. Myers and others concur: It is not that the forests should be left untouched, but rather that all use of them must make serious provision for renewal. "The forests must be put to wise use," Myers says, "which does *not* exclude *all* use."

"Wise use" of the forests means many things to many people, and, although the goals of scientists, commercial developers, and indigenous peoples may diverge totally, their interests still meet at the receding boundaries of the forests. If a large percentage of the tropical moist forests vanishes within the next 10 years—a projection that is not considered particularly alarmist in scientific circles—then the question, "What is wise use?" will soon be an academic one.

The three groups that have the most immediate interest in the forests' survival—native populations and governments, scientists, and multinational corporations—are beginning to plot strategies to try to keep the forests alive. Only one lumber company, Weyerhauser, has an active program in tropical research. "It's just good business," a Weyerhauser spokesman told *BioScience*. Several other lumber companies preferred not to discuss their holdings in tropical forests.

The Agroforestry Alternative

Since forest farmers usually have no other way to make a living, the question is: Is there a form of agriculture that can be used in and around the forest that does not turn the area into a wasteland? In places where population pressures are heavy, many researchers think not. Nevertheless, there are ways to use the land more effectively.

In his report, Myers mentions methods that would allow forest farmers to wring larger yields from the soil. They could increase the use of fertilizer, high-yielding grains, and pesticides, or they could increase their use of "green manure" by planting legumes and then plowing them under. But all of these alternatives are expensive, which makes it unlikely that they'll be widely used in developing nations. A more feasible approach, Myers suggests, would have farmers cultivate a broad range of crops for many purposes—food, medicine, fiber, and decoration—which would more closely mirror the forests' natural diversity and better preserve the soil.

For farmers, one hopeful solution is agroforestry, which is still practiced only on a small scale and is the subject of considerable research. Agroforestry, also a form of "mixed cultivation," involves growing food crops and trees on the same piece of land so that, by the time the farmer moves to another patch of ground, the trees he planted when he arrived are nearly large enough to close their canopy over the land. The fast-growing trees that are essential must provide a valuable crop in themselves or they will offer no incentive for the farmer to use the technique. So far, trial projects have used coffee, manioc, and timber or pulp trees.

In a Thai example cited by Myers, farmers are encouraged to grow rubber by the Forest Organization, which offers the farmer a plot of land on which to plant rubber and timber trees in conjunction with food crops. "After six years, during which the organization pays all expenses of raising the trees in return for the farmer's labor, the farmer starts to tap the rubber latex, paying the organization 30% of the income from the trees. After 30 years, when the rubber trees are worn out, they become the property of the organization, which converts them to timber. The entire exercise produces almost two-and-a-half times as much net income for the organization as would be the case if it established the plantations itself, of which the farmer receives $880 per year in wages during the first six years, plus around $650 thereafter from rubber," writes Myers.

Agroforestry is an attractive alternative, but it is not easy to get people to change cultivation habits, and it hasn't taken hold in enough places to increase the forests' odds for survival by very much. "The forest is disappearing rapidly under the onslaught of increasing numbers of forest farmers, and there is still little evidence of the effective dissemination of desirable practices such as those just described on an international, or in most cases, even a national scale," Myers writes.

The Lumber Barons

Multinational corporations and timber companies own large tracts of tropical moist forests, and they use the wood from them to satisfy the appetites of developed nations for teak tables, mahagony cabinets, and paper. (Beef exporters figure prominently in deforestation as well—Myers refers to this as "the hamburger connection"—which links the carnivorous appetites of North Americans to the fate of the forests.) Much of the world's hardwood supply is located in the tropics, and as supplies are depleted in the more easily accessible temperate zones, the lumber companies turn more and more to the tropical moist forests. Improved technology allows them to penetrate deeper into the jungles, and they are often followed by forest farmers, who complete the conversion.

Weyerhauser, the sole lumber company engaged in reforestation research, is also studying the cultivation of exotic species, developing genetic strains of conifers, and other projects. "No other lumber company is doing what we're doing," a Weyerhauser spokesman said. "Everyone thinks that the 'big bad lumber barons' are going to destroy the forest, but it might be that the 'big bad lumber barons' can *save* the forest." The company has a sizable investment in Indonesia, and is working there on plantation management. It acknowledges the truth of the main accusation leveled against timberers—that they may want only two species and end up ruining an entire tract of forest. "The chief problem in tropical forests as far as commercial use is concerned is that each forest may

Continued on p. 428

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Demise of Tropical Moist Forests

Continued from p. 380

have more than 100 species, but only one or two of them will be commercial species," he said. Good forestry practices can reduce the damage significantly.

Hope for the Future?

There are signs that things are changing very slightly as governments realize that time is running out on one of their most valuable resources. Brazil's new president, Joal Baptista Figueiredo, has stopped granting licenses to foreign investors and has started a national debate on the use of the forests. Last year there were about 300 foreign investors in Brazil's forests; U.S. businessman D. K. Ludwig owns 1.2 million hectares (300 million acres) of land around the Jari River; George-Pacific lumber owns 216,000 ha (540,000 acres); and the famous King Ranch, based in Texas, holds about 72,000 ha (180,000 acres) for beef production. Brazil's new strategy may include leaving large tracts of forest untouched for a long time.

For the companies already there, timber plantations offer the most sustainable means of continuing lumber production. The academy committee points out that plantations will have to be started soon if they are to grow up in time to help save the untouched parts of the forests. Myers agrees: "From the standpoint of safeguarding primary tropical moist forests, the most appropriate strategy is to establish plantations in forest territories that have already been exploited and have become poor quality forest, degraded grasslands, or areas that have been overburdened by forest farmers."

The forests' fate will be decided mostly on a country-by-country basis, although some observers think that an international regulatory group is essential. According to academy committee chairman Raven, the countries involved are interested in accumulating data about their forests, as well as in trying to salvage them as natural resources. The United States is restricted to an advisory role, although the Federal Interagency Task Force and the Nongovernment Tropical Forest Working Group are both involved in efforts to save the forests. As Shelton Davis points out, we may think of tropical frontiers as remote places, but the forests are unavoidably linked to the developed world's supply of food and energy.

Efforts to save the forests are getting underway very slowly. There is little money available and little forthcoming in this era of fiscal austerity. The academy has limited funds for disseminating the report, although it hopes to reach at least the most influential groups and agencies in each country with tropical moist forests. The report is being translated into French, Spanish, and Portuguese. It was aimed also at the National Science Foundation, according to an academy staff officer, but the NSF has no program in tropical biology and no immediate plans to start one (see the Sohmer article in this issue).

In the end, research priorities for tropical forests become a jungle themselves; everything is so intertwined that research distinctions can wind up sounding arbitrary. James Talbot, the academy staff officer for the report, points out that disease and vector ecology are crucial to the study of tropical ecosystems; many disease and insect vectors follow development projects like the TransAmazon highway. Moreover, a development project that starts for economic reasons soon becomes surrounded by scientific and social problems. For the academy, Talbot says, the next step will probably be the formation of a committee on tropical bioecology to concentrate on selected problems of the humid tropics from an ecological point of view. It will work on developing environmental guidelines (i.e., a manual) to help tropical managers assess what information they need in order to reduce the adverse environmental impact of forest use. The International Conservation Strategy, released this spring by the International Union for Conservation of Nature and Natural Resources (IUCN) places tropical moist forests very high on its list of urgent conservation priorities.

The recently released academy reports represent, Raven says, "a small start" toward suggesting what can be done. Is there any hope that the forests might miraculously be saved? Possibly some parts of some forests will be preserved for study and other uses, Raven says. Saving these fragments begins to feel like a victory: When things reach this point, he adds, "Hope is a relative thing."

—Susan Walton

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Burger King, We are deeply concerned about health and rainforest ems.

___ Stop contributing to the problem: stop buying rainforest beef.

___ Please contribute to the solution: return some of your profits to rainforest countries to protect existing tropical forests.

_____ We urge you to provide an alternative meatless burger (made of soy or other plant sources).

Name _____

Address _____

Burger King, Public Relations, P.O. Box 520783, Miami, FL 33152

Dear FARM, Thank you for your message.
Please provide information on the following topics.

___ Chemical Additives ___ World Hunger ___ Animal Suffering
___ Diet and Health ___ Pollution ___ U.S. Forests

___ Here is an urgent donation of ___ $1000, ___ $500, ___ $100, ___ $25

Name _____ Telephone _____

Address _____ Zip _____

FARM, Box 70123 Washington, DC 20088
(contributions are tax-deductible)

Dear Rainforest Action Network,

_____ I have written to Burger King.

_____ Here is an urgent donation of _____ $1000, _____ $500, _____ $100, _____ $50, _____ $25, _____ other, to help save the rainforests.

_____ Please provide me with more information.

Name _____ Telephone _____

Address _____ Zip _____

RAN, 466 Green Street Suite 300, San Francisco, CA 94133
(contributions are tax-deductible)

Hamburgers, Health & the Rainforest Connection

Good News, America... We've Found The Real Herb!

He is alive and well and hiding from the glare of a $40 million national publicity campaign.

Sorry, Burger King. This is the real Herb.

And here are seven reasons why he isn't eating hamburgers:



Herb is challenging all Americans who care about their health, world hunger, and rainforests to come out of hiding, join him, and take a stand. Herb can be reached in care of the two organizations that helped find him:

FARM ANIMAL REFORM MOVEMENT
(FARM)
P.O. Box 70123 Washington, DC 20088

RAINFOREST ACTION NETWORK
466 Green Street Suite 300,
San Francisco, CA 94133

Hamburgers & Chemical Additives

High levels of chemicals, antibiotics, and hormones are fed to domestic cattle. Herb is upset over a recent Congressional study that found the Food and Drug Administration "has inadequately monitored the use of toxic drugs and nutritional supplements in raising livestock, posing a grave threat to the health of consumers..." (*The New York Times*, January 13, 1986.)

Heart Disease, Stroke, & Cancer

Each year 1.5 million Americans are prematurely killed or crippled by heart disease, stroke, cancer. According to the

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How Fast-Food Hamburgers

Rainforests are the winter home for millions of migratory North American songbirds. Already, scientists have reported a decline in the numbers of birds returning from Central America. Many of these birds are essential to pest control. Unprecedented outbreaks of crop-

these disorders are associated with excessive consumption of animal fat and meat—the stuff hamburgers are made of. No wonder the U.S. Surgeon General has warned: "People should consume . . . less red meat . . . more whole grains, cereals, fruits, and vegetables."

World Hunger

To produce one pound of meat, a feedlot steer must be fed 16 pounds of grains and legumes. About half of our nation's cropland is devoted to raising food for America's five billion farm animals. According to Dr. Frances Moore Lappe, ninety percent of our corn, oats, barley, and sorghum are used to feed farm animals. Herb thinks it is tragic that all this grain is diverted to feed livestock when starvation continues to plague much of the world. The horror of Ethiopia is only the most recent example. Overcultivation depletes topsoil and groundwater. If this trend continues, even America's food supply could be endangered.

Pollution

Water from rain and melting snow runs off the croplands and pasturelands used to feed farm animals, carrying along particles of soil, pesticide, fertilizer, organic debris, and minerals. This runoff contributes more pollutant burden to our lakes and streams than all other human activities combined.

U.S. Forests

According to the National Agricultural Land Study, between 1965–1977 260 million acres of U.S. forestlands were leveled—converted to pasture and croplands to feed American cattle. To package 8 billion fast-food burgers, approximately 890 square miles of forest must be chopped down.

Animal Suffering

Each year, 38 million cows and steers are made into hamburger after a lifetime of confinement, crowding and manhandling. Cattle are dehorned, castrated, and branded without benefit of anesthesia. Where cattle do graze freely on open pastures, it is often because "predator control" programs have removed native wildlife—ground squirrels, wolves and coyotes—by poison, traps and bullets.

Rainforests

Herb is also distressed about the mounting threat to the world's invaluable tropical rainforests—the most diverse ecosystems on this planet. They are disappearing. To learn how America's hamburgers threaten Central America's rainforests, read the story in the adjacent box.

For more information on the first six issues use the coupon and write to the Farm Animal Reform Movement (FARM).

Destroy Tropical Rainforests

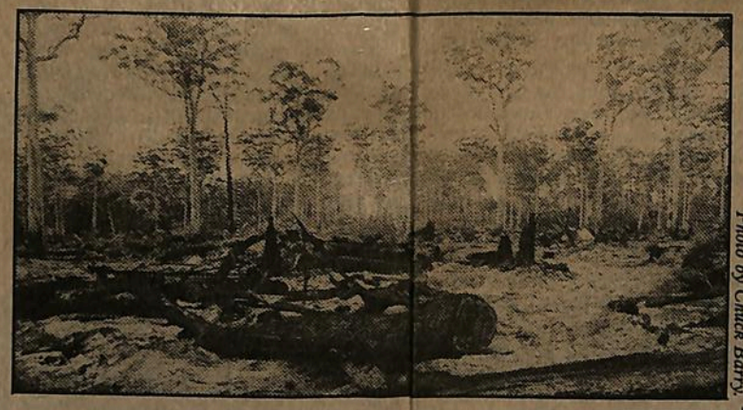


Photo by Chuck Barry.

The cheapest way to raise beef is to get cheap land. And in Central America, the quickest way to create cheap grazing land is to cut down a rainforest.

It's a formula that has meant whopping profits for wealthy cattle barons and for the US companies that buy Central America's beef.

Unfortunately these "instant cow pastures" don't last more than a few years. The nutrient-poor topsoil is soon depleted, and the land degrades from lush jungle to scraggly desert. Then the cattlemen move on to the next forest.

Over the past 25 years nearly half of Central America's tropical rainforests have been destroyed. The pace is accelerating. If the bulldozers and chain saws aren't stopped soon, these irreplaceable rainforests will be stripped bare. Nearly all could vanish in the next fourteen years.

The world's tropical rainforests are home to half of our planet's 10 million species of animals and plants. They are home to rare and exotic wildlife (jaguars, margay cats, ocelots, tapirs, harpy eagles, anacondas, and howler monkeys), as well as fascinating smaller creatures such as the bright orange tree frog and the brilliant electric blue morpho butterfly.

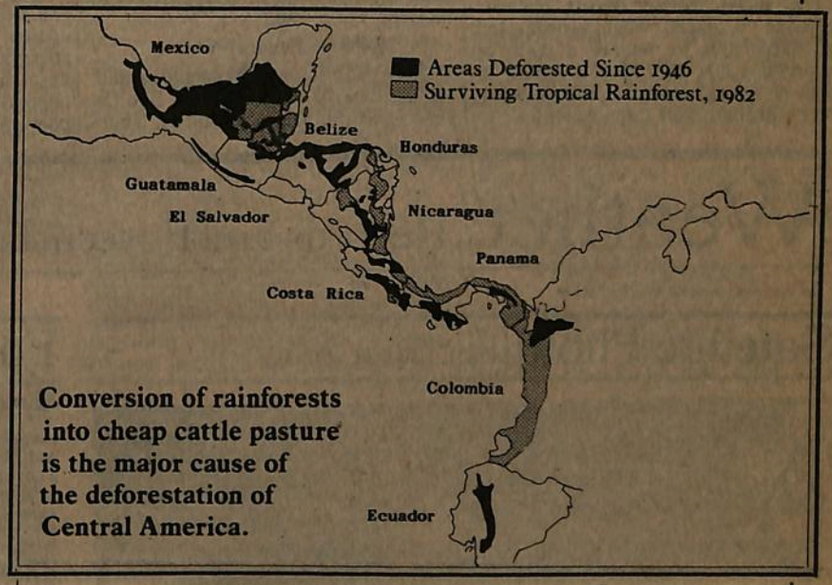
Rainforests provide us with medicines: over 25% of our prescription drugs are derived from rainforest plants. Seventy percent of all plants known to have anti-cancer properties grow in tropical rainforests. Curare, the fabled vine from which the poison for blow gun darts is extracted, also yields a potent muscle relaxant essential to heart surgery. The vines that yield curare can grow only in tropical rainforests.

Destruction of the rainforests means destruction of indigenous peoples. Only they know how to live in the forest without destroying it. Their wisdom and experience, accumulated over thousands of years, has not been matched by modern science. The tribal elders know which plants can heal. Which can kill. Which plants might provide a major new food source for the world.

predators disappear.

The widespread burning of rainforests to create cattle pastures contributes to the buildup of CO_2 in the atmosphere, accelerating the "Green House Effect" which threatens to melt the Earth's polar ice caps, and cause flooding in the world's coastal cities and industrial lowlands.

In short, destruction of the rainforest could trigger the greatest natural calamity since the mass extinctions of the last Ice Age. Only this time, the disaster would be man-made. Is this destruction worth a cheap hamburger?



Conversion of rainforests into cheap cattle pasture is the major cause of the deforestation of Central America.

Burger King's Rainforest Connection

In 1981 Burger King admitted using Central American beef in its hamburgers. Now it says its "preference" is to use domentic beef, but it still "does on occasion use a small percentage of frozen beef from Costa Rica."

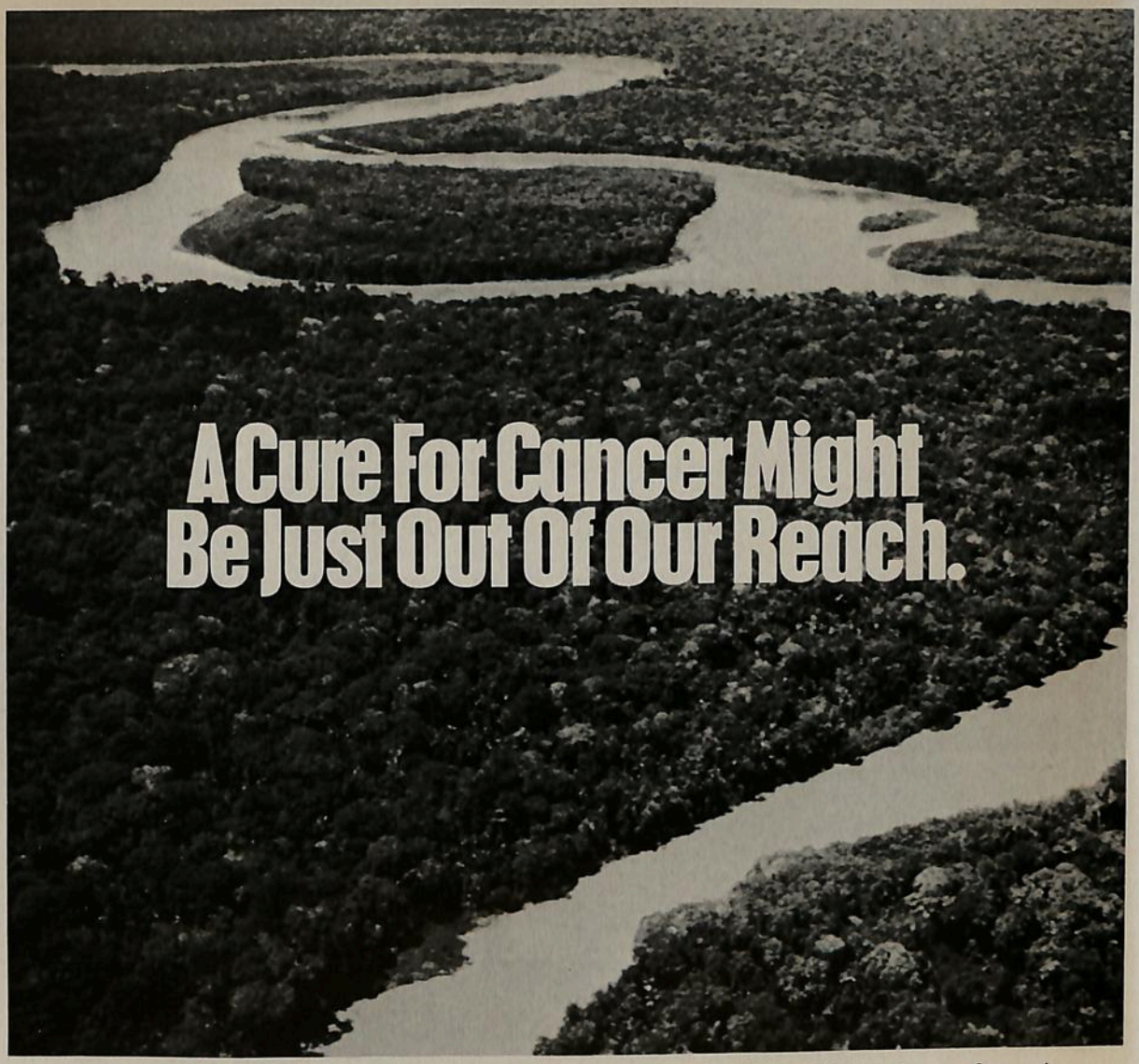
McDonalds, Burger King's biggest competitor, claims it uses no rainforest beef in its US and Canadian operations—"only 100% pure, government inspected, domestic beef."

Burger King is not the only culprit. Other major chains are suspected of using rainforest beef (inadequate labeling laws make this almost impossible to prove.) Ultimately, as consumers, we are all responsible.

It is going to take education and a mass movement to save the rainforests and the native people who live in them. Organizations working to save rainforests need your help. The Rainforest Action Network is an international consortium of environmental, scientific and native peoples' organizations. We can't do it without you. Contact us to learn how you can help save the rainforests. Please use the coupon above.

Alex Hershaft **FARM ANIMAL REFORM MOVEMENT (FARM)** P.O. Box 70123 Washington, DC 20088 Randall Hayes **RAINFOREST ACTION NETWORK** 466 Green Street Suite 300, San Francisco, CA 94133

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It's not surprising that one out of four pharmaceuticals comes from tropical forests. Or that an estimated 1,400 tropical plants, like the rosy periwinkle, have promising anti-cancer properties. After all, as home to half of the world's plant and animal species, these forests are a vast biochemical warehouse.

What is surprising is that the human race is destroying this living resource at an alarming pace.

Each day, 74,000 forested acres are cleared, pushing untold numbers of species toward extinction.

The future of medicine and agriculture, the existence of thousands of wildlife species, and the survival of hundreds of millions of people in developing countries depend on what we do now to keep the tropical forests alive.

The means of solving this problem are within our reach. Write in order to find out how you can help keep the tropical forests alive, before the reasons disappear.

Keep Tropical Forests Alive.

Tropical Forest Project, World Resources Institute, 1735 New York Avenue, N.W. Washington, D.C. 20006/ Prepared by Richardson, Myers & Donofrio, Inc.

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Nat. Geogr. Aug. 1987.

OVEMBI

There's Gold in Brazil! (Also Many Gunfights And Airplane Crashes)

By JAMES BROOKE

Special to The New York Times

BOA VISTA, Brazil, Nov. 23 — The streets of this jungle city may not be paved with gold, but Albert Dunbar Beckers finds it worthwhile to sweep the sidewalks.

Every morning, Mr. Beckers, a spry 62-year-old native of Guyana, is out, broom in hand, to sweep in front of the gold-buying shops on Gold Street.

"On a good day, I can get two or three grams," he said, referring to the flecks of gold dust lifted by the wind from shops patronized by rough-cut miners coming in from the gold camps for provisions and a night on the town. "It's just like the Yukon, just like California."

Younger men — 50,000 at last count — seek their El Dorados in a nearby chunk of Amazon jungle the size of Portugal. Panning gravel and water-blasting mud, they are following one of Brazil's biggest gold rushes of the 1980's.

Brazil became the world's sixth-largest gold producer in the 1980's, behind South Africa, the Soviet Union, the United States, Canada and Australia. Today, Brazil produces about 100 tons of gold a year, roughly triple the production at the start of the decade.

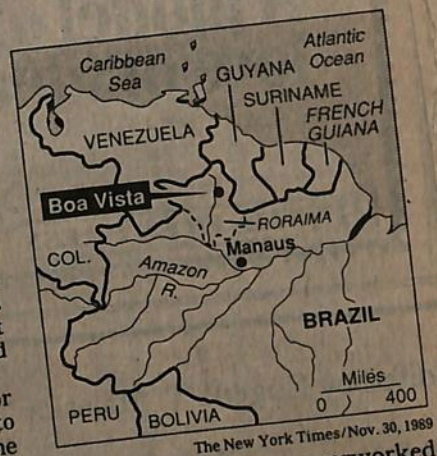
Here in Roraima, a territory that is scheduled to achieve full statehood next year, claim jumping, gunfights and plane crashes in the rain forest are the currency of the day.

The newspaper Crítica captured the spirit of Boa Vista today with a banner headline: "Eight dead in fire-fight in Roraima gold camp."

Since the gold rush started in earnest about a year ago, more than 400 miners have died in gunfights or in plane crashes. In a frontier where many people are known only by their nicknames, most burials amount to little more than a few words from a priest and a circle of friends standing at graveside, hats in hand.

Last January, during the dry season, overworked bush planes were

Continued on Page 22



The New York Times/Nov. 30, 1989

In the dry season, overworked bush planes crashed at the rate of one a day at Boa Vista airport.

for gold miners, some 50,000 at last count.

There's Gold in Brazil! (And Many Gunfights)

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Rain and Fines Reduce Fires in Brazil's Amazon

By JAMES BROOKE
Special to The New York Times

MANAUS, Brazil — Plumes of gray smoke are once again rising over the green sea of Amazonian rain forest surrounding this city. But preliminary survey figures from this year's dry season point to a new trend: a marked drop in burning.

Rain, fines and reversals in public policy are combining to slow deforestation by fire, according to Brazilian and American environmentalists interviewed at a scientific conference here in late August.

"In 1989, there has been a considerable reduction in burning," Alberto Setzer told the gathering. Mr. Setzer directs a three-year-old Brazilian project to monitor Amazon forest fires through photographs taken by a satellite of the National Oceanic Atmospheric Administration.

In June, to the surprise of many Amazon watchers, Mr. Setzer's researchers reported that fires during

'Wettest dry

stretch of jungle.

"This is going to be an unusually wet year," said Paulo Nogueira Neto, an ecology professor at the University of São Paulo.

In addition, Brazil has made several policy changes that are believed to be slowing the burning.

This year, Brazil suspended tax incentives that made it artificially profitable for landowners to clear large expanses of jungle for cattle ranches.

Last year, it adopted a Constitution that did not penalize owners of unproductive land. During a constitutional debate in 1987, landowners' fear of losing title to "unimproved" lands is believed to have contributed to a record level of burning — 80,000 square miles.

"Every indication is that the burning is going down, because of weather, enforcement and the lack of new project incentives," said Thomas E. Lovejoy, assistant secretary for external affairs of the Smithsonian Institution.

This year, in the face of international pressure, Brazil began a highly publicized campaign to slow the burning.

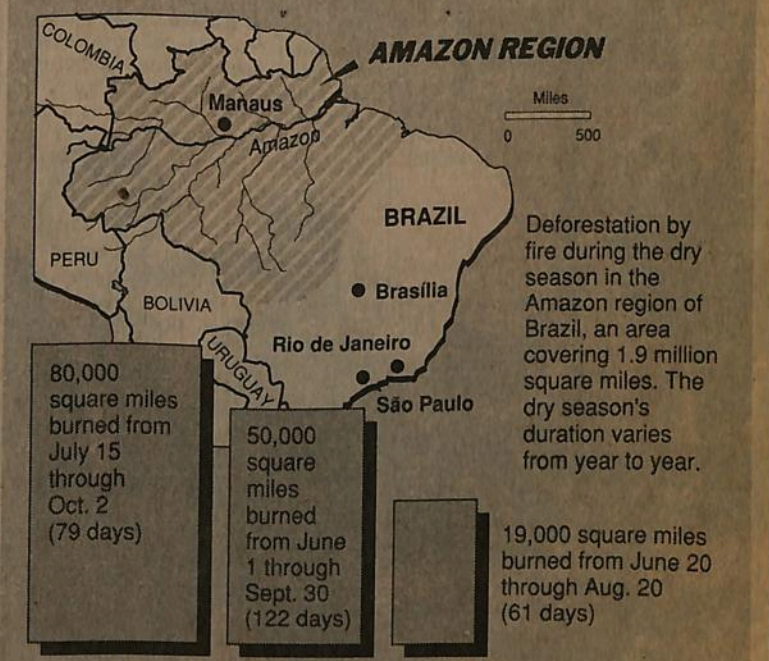
Using 5 helicopters and 60 pickup

The money was used to rent helicopters, buy pickup trucks and pay salaries for forestry agents.

ing should be restricted to areas with soils suitable for support agriculture.

"They have to go the whole way from

Hope for the Amazon



Deforestation by fire during the dry season in the Amazon region of Brazil, an area covering 1.9 million square miles. The dry season's duration varies from year to year.

Source: National Institute of Space Research, São José dos Campos, Brazil

The New York Times/Sept. 17, 1989

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Pôrto Velho Journal

In Amazon Gold Rush, Nature Gets Trampled

By MARLISE SIMONS
Special to The New York Times

PORTO VELHO, Brazil — When Thalis de Castro headed for the Amazon in 1976, he was in search of God. He joined a sect that stimulated its prayers and visions with the juices of a jungle plant, and for four years, he said, nothing drove him to hunt for wealth.

But the Amazon's hustling and gambling caught up with the young man, and he is now a frontiersman stalking the wilderness for gold.

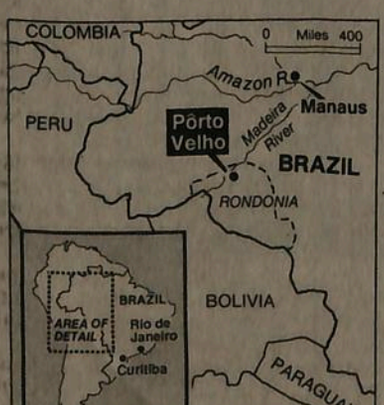
His three barges churn soil from the riverbed and sift out gold dust. Like other boat owners, he brushes aside talk of profits because that would attract the "big eye — a local expression for greed.

"This is one tough river," he said of the Rio Madeira, a major tributary of the Amazon and the site of one of Brazil's most prolific goldfields. "It has rapids and it has prospectors. I don't know which are trickier."

The Menace of Mercury

In recent months, gold mining in rivers like these has caused alarm among environmentalists who have warned that poisonous mercury, used to amalgamate gold, is getting into the water and the food chain. The Government has banned the unlicensed use of mercury, but officials concede there is no way to enforce rules in the wilderness.

From the hot border with Guyana to the rain forests along the division with Bolivia and Peru, the sight has become familiar: prospectors are panning, grinding and prodding for gold and precious stones. With an output of almost 70 tons in 1987 — five times that of Brazil's industrial gold mines — the Amazon's gold rush is the greatest ever seen, experts say.



The New York Times/May 17, 1989

The gold rush has brought money and problems to Pôrto Velho.

More than half a million people are said to be part of this industry.

The boom owes much to the crisis in Brazil's formal economy, but it also thrives on the laissez-faire spirit with which the Government views settlement of what is now the world's largest tropical frontier.

The freelance prospectors are spurred on by good fortune and tough labor. And there are fights over things like invading claims, fixing scales or stealing another man's dust under one's fingernails.

Competition Is Ruthless

Even the seasoned nomads who have moved from camp to camp say the race for gold on the bottom of the Madeira River is perhaps the harshest and most dangerous.

Almost every day, hundreds of divers go down into the swirling currents of the Madeira, a fast, wide stream, sometimes up to 60 feet deep. The Madeira carries into Brazil gravel and silt brought from the Andes by Peruvian and Bolivian tributaries. And it is here, deep down amid its gold-bearing detritus, that a ruthless competition is being waged.

From the rows of barges, which are rafts cluttered with pumps and sluice boxes with up to 10 workers each, divers with primitive air tubes fight the current to push vacuum hoses along the riverbed and bring up gravel and silt. On a lucky day, a barge can make a pound of gold.

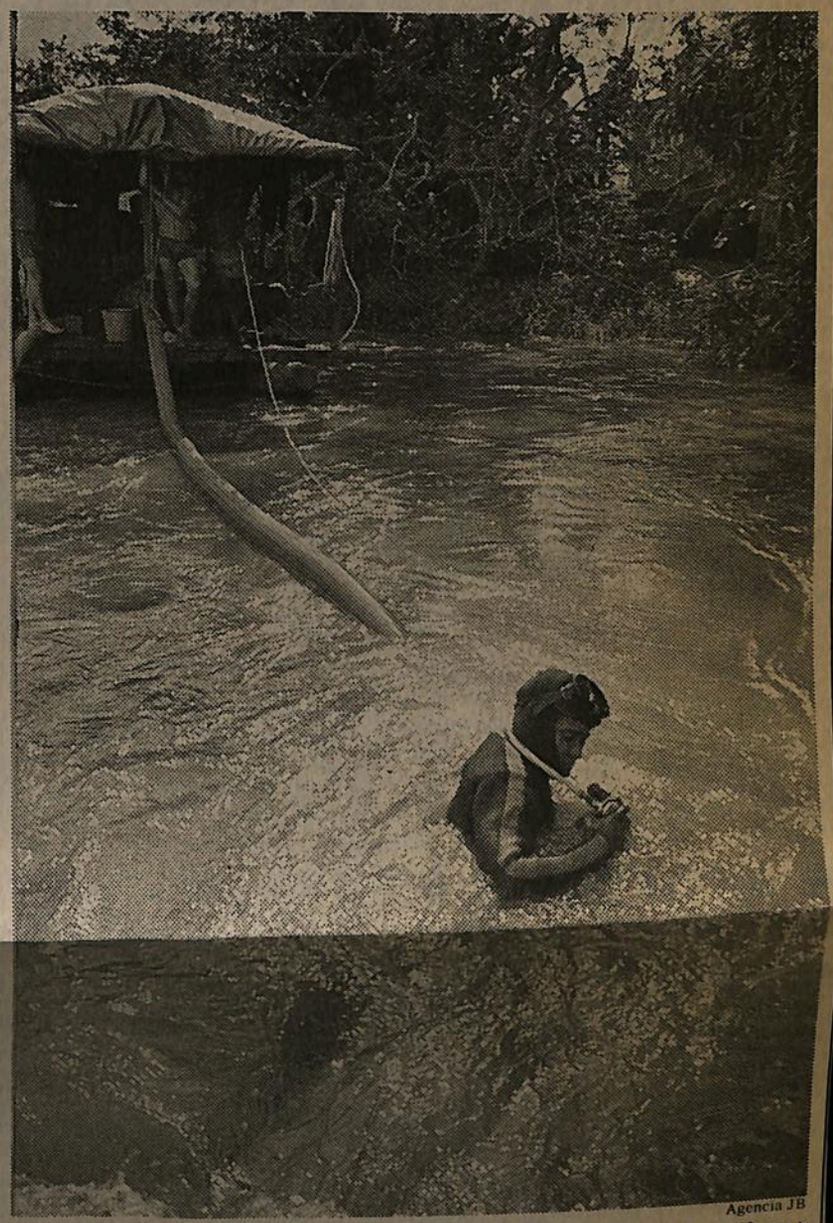
"It's dark like hell itself down there," said Waldemar da Silva, who had just finished a three-hour shift in the thick brown water. Barge workers said new divers regularly have accidents and sometimes die from embolisms.

More hazardous still, it seems, is the way scores are sometimes settled underwater. "These guys use their knives," said Mr. de Castro, describing fights among divers over territory and adding that they have been known to slash another's air hoses. Anchor lines are cut to set a barge adrift, he said.

White Powder for Gold

"True, the fights can get nasty," a police official said, explaining that the gold rush here is fueled by cocaine from Bolivia, which is traded for gold dust. "White powder for gold powder," he said.

Although diving has been going on here for a decade, the great rush, locals say, began four years ago. It has brought money and a host of problems to Pôrto Velho, the capital of Rondônia State and of Brazil's far west. Already swollen by the great wave of migrants on this agricultural frontier, Pôrto Velho's population has doubled to 320,000 in just four years.



Agencia JB

A diver using a hose to churn soil from a Brazilian riverbed and sift out gold dust. Such mining has caused alarm in recent months among environmentalists who have warned that poisonous mercury, used to amalgamate gold, is getting into the water and the food chain.

Because much of the gold is thought to be traded illegally for dollars or cocaine, no one knows for sure how much is found in Rondônia. But some officials guess that last year's production was five to six tons.

Foreign Boats Arrive

Such a bonanza deeply troubles the officials at the new state environmental office. "Those people are a huge headache," Alexandre Moreira Santos said of the 3,000 or so barges on the river in the low-water season. Mr. Santos, director of ecosystems, said that as the barges have churned away riverbed soil, they have caused "a terrible imbalance in the life of the river," disturbing the light and the food chain and filling up the navigation channels.

Worse still, he said, is the highly poisonous mercury. The mercury is placed in the riffles of the sluice boxes to trap the gold dust. When it is burned off, workers breathe its vapors and waste gets into the water.

Asked about the government ban on mercury, Mr. Santos gestured at the jungle. "Fine," he said, "but how could anyone implement this?"

Now another conflict has emerged as the local prospectors are being challenged by entrepeneurs, among them reportedly Americans, Koreans and Japanese who have arrived with modern dredges with air-conditioning and earth-moving equipment.

As rumors circulated that angry divers were preparing assaults on the foreign boats, Mr. de Castro blamed the authorities for the tension. "This is a land where anything goes, no licences needed, no questions asked," he said. "This is a tough life but a free life. That's why we are all here."

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Up Against the Flames

FIRE ON THE RIM
A Firefighter's Season at the Grand Canyon.
By Stephen J. Pyne.
323 pp. New York:
Weidenfeld & Nicolson. $19.95.

By Andrew H. Malcolm

STEPHEN J. PYNE is to fire what Theodore White was to American politics, an insider who can explain how his subject works and affects our lives. Mr. Pyne, the author of "The Ice: A Journey to Antarctica," "Fire in America: A Cultural History of Wildland and Rural Fire" and "Introduction to Wildland Fire," teaches at Arizona State University and has studied and written widely about American wildfires. But "Fire on the Rim" is no boring academic treatise. According to its misleading subtitle, the book covers one season fighting fires at the Grand Canyon. But Mr. Pyne has actually compressed accounts of the 15 summers he spent as an eager firefighter there.

He begins as a single man, enjoying the heady freedom of his summertime release from college, and ends when he is married and a father, a veteran fighting his last gritty battle against the flames before regretfully packing up like a successful professional athlete who has stayed two or three seasons too long. He will miss the thrill of demanding combat and the highly addictive male camaraderie, but his body has been ready to call it quits for some time.

"Fire on the Rim" is particularly timely, as society becomes more aware of the great value of its forests and the role forest fires play. And although the book understandably does not cover the great 1988 Yellowstone fires, it does bring to mind the continuing emotional debate over the National Park Service's latest policy of letting some large fires burn themselves out and cleanse the landscape. (Mr. Pyne is a member of the committee reviewing the fires' consequences.)

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For many city dwellers, forest fires — colorful, malevolent conflagrations that consume trees so obviously intended by nature to decorate our national parks — are confined to television screens. This book, full of human detail, brings us to the front lines, and we learn what fires mean to the fire-crew foreman (an empire to rule over, if only for a summer) and to the individual firefighter (not the least is plenty of overtime if the struggle against a minor blaze can be stretched out). Not surprisingly, Mr. Pyne uses no real names in his chronicle, to protect the guilty in a Government service that reeks of the bureaucratic mentality.

Thankfully, there is no strident advocacy here. The author simply reminds us of the natural rhythms of these vast wild preserves that thwart any of man's efforts to shape them. As Mr. Pyne knows from his experiences, forest fires have their own majesty, and when they get going, fanned by a dry day's warm wind, the firefighters know better than to think of controlling them; the survival instinct takes over.

Mr. Pyne has a very nice way with words: the log cabin that "is vacant, dreary with winter"; the vacationers' motor homes "that swarm like tent caterpillars"; the "trees in the crystal air [that] look as if they have been etched on glass." As a rookie, he learns Smokey Bear's "First Rule of Firefighting: You can't fight a fire you can't find." His description of the firefighters' rivalry with the park rangers, derisively dubbed "fern feelers," elicits numerous chuckles. He also has an old-timer explain with a veteran's wryness how "useful" plastic goggles are: "They are supposed to keep the smoke out of your eyes. But you see, they have all these holes for ventilation. The smoke pours through. If you seal off the holes, the glasses fog up. The government issues these. We all carry them."

I must admit to a brief initial confusion. There is a flurry of exotic names for tools, and they go unexplained for too long. The use of disconnected local names for landmarks is also annoying, and I was disappointed to learn in a one-page "Final Report" that some of the tales here are really composites of various incidents. But these are minor complaints about an enlightening and entertaining journey through the woods. □

Andrew H. Malcolm is national affairs correspondent of The New York Times.

Inferno in China: Finally the Rains Came

THE GREAT BLACK DRAGON FIRE
A Chinese Inferno.
By Harrison E. Salisbury.
Illustrated. 180 pp. Boston:
Little, Brown & Company. $17.95.

By Hal Bruno

IN terms of sheer destruction and ecological damage, the fires that swept the Hinggan forests of Manchuria and Siberia in May 1987 rank as one of the worst environmental disasters of this or any other century. The fires were more than 10 times the size of last year's fires in Yellowstone National Park. Yet little is known about them outside China and official circles in the Soviet Union. Even among experts, there is only sketchy information on possibly the world's largest forest fires in the past 300 years, conflagrations that blackened an area almost the size of New England.

Harrison E. Salisbury, the distinguished former New York Times correspondent and the author of, among other books, "The Long March: The Untold Story," is one of the few foreigners to have visited the remote, devastated region. "The Great Black Dragon Fire" is the sobering story of a catastrophe whose full impact has yet to be measured or understood. The Chinese are convinced that the fires affected their climate, and there has been speculation that they may have further damaged the fragile ozone layer.

The Greater Hinggan Forest was the world's largest stand of evergreens, stretching like a green velvet sea, approximately 500 miles long and 300 miles wide. It is bisected by the Heilongjiang, or Black Dragon, River (known in the West by its Russian name, the Amur), which forms the border between Chinese Manchuria and Soviet Siberia. Before the fires, the Manchurian part of the forest accounted for a third of China's timber reserves.

There had been a prolonged period of dry weather, and the danger of fire was high on both sides of the river in the spring of 1987. From Mr. Salisbury's description, it would seem that the Chinese fire prevention and detection methods and firefighting resources were primitive by American and Canadian standards. Despite the hazardous condition, people smoked in the forest, built campfires and used unsafe logging practices. From natural and accidental causes, a number of fires broke out about the same time in Manchuria and Siberia, quickly consolidating into several large ones.



FROM "THE GREAT BLACK DRAGON FIRE"

The trial of Wang Yufeng, the young Chinese worker who started the Black Dragon fire.

• • •

One known cause was Wang Yufeng, an 18-year-old who was temporarily working as a brush cutter. Ironically, brush cutting is done to reduce the danger of fire, but the inexperienced teen-ager violated every safety rule and, as Mr. Salisbury notes, became a modern Chinese version of Mrs. O'Leary's cow. He overfilled his machine, spilling gas, which ignited from an engine spark and set the machine and the grass on fire. It jumped to the trees and flashed into a raging inferno that destroyed the town of Xilinji. (The hapless young man was whisked off to jail even as the alarms were sounding.)

Thus began one of the largest Black Dragon fires. The monthlong battle was fought by Chinese Army troops, the local inhabitants and what appears to have been a small number of professional firefighters. Missing were the battalions of trained forest firefighters who are deployed in the American West and specialized apparatus, effective communications and airplanes that drop fire-retardant chemicals. There was no contact between the Chinese and Soviet commands that were fighting fires on each side of the river.

Mr. Salisbury's interviews with the people involved reveal the strength of the human spirit when faced with overwhelming tragedy. There were some notable cowards and incompetents, but there were more heroes. Most of the inhabitants of the Manchurian timber towns did the best they could as the fiery monster devoured their homes and livelihood and killed their families and neighbors. No one really knows how many died, but Mr. Salisbury believes the official Chinese report of only 250 is far below the actual toll.

As the Mayor of Xilinji, Wang Zhaowin took firm command, anticipated the tricks of the wind and saved thousands of lives by evacuating her people from the river — where they would have been trapped — to an open road junction. Incredibly, 18,000 people huddled at the crossroads as flames fanned by a 40-mile-an-hour wind engulfed the town. (Later, her bitter reward was to be relieved of her job by the provincial government.)

The Black Dragon fires burned until it rained in early June. When they were over, China had lost more than three million acres of timber. The total damage is estimated at more than $4 billion. The long-range environmental impact has yet to be calculated, but the outlook is grim. It could be several generations before the dominant larch evergreens grow again, and the Hinggan forest may never be the same.

One can only guess at what happened on the other side of the river in Siberia. Between 9 million and 15 million acres are believed to have burned there — at least three times larger than the area destroyed in Manchuria. Despite glasnost, there has been no report from the Russians. What may have been the greatest forest fire in history remains a nonevent in the Soviet Union.

Mr. Salisbury's book penetrates some of that secrecy and provides a fascinating look at a remote pocket of the world. It is also a dramatic and compassionate account of the people who live there and the disaster that befell them. And "The Great Black Dragon Fire" is another warning to everyone who is concerned about what is happening to planet Earth. □

Hal Bruno, the political director of ABC News, is a columnist for Firehouse magazine and has served for many years as a volunteer firefighter.

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Wall Street Journal April 4, 1989

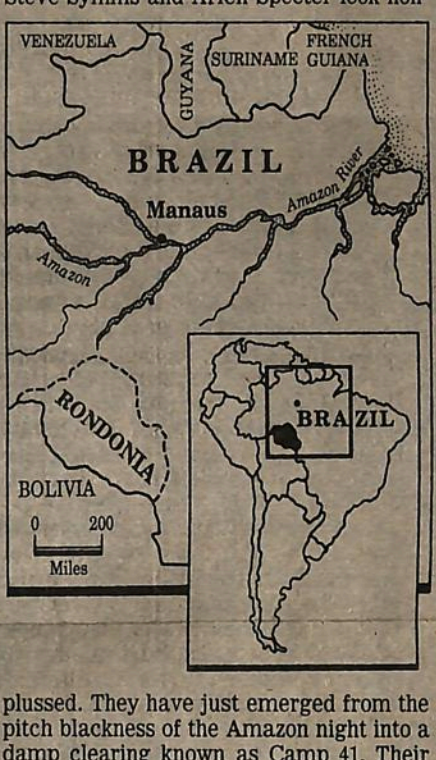
While Trekking Through the Amazon, Senators Learn Not to Mimic Bananas

By Roger Cohen
Staff Reporter of The Wall Street Journal

CAMP 41, Brazil—The U.S. senators were warned of the hazards of the Amazon: a disease that might leave them without their noses, or a tiny fish inclined to swim up human orifices before erecting a sharp fin. But nobody told them how to sleep.

So, here in the "green hell" of the Brazilian rain forest, U.S. Marine Lt. Col. Terry Paul takes charge. "Try to sleep diagonally in the hammock," he barks, "rather than like a banana."

Sens. John Chafee, Dale Bumpers, Steve Symms and Arlen Specter look non-



plussed. They have just emerged from the pitch blackness of the Amazon night into a damp clearing known as Camp 41. Their arrival, after a visit to a bird-watching tower, has been delayed several hours because the jeep in which two of them were traveling careened off a muddy track into a ditch.

"I can't believe I went through all this just to see two Toucans from 300 yards," Senator Bumpers grumbles, "and then sleep in a hammock."

It sure is a long way from his native Arkansas. But there is an important cause. The Amazon jungle, which accounts for more than 30% of the world's tropical forests, is being destroyed at an alarming rate. Already, an area close to the size of France has gone up in flames. This devastation is contributing to the global warming known as "the greenhouse effect."

"After that hot summer last year," says Joan Specter, wife of the Pennsylvania senator, "some people thought, 'Oh My God, the world is coming to an end.' "

In fact, industrialized nations, through their combustion of fossil fuel, contribute most of the carbon dioxide that is the main cause of global warming.

But the Amazon is "in." "Jaws" author Peter Benchley has been down here recently researching a novel on the ecological collapse of the world. Robert Redford is said to be planning a film on Chico Mendes, the Brazilian rubber-tapper and Amazon conservationist murdered last December. British rock star Sting has taken to powwowing with Amazon Indians. And, in the past three months, 7% of the U.S. Senate has waded into the rain forest.

Senator Chafee, who is leading his second mission, explains: "I don't believe my constituents in Rhode Island wake up every morning worrying about the Amazon. But there is increasing awareness among everyone that this is one world we're spinning around in. It's not just a bunch of rich tree-huggers who care."

However, this one-world notion has not convinced the Brazilian government. It has increasingly seen "imperialism" in the U.S. outcry over the Amazon. Senator Chafee has warned on the flight down from Washington that "we're going to be sort of tip-toeing through the tulips."

More like sloshing through swamps. Still, Camp 41, a research center 50 miles north of Manaus run by the World Wildlife Fund and a Brazilian scientific institute, has its compensations. There is barbecued *tambaqui* (a succulent fruit-eating fish) and plenty of Brazilian rum.

Before climbing into his hammock, Sen. Symms of Idaho expounds his theory that elephants could be imported into the Amazon to haul out timber from selective logging. "That way you wouldn't have to build roads," he exclaims.

The next morning dawns sticky. Mrs. Specter, who has passed a difficult night, consoles herself with a hard-boiled egg. "Oh these eggs feel so nice and warm. Everything is so wet and horrible. Or am I not allowed to complain?"

"Sure you can," says her husband, Sen. Specter. "That's guaranteed under the Constitution."

After breakfast, it's time for a walk in the rain forest. We see a leaf-nosed bat, a jungle robin, a squeaky beetle and an army of ants with little white flowers on their backs. "The ants are carrying the flowers to their nest to nurture a fungus they feed on," explains scientist Roger Hutchings.

This is all to illustrate to the senators the delicate symbiosis of the Amazon jungle—an area that would cover over one-third of the U.S. These life patterns might be destroyed by further deforestation. Scientists also point to the vast genetic diversity of the jungle—over 30% of the world's genes are believed to be here, many of them unresearched. Leading environmentalist Tom Lovejoy of the Smithsonian Institute suggests the jungle may contain a cure for AIDS and is "the flywheel of the regional and global climate."

Its own climate can certainly be nasty. As we begin the 500-yard trek out to the jeeps, a torrential downpour strikes. The road back to town deteriorates fast and one jeep doesn't make it up the first hill. "Come on," says Senator Bumpers, "let's push." The senators all get behind and start heaving. "And in Washington they call this a junket," grunts Senator Chafee after slipping to the ground.

The mission continues the next day in Rondonia, a western state already 23% deforested, mainly by pioneers who have come up from southern Brazil where large-scale, mechanized farming has taken over.

Senators Chafee and Symms opt to fly over the area in a small plane to witness the considerable destruction alongside roads carved out of the forest. The land is mainly being used for pasture by poor farmers—part of the human tide criss-crossing debt-ridden Brazil in search of work. And the sight of it throws Senator Symms into some confusion.

"I'm quite sympathetic to poor Pablo down there," he concedes. "After all, he's a pioneer, doing what my family did in Idaho. I don't know what the solution is."

He gazes out the window and a flash of Republican inspiration hits him. "I know. Let's privatize the rain forest. Just remember, freedom works."

Benetton Group S.p.A.

Profit Slipped 0.6% in 1988 Despite 17% Gain in Sales

Benetton Group S.p.A., the Italian casual-clothing manufacturer, said group earnings slipped 0.6% in 1988, despite a 17% rise in sales.

Reduced margins were cited for the lack of earnings growth, along with higher financial charges that were partly the result of increased debt from acquisitions.

Group earnings totaled 130.2 billion lire ($93.7 million) last year, down from 131 billion lire a year earlier.

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The Fungus Is Still Among Us, Thank Heaven

By P.J. Wingate

A plant that produces no green chlorophyl is called a fungus—there are more than 100,000 types of them in the world. They have given us such delightful things as truffles, sauteed mushrooms and penicillin, along with not-so-delightful death-cup toadstools and carcinogenic aflatoxins. For all of which we should be thankful.

It is not necessary here to plead the cause of truffles and sauteed mushrooms. They are to the plant world what lobster and caviar are to the animal world. Some people are allergic to all four of these foods but most people are not, and are inclined to steal a line from Cole Porter and simply call them the top.

Similarly, penicillin needs no one to sing its praises. Despite the fact that penicillin is lethal to guinea pigs and creates deadly allergic reactions in some people, it probably has saved more lives than any other medicine during the past 50 years.

Poisonous toadstools of the Amanita family, looking so much like ordinary mushrooms that some people make the fatal mistake of eating them, and the carcinogenic aflatoxins on moldy peanuts, corn and other grains are another matter.

Why should anyone be thankful such things exist? Because the deadly toadstools and aflatoxins are nature's way of telling us that almost everything has some good in it if we know how to use it properly.

Natural chemicals have the purpose of promoting the welfare of the species that produce them, though the mechanism may not always be evident to people. The mold or fungus known as penicillium notatum had been producing penicillin for millenniums to protect itself from certain bacteria in its environment before Alexander Fleming won a Nobel prize by showing that penicillin could do the same thing for people. True, massive doses of penicillin will kill human beings and even small doses will kill guinea pigs and people who are allergic to it, but none of this negates the fact that penicillin is a great boon to the human race if used properly.

Just exactly what the cancer-producing aflatoxins do for the fungus producing them is not yet known, nor is it known how these compounds might be used to benefit humans, but it is entirely reasonable to assume that someday a way will be found to make use of them, just as ways have been found to make use of such deadly alkaloids as curare, ergot and strychnine.

The struggle for survival among plants has never been restricted to chemical warfare between the fungi and their enemies. The green plants and their foes also have been battling for millenniums. Poison ivy manufactures an alkyl phenol, urushiol, that produces fatal blistering in the mouth and stomach of any animal—rabbit, deer or human—foolish enough to think poison ivy leaves would make a good salad. Similarly, the curare plant manufactures an alkaloid so deadly that no animal eats it, and a bush hunter in Africa can bring down a zebra with a single shot using an arrowhead dipped in curare juice.

Nevertheless, curare used properly in hospitals is a valuable muscle relaxant. Strychnine, deadly in large doses, also has a medicinal use, as does even conine, the alkaloid manufactured by the water hemlock plant, provided it is used in doses far below the massive one in the hemlock tea given to Socrates.

The list is long but I'll end it here with the oldest of all living things—the giant redwood trees of California. Redwoods produce and store in their bark and wood a complex mixture of phenols—distant cousins of the urushiol in poison ivy—that protect them against boring insects and fungi so well that the redwoods can live to more than a thousand years. Even after the tree has been cut down and converted into shingles these phenols continue to protect the wood against all agents of rot until the rains have worked away enough of them to permit decay to begin.

The examples of chemical warfare in nature point to the need for better understanding of how chemicals react with living species, particularly Homo Sapiens. H.L. Mencken once said Homo Sapiens was more sap than anything else, but the sap nevertheless has been making progress in understanding the jungle around him.

Consequently, there is no reason for panic just because one fungus is continuing to produce aflatoxins on moldy corn and peanuts. The spores from this fungus have been blowing around in the air for millions of years, looking for corn, peanuts or some other crop to grow on, and every person now alive has surely been exposed to small doses of these chemicals. Good farmers know that moldy corn should not be eaten, even by hogs, but they also know that if the dose is kept small enough no harm will be done. The key question, however, is just how small is "small enough."

This is a difficult question to answer, but should not be an impossible one. If a fungus can learn now to protect itself against the hazards of nature, so can people. However, it should be noted that the fungi that produce aflatoxins probably outnumber people by a quadrillion or so to one. Scientists must go to work if they hope to make the aflatoxins as useful as penicillin anytime soon.

Mr. Wingate, retired from Du Pont Co., lives in Wilmington, Del.

Wall Street Journal
4-3-89

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31-XI-'89

Tom Belford

Dear Valued Member,

I am proud and deeply honored to be able to announce to you that on November 1, your Better World Society will televise our powerful new documentary on Chico Mendes -- Voice of the Amazon.

And I urge you to watch this moving film about the man Time Magazine recently called "the world's most celebrated environmental martyr."

As you may know, Chico Mendes was a rubbertapper in the Brazilian rain forests who fought to preserve these forests against rampant destruction by short-sighted developers. But Mendes' crusade soon extended far beyond the needs of the local people ... to the needs of our world.

For the trees of the Amazonian rain forests form an irreplaceable engine which generates oxygen and absorbs the carbon dioxide that causes global warming.

Mendes' movement soon became too threatening to those intent on ravaging the forest for profit. They tried to kill him several times, but that did not stop him.

A few years ago, his crusade to save the rain forests of Brazil came to our attention. And in 1987, the Better World Society honored Chico Mendes with our Environmental Award.

But even international recognition could not protect him from the violent forces seeking to destroy the rain forests. Last December, Chico Mendes was viciously gunned down in front of his home in the Brazilian rain forest he had fought so valiantly to protect.

Immediately after his shocking murder, your Better World Society organized the Chico Mendes Campaign to keep his memory and his work alive.

Voice of the Amazon is an inspiring and compelling story of one man's heroic personal struggle to help save our environment.

At the same time, it is far more than that. Our film

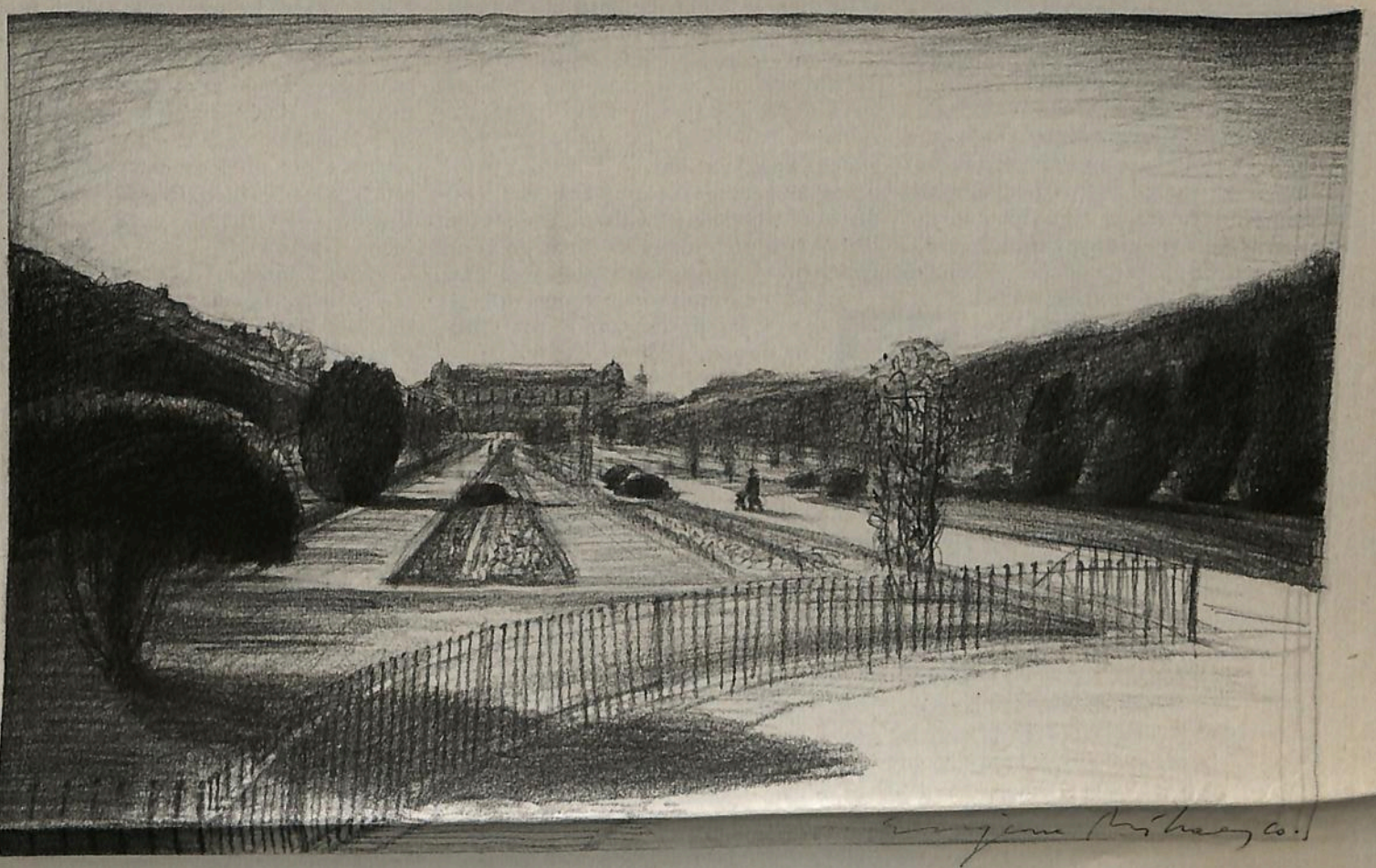
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Better World Society 1100 17th Street, N.W. Suite 502 Washington, D.C., 20036

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OUR FAR-FLUNG CORRESPONDENTS

PLEASANT AND LIVING



THE last time I was in Paris, I gave myself the pleasure, the unusual pleasure, of a long day in the Jardin des Plantes. I say unusual because the Jardin des Plantes, though a favorite pleasance of Parisians of all ages and classes since the turn of the eighteenth century, and no more inaccessible than Nôtre Dame, is all but unknown to tourists. The reason for this would seem to be reasonably clear. The Jardin des Plantes is not a certified sight. It is not Nôtre Dame. It is not the Champs-Élysées or the Eiffel Tower, the Opéra or the Centre Pompidou, the Louvre or the Panthéon or the Café des Deux-Magots. It is still distinctively French and Parisian. In all the hours I walked and wandered there, I hardly saw a man or a woman without a cigarette, I hardly saw a man or a woman without a commodious bag or pocketbook or carryall of some sort, I never saw a pair of sunglasses, and I never overheard a word that wasn't French. Toward the end of the day, when I made her acquaintance, I mentioned this impression to Geneviève Boulinier, the Jardin's public-relations director ("Relations Extérieures et Service de Presse"), and she looked thoughtful. "Oh?" she said. "Oh, no. I do not think that can be entirely correct. It was only two weeks ago we had two visitors here from Finland."

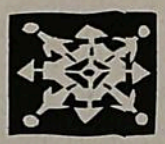
The Jardin des Plantes (like the Panthéon) is on the Left Bank of the Seine, in the populous 5th Arrondissement. It is almost literally on the riverbank. It occupies some seventy walled and richly verdant acres just upstream from the Île Saint-Louis and fronting on the Quai Saint-Bernard and a stretch of Giscard d'Estaing's ingenious stringbean riverside park. It is neighbored on the east by the mass of the Gare d'Austerlitz and on the northwest by the skyscraper campus of the Faculté des Sciences de l'Université de Paris, and the names of the streets that roughly bound it signal something of its history and its character—Rue Buffon, Rue Linné, Rue Cuvier, Rue de Jussieu, Rue Geoffroy Saint-Hilaire. The main, or Seine-side, entrance, a splendor of carved stone and gilded wrought iron, opens on the Esplanade Lamarck.

It is not certain just where the Jardin des Plantes had its beginnings. History records only that it was developed on its present site as the Jardin Royal des Plantes Médicinales (to meet the needs of an expanding herbal pharmacology) in 1635, at the urging of Guy de la Brosse, physician to Louis XIII. For more than a hundred and fifty years, it continued to function under various versions of its royal title, first as directed by de la Brosse himself, and then by such men as Guy Fagon, royal physician to Louis XIV, and Buffon himself, the most eminent natural historian of his day. It emerged from the Revolution as the egalitarian Jardin des Plantes. Though still most visibly a botanical garden, it has vigorously evolved over the many years into something considerably more than that. It now embraces among its gardens and groves a consortium of research and teaching institutes that cover almost the entire curriculum of the natural sciences (biology, chemistry, ecology, entomology, geology, mineralogy, paleontology, zoology,

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comparative anatomy), a beguilement of natural curiosities, and even a menagerie.

I CAME into the Jardin des Plantes by way of the Esplanade Lamarck on a mild, cloudless early-autumn morning. It was hardly ten o'clock, but there were strollers to the right and left and the fore and aft of me. All of them had their bags or pocketbooks or carryalls. I carried a guidebook, the only guide to the Jardin that I could find—a little pamphlet (in French) with a couple of dozen illustrations and a foldout map. We strollers broke ranks around a massive bronze statue—a triple-life-size seated figure in knee breeches. I paused for a closer look: "1744 LAMARCK 1829/ FONDATEUR DE LA DOCTRINE DE L'ÉVOLUTION." I looked again. *Fondateur* of the theory? The Jardin des Plantes was indeed a French, a Parisian, enclave.



Beyond Lamarck stretched an immense parterre of gravel paths and beds of flowers, in brilliant, sunstruck bloom. The parterre extended between a double *allée* of sculptured plane and chestnut trees, and it went on and on and on, for what looked like half a mile, to another esplanade and a building in the style of an eighteenth-century palace. My map identified the building as the Galerie de Zoologie, and through the trees on the left I could see similar buildings—among them (according to my map) the Galerie de Minéralogie et de Géologie, the Galerie d'Anatomie Comparée et de Paléontologie, and the Maison de Buffon. I walked down the rows of flowers in a mingled garden scent of roses and a barnyard smell (from the Ménagerie) of manure. I walked in an almost rural quiet. The only sounds were a distant quacking and squawking and whistling (from the Ménagerie) and (from far away in the outer world) the occasional whoop of a siren. There were benches and metal chairs along the *allées* (all of them occupied by readers or gazers or dozers), and a man in a felt hat bent over an easel. I cut around behind him, and got a glimpse of what looked like Monet's garden. The flowers that surrounded me were of every kind and range of color—like an ardent Oriental rug. There were three-inch meadows of purple ageratum, and three-foot masses of chrysanthemums and dahlias in pink and yellow and red and white and orange and lavender, and roses nurtured into six-foot trees; between the inner rows of flowers were strips of immaculate lawn, too narrow to be mowed by any means but hand—by a man on hands and knees. Apart from the roses and one or two others, the flowers all were annuals. (There were signs along the way: "PLANTES ANNUELLES DES FLEURS: DE MAI JUSQU'AUX GELÉES.") I looked at the acres and acres of flowers, the hundreds of thousands of them, the fruit of uncountable bushels of seed, and thought of spring and planting time, of the hundreds of hours of bent-back labor that made their perfection.

I came to the end of the gardens, to another massive statue, another enormous seated figure in bronze: "BUFFON / 1707-1788." I knew something of Buffon—Georges-Louis Leclerc, Comte de Buffon. I knew of his once authoritative forty-four-volume "Histoire Naturelle." The Jardin des Plantes, as it came to international attention, was largely his creation. In 1739, when he became its overseer, it was little changed in look or purpose from its simple herbal beginnings. He added acreage, he dispatched botanical and other expeditions throughout the darkest Africas and Asias and Americas (whose harvests included the quinquina tree, the source of quinine, and the infamous coca shrub), and he laid the foundations of its present beauty. He found in one far corner of his new domain a stinking centuries-old dump and converted it into a miniature mountain, a model of eighteenth-century landscape ingenuity. He was a naturalist who was repelled by the natural world. His aim, Marguerite Duval notes in her 1977 study "La Planète des Fleurs," was to tame nature to his liking. She quotes his credo: "Brute Nature is hideous and dying; I, and I alone, can render her pleasant and living." I gazed at the giant Buffon. It was, at first glance, an entirely conventional memorial. But only at first glance. Buffon was draped in a great green weathered robe, but one arm and hand were free, and in them, cuddled to his chest, his heart, was a great green bird—part condor, perhaps, or parrot, or wild heraldic fantasy. And not only that. From beneath his chair, from beneath the mighty folds of his flowing robe, peered the head of a lion—a mild and diffident lion, a lion that could only be Bert Lahr. I consulted my guidebook for some sort of explanation. There was no mention of either bird or lion, but there was a further note. The statue had a further distinction. It was erected to Buffon in his lifetime, and he was present and approving at its unveiling.

I stood and looked at Buffon and his strange companions. It was a curious feeling to stand where he had stood, had probably often stood, and to see what he himself must have seen with much gratification. Buffon and his lifetime, his lifetime of accomplishment rewarded by fame, made me think of Lamarck, at the other end of the gardens. Lamarck had stood here, too, had walked and worked and died here. But he had died scorned for his great work—his fledgling theory of evolution—where Buffon was revered for his. (Lamarck's "new piece of madness" was what the great paleontologist Georges Cuvier called it.) His worth was finally recognized (though not by Darwin) in the eighteen-eighties, and his statue dates only from 1908. Buffon by then was only history. Buffon, Lamarck, Cuvier—this was indeed a place of presences, of many presences. Linnaeus had walked here, had visited here, and so had Napoleon. The German naturalist and explorer Alexander von Humboldt had such a feeling for the place that after the surrender of Paris in 1814 he almost single-handed prevented the occupying Prussian troops from vandalizing the gardens. Stendhal walked here (many times), and Victor Hugo, who lived in the neighborhood, walked here daily with his wife. Renoir walked here, and the Dutch pioneer plant geneticist Hugo de Vries, and Colette, and the Peruvian novelist Mario Vargas Llosa ("One day each week I went to the Jardin des Plantes to see the trees and flowers of the Amazonian region"), and Joseph Losey (who filmed much of his "La Truite" in the gardens)—the whole, almost, of Paris. It was an interesting, even an exciting, thought. But it was also a little claustrophobic.

I MOVED on. I found, with my map, the École de Botanique—the modern remains of what must have been the original gardens: an acre or two devoted to the cultivation of herbs and other useful plants. And there was a new smell. I could smell the flowers from the great parterres and the manure from the Ménagerie, but I could also smell a pungency—the heated scent of rosemary and thyme and many different mints. The plant beds all were as beautifully kept as the larger

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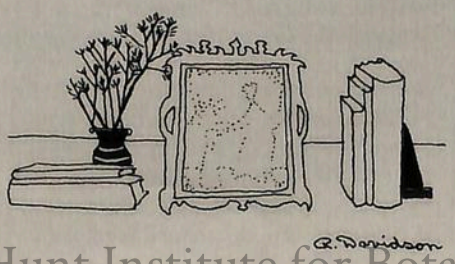
of flowers, and the plants were ied as to kind and function— licinale Textile: Cotonnier," nentaire: Concombre," "Médici- Toxique: Belladone," "Medici- Condimentaire: Cumin." At the of the École de Botanique were llée de Jussieu and the beginning ne Parc Écologique. I followed inding woodland path through ds—woods of natural density, of ral growth, but composed entire- of superior specimens of indige- s trees and shrubs. The end of the c Écologique became the Carré ngniart. This was a little grove of as trees (*Cercis siliquastrum*), nted by Buffon in 1785, which med another monumental statue. It s also monumentally dramatic. It picted, in bronze, a giant, half- ked savage in deadly combat with an en more gigantic bear. The man d thrust a knife deep into the throat the bear, but the bear was crushing e man in a lethal hug. The cause of all was hanging from the man's belt: tiny, lifeless cub. It was a powerful ork, but a peculiar work, too, and it ade me wonder. This was nature, all ght. It was, however, nature very far om that preferred by Buffon.

My guidebook showed a Jardin Iris, described as one of the glories f the place, near the Laboratoire de Cryptogamie. I found it easily enough, but I should have known: I could only imagine its beauty. The iris season is May. There were cries and giggles up ahead. I came to a class of small children sprawled on a sunny patch of perfect lawn. All the girls wore calf- length dresses, and all the boys wore calf-length trousers (they looked like little Tom Sawyers), and all of them were munching tomatoes. I reëntered the chestnut tunnel, and wondered if it might have been here, in one of these *allées*, that Jules Renard made his dis- covery that "shadow lives only in light." I came to an open-air café— the French equivalent of a snack bar in an American public park—with an appetizing menu chalked on a slate ("*Entrecôte et Frites, Saucisson et Frites, Omelette et Frites, Croque Monsieur, Hod dog*"), but also a sign: "FERMÉ." I found an ancient tree— the oldest tree, in fact, in Paris: Le Robinier. It was (my guidebook noted) a black locust (*Robinia pseudoacacia*), grown from a seedling found in Louisiana and planted, in 1601, on the Place Dauphin, by one Vespasien Robin, and then trans- planted by him to its present site in 1635. Most black locusts growing to- day in Europe are (according to Mar- guerite Duval) its progeny. It was im- pressively decrepit: a heavy stump with a thicket of writhing branches artfully propped and crutched. It looked old, very old, but it looked good for an- other century or two. I found Buffon's house, a small château in the style of his time, preserved not (as might be expected) as a museum but as a dingy office building, closed to the public. There was an open gateway beyond the house. I went through, and found myself on a busy street, on the Rue Geoffroy Saint-Hilaire. It was past noon. It was time for lunch. I headed up the street. There would be a restau- rant somewhere near. There always is in Paris.

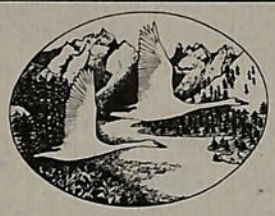
I FOUND one at the end of a long and crowded block of student bars and bakeries and pizza parlors. It was a bistro called Le Buisson Ardent, which is cited (I later learned) with some respect by Gault Millau. The clientele was largely academic—seri- ous men and women of middle age from the university. They were also serious about lunch. I sat with my confit of duck (a specialty of the house) and a *pichet* of Côtes du Rhône, and watched them come and go. Every- one had his apéritif—his Suze or Ricard or Kir. Everyone had his en- trée. Everyone had his main course, with wine. Everyone had his cheese or dessert, or both. Everyone had his coffee. Everyone had his *digestif*—his cognac or mirabelle or poire. Everyone smoked from start to finish. I also no- ticed here and there a curious gesture. The arm was stretched out, the wrist limp and dangling, then the hand vigorously shaken. It was a gesture I had never seen before, but its meaning was clear enough. Negative.

I RETURNED to the Jardin des Plantes by still another gate—a mere break in the wall on the Rue Cuvier. I came in past the Maison de Cuvier, a château much like Buffon's and, like his, now an office building. This was an area of broad lawns and occasional well-grown trees. None of them (my book explained) was an ordinary tree. Each was a specimen, and each had its identifying plaque: species, place of origin, date. One of them—a great plane tree (*Platanus orientalis*), India, 1785—overhung still another statue of monumental size: "BERNARDIN DE SAINT-PIERRE / 1737-1814." I knew about Bernardin. He was Rousseau's chief disciple and the author of "Paul et Virginie," the feverish novella that did much to set the Romantic Movement in motion. But what was he doing here? My book explained. He was, like so many others of his time, a man of protean interests: he served a term as intendant of the gardens. There was a sign to his left: "GRAND LABYRINTHE." And an ar- row pointing up a winding wooded path. This was Buffon's transmogri- fied dump. The sign led me past a famous tree (*Cèdre du Liban*) brought back from England by Buffon's col- league Bernard de Jussieu in 1733. (A once widely held belief related that the tree was brought back from Syria, and that it was kept alive by daily water- ing from de Jussieu's ration.) It was a good big tree, with a spreading canopy of feathery leaves and a bench around its considerable girth, which was oc- cupied, as I passed, by a young man smoking a marijuana cigarette. I fol- lowed the path—and emerged in the shadow of Bernardin and "GRAND LABYRINTHE." I tried again: up past the ancient cedar, past a brown stone obelisk ("DAUBENTON / 1716-1799 / PREMIER DIRECTEUR DU MUSÉUM D'HISTOIRE NATURELLE"), around a turn, and down a steep slope—and into the shadow of Bernardin. I then began to pay attention, and made it to the top—to a kind of gazebo, an open- work wrought-iron kiosk with a jaunty iron cupola. My guidebook spoke of a view, but that would have been an eighteenth-century phenome- non. My view was a sea of treetops. But the kiosk ("LA GLORIETTE DE BUFFON") was itself a view. It was built in 1788, the year of Buffon's death, by an architect named Verniquet, and it was the first iron structure built in France, predating the Eiffel Tower by a hundred and one years.

The Labyrinthe remained a laby- rinth. I left the kiosk by the way I thought I had come, but that meant nothing. I never saw Bernardin again, but I did emerge from the maze, some minutes later, between two great, domed, multipaned greenhouses steaming with tropical plants. These,



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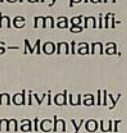
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Duval reports, were the progeny of one designed by Fagon: "One day, Fagon's assistant, Sebastien Vaillant, a talented botanist, received a coffee seedling from Leyden. In order that it might survive, he made, following the suggestions of his Dutch friends, a small glass house 'tall enough for a shrub.' Inspired by this, Fagon immediately ordered built not a small house but vast ventilated glass buildings, heated by pipes. Greenhouses were born." In the distance, in the near distance, sat Buffon. But there was a sign that pointed elsewhere: "ADMINISTRATION." I followed it to another converted château. There, by good fortune, I met a woman with a smattering of English (French is easier read than spoken, and easier spoken than understood), who directed me to still another converted château, to the "RELATIONS EXTÉRIEURES ET SERVICE DE PRESSE," to Geneviève Boulinier.

MME. BOULINIER is young and beautiful and enthusiastic and fluent in English. "So!" she told me. "You are American! And you are here in the beautiful gardens. So now you will tell me what you have seen and how I can help. *Bon! Bon! Très bon!* Most excellent! You have seen the famous sequoia—or, at least, its cross-section? An ancient tree of California that was born before Jesus Christ. It died in 1898. You must see it. It was the gift of America.

"You have seen the Jardin Alpin, the garden of mountain plants? But no! It is closed. The season is over. In the spring, it is all in bloom. So much color. So beautiful. Now, let me think. There is the Ménagerie. Not yet? You must visit there before you go. That is a promise. It is old-fashioned and not large. But it is charming. There are many stories. You know of Bernardin —Bernardin de Saint-Pierre? It was he who began the Ménagerie. It was after the Revolution, in 1793, in the time of the First Republic. He was then the intendant of the garden. Before the Revolution, there were only private menageries—at Versailles and at the châteaus of the nobles. Bernardin removed those menageries to the Jardin des Plantes for the people to enjoy. There were also at that time what were called circuses in Paris. These were the street entertainers—the men with the dancing bears and the trained monkeys. Bernardin had the circuses made illegal, and the animals were brought to the Ménagerie.

"There is a famous Mén story. This was in 1826 and 18 the time of Charles X. The V of Egypt wished to make a g France, and he chose a giraffe. raffe in France at that time was *tique*. No one in France had ever such an animal. So it was arrang was to come to the Jardin des Pla to the Ménagerie. There was excitement. The plan was for giraffe to sail by ship from Alexan to Marseilles, and from Marseill was to walk to Paris. A staff was ass bled: an Egyptian stableman and t Sudan assistants—and three cow provide milk for it to eat. Giraffes much—twenty-five litres of milk ev day. The giraffe landed in Marsei on October 23rd, and it was deci that it should spend the winter th Geoffroy Saint-Hilaire came fr Paris to meet the giraffe, and he signed for it a raincoat to keep it wa and dry until the spring. On May 1827, the walk to Paris began. T first night was spent at Aix. The were crowds along the way to p welcome. There were crowds at eve little town along the way. The giraf reached Lyons on June 6th. Ther was a celebration in the Place Belle cour. Many people had come fron Paris for the great event. Stendhal wa one of these. On June 30th, at sunset the famous giraffe entered Paris. I rested, and then marched across Pari to Saint-Cloud, to be viewed by th King. Then it marched back again to the Ménagerie. The giraffe was the talk of Paris. Six hundred thousand people visited the Ménagerie to see the giraffe that summer. It became high fashion. It had an influence on the couturiers, and there were songs and poems written about it. The giraffe lived long—until the day of January 12, 1845. It was not replaced. It was thought to be too famous. But it lived long in memory. In every French town through which the giraffe had passed on its famous walk, there was named in its honor a street or a square. I think there are many towns where you will still find a Rue de la Girafe or a Place de la Girafe. There was once a Rue de la Girafe even here in Paris."

I CAME upon the ancient sequoia on my way to the Ménagerie. It was much as Mme. Boulinier had said. The cross-section was around ten feet in diameter and ten inches thick, and it stood on its edge behind a protective wrought-iron fence. A plaque identi-

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certain historic events ("PRE-ÈRE CROISADE, 1039") through ich the tree had lived. The last g, the ring of 1898, was remem-ed by its distant donors as "GUERRE SPANO-AMÉRICAIN." The entrance the Ménagerie was off the Allée vier. I bought a ticket (thirteen ncs) and walked up a flowery, tree-ed path between a hilly enclosure ntaining four pacing wolves and a nny field containing what looked e four overturned wheelbarrows. A gn said "TORTUE ELÉPHANTINE." he biggest of the giant turtles irred, its head protruded, it snipped a ny blade of grass, methodically unched, withdrew its head, and ecame again an old, abandoned heelbarrow. Beyond the turtles was n open field (fenced but open to the ky) of noisy ducks and parading geese nd opportunistic visiting gulls and parrows, and standing alone was an strich that looked (as Jules Renard nce wrote) exactly like a giant chick. The path continued to wind through specimen trees and gardens of flowers and widely spaced and unobtrusive en-closures. If this was an old-fashioned zoo, it was years before my time. The zoos that I remembered all had an nstitutional look. I came to the "FAUVERIE." Rilke—Rainer Maria Rilke—had walked here, and had remembered the occasion in one of his late poems, "Der Panther, Im Jardin des Plantes, Paris." But that had been seventy years ago, or more. I passed a black leopard, and then a black jaguar. Rilke's panther, of course, was long gone. I came to a larger cage. It was furnished with a high, rocky cliff and two waiting lions—a male and a female—outstretched. They seemed to have been waiting for me. They gave me a glance, and then a grunt. They stood up, growling. They stood higher, poised on the very brink of the cliff, and roared. And roared. And roared. It had every mark of a perfor-mance. And the moment I took a step, the moment I started to move away, they gave one more awful roar and lay peacefully back on their rock.

I came to an aviary—screeches, movement, color—and a workman climbing out of a miniature pickup truck. He unloaded a couple of bags of seed and a couple of boxes of carrots and two big crates of lettuce. The seeds were merely seeds, a dusty anony-mous mixture. But the carrots! They were a glowing golden yellow and perfectly shaped and matched, as if by hand. And the lettuces! They were great, green leafy bunches of a fresh-ness almost dewy. I stood in wonder. This was what one might expect to see in the markets around the Madeleine or along the Rue de Buci. I watched the workman hoist a box of peerless carrots and carry it in to the waiting birds.

I came to a statue in a convergence of paths. It was a kind of mate to the naked man and the bear. It depicted another naked man in massive bronze —a grinning man of the Stone Age, holding exultantly aloft the bloody head of a tiger. I had wondered about the death struggle in the peaceful Ju-das grove. This was even more pe-culiar. I wondered who could have chosen so ferocious, so inapposite, a sculpture to grace the peaceful Ména-gerie. Was this a revelation of Gallic insensitivity? Or was it a Gallic subtlety? Was it a metaphor? The Stone Age man was a brutal killer of wild animals. Modern man was their keeper. I treated myself to a Gallic shrug, and moved on.

IT was getting late, and I was get-ting tired. I had hardly sat down all day except at lunch and in Mme. Boulinier's office. But I wanted to see the bear pit. I have a fondness for bears. I am of the generation that met them first as toys, as Teddy bears. And there it was, just ahead: "FOSSES AUX OURS." And, as I came closer, "OURS BRUN." I looked down through a bar-rier of bars to a pit of rocks and caverns and a branched dead tree and a trickling rivulet. A big brown bear was asleep in a corner. A second big bear was trudging. A small bear emerged from one of the caves.

A voice behind me said, "Ooh!"

I turned. It was a little boy, with a man I took to be his father.

"Ooh!" the little boy said again. "*Regardez! Nounours!*"

I looked at him kindly. *Nounours* means much the same as Teddy bear.

"*Oui*," the man said. He gave me a smiling look. "*Il s'appelle Martin.*"

"*Martin?*" I said. I went on as best I could. "*Le ours est nom Martin?*"

"*Oui*," he said. He laughed. "*Tous les ours s'appellent Martin.*"

"Oh?" I said. "*Pourquoi?*"

The man gave a real Gallic shrug. "*Le premier ours à la Ménagerie s'est appellé Martin.*"

I looked down at the three bears. I said, "*Bonjour, Martin.*"

"*Non*," the little boy said. "*Pas Martin. Il s'appelle Nounours.*"

—BERTON ROUECHÉ

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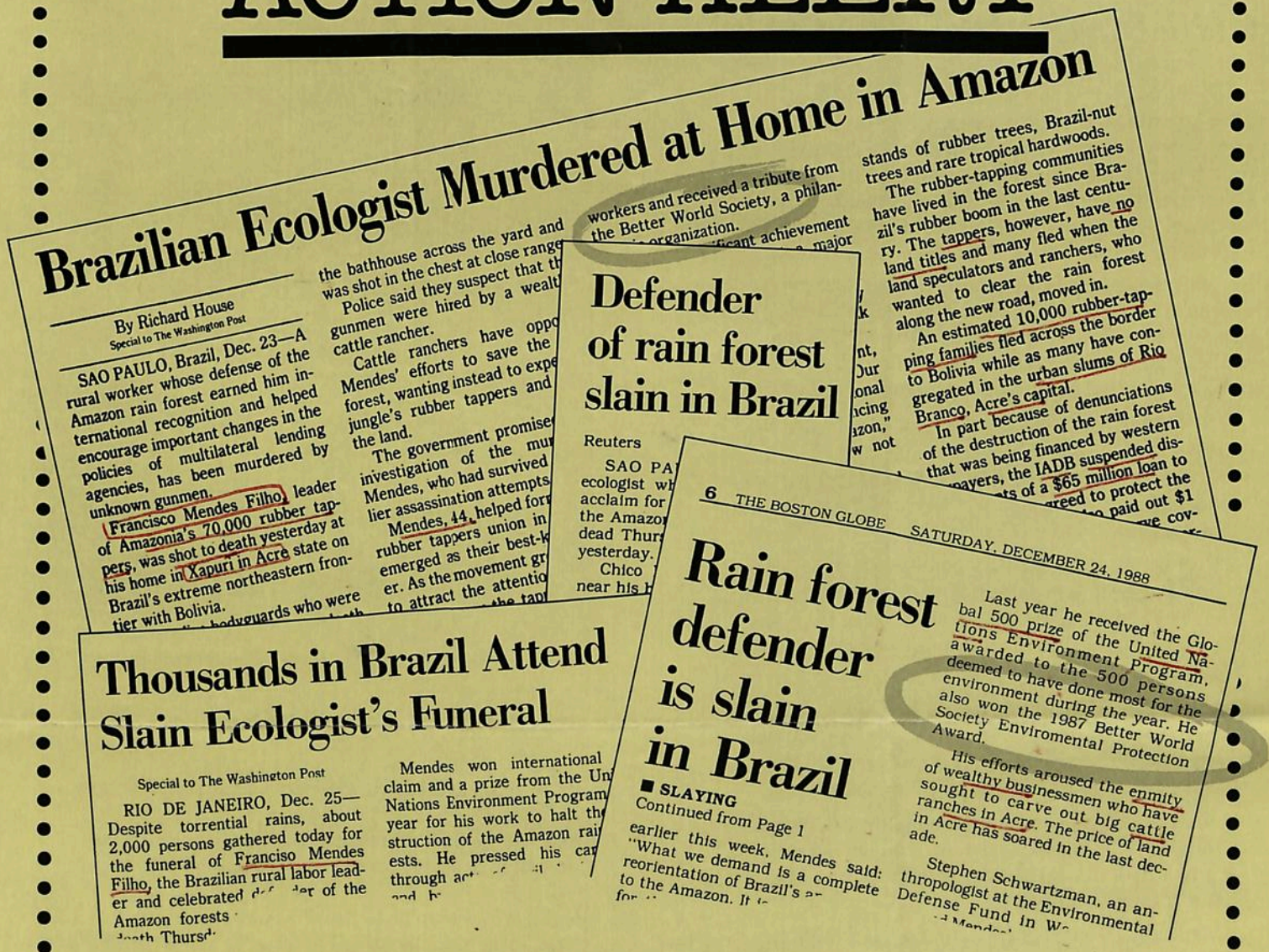
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ACTION ALERT



Brazilian Ecologist Murdered at Home in Amazon

By Richard House
Special to The Washington Post

SAO PAULO, Brazil, Dec. 23—A rural worker whose defense of the Amazon rain forest earned him international recognition and helped encourage important changes in the policies of multilateral lending agencies, has been murdered by unknown gunmen.

Francisco Mendes Filho, leader of Amazonia's 70,000 rubber tappers, was shot to death yesterday at his home in Xapuri in Acre state on Brazil's extreme northeastern frontier with Bolivia.

the bathhouse across the yard and was shot in the chest at close range. Police said they suspect that the gunmen were hired by a wealthy cattle rancher.

Cattle ranchers have opposed Mendes' efforts to save the forest, wanting instead to exploit the jungle's rubber tappers and the land.

The government promised investigation of the murder. Mendes, who had survived earlier assassination attempts.

Mendes, 44, helped form rubber tappers union in the emerged as their best-known leader. As the movement grew, to attract the attention

workers and received a tribute from the Better World Society, a philanthropic organization.

stands of rubber trees, Brazil-nut trees and rare tropical hardwoods.

The rubber-tapping communities have lived in the forest since Brazil's rubber boom in the last century. The tappers, however, have no land titles and many fled when the land speculators and ranchers, who wanted to clear the rain forest along the new road, moved in.

An estimated 10,000 rubber-tapping families fled across the border to Bolivia while as many have congregated in the urban slums of Rio Branco, Acre's capital.

In part because of denunciations of the destruction of the rain forest that was being financed by western taxpayers, the IADB suspended disbursements of a $65 million loan to agreed to protect the paid out $1

Defender of rain forest slain in Brazil

Reuters

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ecologist wh
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Chico
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Thousands in Brazil Attend Slain Ecologist's Funeral

Special to The Washington Post

RIO DE JANEIRO, Dec. 25—Despite torrential rains, about 2,000 persons gathered today for the funeral of Franciso Mendes Filho, the Brazilian rural labor leader and celebrated d... of the Amazon forests
...day Thurs...

Mendes won international claim and a prize from the Un... Nations Environment Program... year for his work to halt th... struction of the Amazon rai... ests. He pressed his ca... through ac... and h...

6 THE BOSTON GLOBE SATURDAY, DECEMBER 24, 1988

Rain forest defender is slain in Brazil

■ SLAYING
Continued from Page 1

earlier this week, Mendes said: "What we demand is a complete reorientation of Brazil's a... to the Amazon. It ...
for ...

Last year he received the Global 500 prize of the United Nations Environment Program, awarded to the 500 persons deemed to have done most for the environment during the year. He also won the 1987 Better World Society Enviromental Protection Award.

His efforts aroused the enmity of wealthy businessmen who have sought to carve out big cattle ranches in Acre. The price of land in Acre has soared in the last decade.

Stephen Schwartzman, an anthropologist at the Environmental Defense Fund in W... and Mendes...

In 1987, Better World awarded Chico Mendes the Society's Environment Medal citing his extraordinary efforts to protect Amazonia's rainforests. He was the organizer and leader of a union of rubber tappers in the Amazon regions of Brazil fighting for responsible use of the land.

On December 22, 1988 Chico Mendes was assassinated for his efforts.

After many attempts and much publicity, gunmen allegedly hired by wealthy ranchers finally reached their target. Thinking this violence would put an end to the "problem" of conservationists, those responsible for Chico Mendes' death have only succeeded in stirring worldwide attention.

The Better World Society is undertaking a Chico Mendes Campaign to heighten public support for rainforest preservation, and to advance the work of Chico's union and similar grassroots organizing efforts to protect the forests.

Tropical rainforests have been called the "lungs of the planet." They provide an essential balance to the global ecology and house nearly one-half the Earth's plant and animal species. They are an especially fragile and vulnerable environment.

However, most Third World countries, aided by public and private international banks have financed large scale projects to develop and exploit their natural resources. The accelerated rate of development without regard to the environment has contributed directly to deforestation. In the Amazon, deforestation claims 2.5 million acres per year. At that rate of destruction, all tropical forests could be gone within twenty years. Global shifts in weather patterns, atmospheric warming, loss of species and other effects will cause incalculable damage to the entire planet. Some of these impacts are beginning to be felt.

We need your help to mount our Chico Mendes Campaign. Listed on the reverse side of this Action Alert is the agenda of the Campaign. Beyond contributing toward production of our film and TV commercial to rally public support, you'll find steps you can take to help protect the rainforests of the Amazon and to see that justice is done in the apprehension and prosecution of Chico Mendes' murderers.

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BW'S ACTION ALERT

CHICO MENDES CAMPAIGN

Better World's campaign has two purposes:

First, to raise monies, in concert with other interested groups, for a Chico Mendes Fund that will provide security for Chico's family, assure legal resources to monitor the investigation of Chico's murder, and directly support grassroots organizing in the Amazon region and elsewhere to protect the rainforests.

Second, to use television to bring even greater public attention to the plight of the rainforests, to advance policies that would protect the forests, and to provide some modicum of protection for those in the Third World *who risk their lives* to save the environment.

Funding permitting, the major elements of our campaign include:

1. Complete and telecast in the U.S. *and* Brazil a documentary program on Chico and the significance of his work.
2. Produce and telecast a TV commercial designed to rally political and financial support to continue the critical efforts Chico led to save the rainforests. Both this commercial and the documentary will carry appeals for contributions to millions of viewers.
3. Co-sponsor with other environment, human rights and interested groups a Memorial Service in Washington.
4. Screen Chico Mendes video at Congressional hearings or comparable forums in the months ahead.
5. Telecast Better World's upcoming film, JUNGLE PHARMACY, which deals with potential life-saving products derived from the rainforests, in the context of this broader campaign.
6. Send official letter of concern from Better World Directors to President Sarney of Brazil.
7. Carry out public relations efforts to keep alive the public concern and issues raised by Chico's murder.

YES! I understand the urgency of getting the Chico Mendes Campaign underway. Here's my contribution. I want to help continue Chico's important work.

I WISH TO CONTRIBUTE $ _____

obsolete.
9:00 PM **FRONTLINE** *Murder in the Amazon* The murder of environmental activist Chico Mendes in Brazil this winter made headlines around the world. FRONTLINE had been covering his campaign to halt the deforestation of the Amazon for some years. cc
11-17 1989

Name _____

Address _____

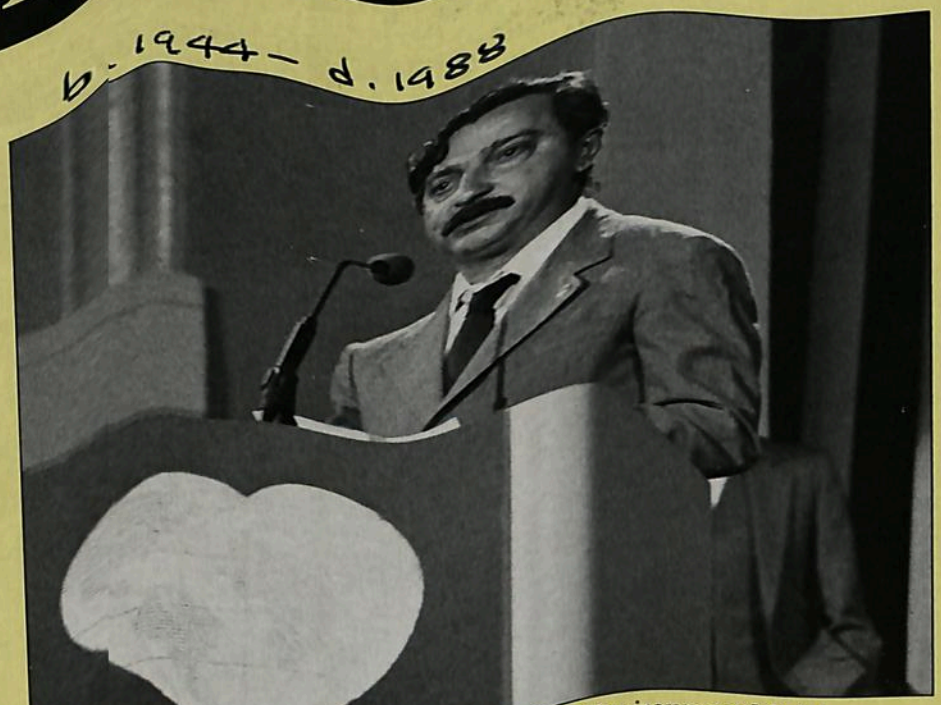
City _____

State _____ Zip _____

Better World Society, 1100 Seventeenth Street, N.W., Suite 502, Washington, D.C. 20036

CMC

b. 1944 – d. 1988



Chico Mendes accepting the 1987 Environment Medal

STEPS BWS MEMBERS CAN TAKE

You can join in the Chico Mendes Campaign right now.

First, you can make an emergency contribution to the Campaign, using the coupon on this page.

Second, you can write to Brazil's Ambassador to the United States, urging him to convey to his government, a) that all those responsible for Chico Mendes' death, whatever their status, be brought to justice; and b) that Brazil adopt stronger measures to protect its rainforests, given their crucial importance to the entire planet.

His Excellency
Marcilio Marques Moreira
Ambassador of Brazil
3006 Massachusetts Avenue, NW
Washington, DC 20008

Third, you can write to U.S. Secretary of State James Baker, urging him to make clear that the U.S. government will not support international development banks if they do not couple their Third World loans with effective environmental safeguards.

The Honorable James A. Baker
Secretary of State
The Department of State
2201 C Street
Washington, DC 20520

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AFTER YEARS OF RELYING ON CHEMICAL insecticides to control rice pests, the Indonesian government has adopted integrated pest management (IPM) as a national policy and banned the use of 57 pesticides on its important rice crop. As a result, Indonesian farmers have dramatically cut their use of toxic pesticides and increased yields in rice paddies across the archipelago.

Indonesia is the first country in the world to take the radical step of institutionalizing a pest control strategy by presidential decree. The commitment of President Raden Suharto to IPM reverses two decades of agricultural practices brought on by the "Green Revolution," which promised miracle rice yields but ultimately delivered devastating crop losses and an expensive chemical addiction.

Indonesia got started on the pesticide treadmill in 1967 when, upon taking office, President Suharto pledged to make his country, then one of the world's largest rice importers, self-sufficient in rice. The ingredients for his Green Revolution were simple: grow strains of rice specially developed to stand up straight, produce more kernels, and resist insects and diseases. Add irrigation, heavy doses of pesticides and fertilizers, and the technological package is complete. By the early 1980s, Indonesia's impressive yields made this country of 170 million people self-sufficient in rice.

But the economic and ecological cost of self-sufficiency was high. Government bureaucracies, under the influence of high-tech agricultural research institutions and powerful chemical companies, pushed a calendar-based chemical application as the solution to all the farmers' pest problems. Government loan packages invariably required that if a farmer accepted a loan, he or she had to accept the chemicals. The pesticide treadmill was virtually guaranteed by some of the highest pesticide subsidies in the world. During the first decades of Indonesia's Green Revolution, the government subsidized as much as 85 percent of pesticide costs, spending an astonishing $150 million a year.

The widespread adoption of the chemical approach left many farmers with the idea that pesticides are progressive and modern. With the cost of chemicals inconsequential, the prevailing attitude became, "the more the better."

But the "progressive" pest control strategy eventually wreaked ecological havoc on Indonesia's rice fields and turned Indonesia's Green Revolution brown. During the 1970s, a small flying insect called the rice brown planthopper destroyed millions of tons of Indonesian rice. Using typical Green Revolution methods—the introduction of a new strain of rice, IR36, and an arsenal of chemicals—the pest was suppressed. But only temporarily.

In 1986, the planthoppers were back. And by the end of the season, 100,000 hectares, roughly 600,000 tons, of rice were devastated. Chemical applications, in some cases up to 15 per month, did nothing to prevent disaster.

The fact is, for Indonesia's rice fields, along with those in Thailand and the Philippines, the use of pesticides actually contributed to the destruction of rice by the planthopper. Long-term studies now show that there is virtually no correlation between the use of pesticides and increased rice yields.

The conclusive evidence was developed by scientists with the Gadjah Mada University and the Food and Agriculture Organization (FAO) of the United Nations, along with Dr. Peter Kenmore, then a graduate student from the University of California at Berkeley. Their work concluded that the use of pesticides killed off the planthopper's natural enemies including wolf spiders, lady beetles and wasps. The pest problem was further exacerbated by spraying such highly toxic pesticides as methyl parathion and diazinon, which actually stimulated the reproduction of the brown planthopper. An FAO report concluded that the planthopper "was a pest because of, not in spite of, pesticide applications."



© FAO

Having discovered the cause of the hopper infestation, the problem then became how to promote its cure. Neither President Suharto in Jakarta, nor the rice farmer in the fields would have willingly given up pesticides without an effective alternative. Fortunately, that alternative, IPM, was then being successfully tested in the field.

The IPM approach involves conserving the hopper's natural enemies, manipulating the planting time to interfere with the steady supply of planthopper food (rice), and spraying only when the pests actually became a threat. At that point, farmers would apply chemicals designed to do the job without stimulating planthopper reproduction.

Translating IPM from field tests to a national policy was a monumental undertaking, which has become one of the most progressive and successful agricultural extension programs in the world. Based on a bottom-up approach to decision-making and training developed by an interdisciplinary team of scientists, including anthropologists, entomologists, and social scientists, the Agricultural Extension Service was able to train more than 15,000 farmers in the IPM techniques in the first year. The decentralized approach worked like a telephone tree: 30 trainers taught IPM to 200 master field trainers, who in turn trained farmers in groups of 20 to 30. These groups subsequently became the nucleus for training other farmers. The government also supplied 1,000 motorcycles so that trainers and pest observers could swarm around the countryside monitoring pest infestations and teaching farmers how to cope without pesticides.

During the first season, pesticide use dropped drastically, and in the third season since the IPM decree, overall insecticide use fell 90 percent. During that same period, rice yields were up, from 6.1 tons per hectare in 1986 to 7.4 tons per hectare in 1987. Farmer's costs dropped from 7500 rupiah in 1986 to 2200 rupiah in 1987, despite an overall increase in the price of the chemicals.

Since Suharto's decision, more and more farmers have laid down their backpack sprayers and are taking greater responsibility for managing their crops. Increased incomes should help the economy, and the government will be able to use money previously used to purchase pesticides to further implement IPM.

The only losers in the IPM deal are the pesticide producers, including such multinational giants as ICI, Ciba-Geigy, Bayer, Monsanto and Hoechst. Dow Chemical Pacific lost 80 percent of its business almost overnight, including half its shipment of Dursban, which was ordered before the ban. Dow has also had to postpone construction of a $4 million Dursban production facility. And Ciba-Geigy is now reconsidering plans to build a $10 million organophosphate manufacturing plant.

Petitions against the order have been submitted to the government, and the companies have complained that the severity of the brown planthopper threat has been exaggerated by the Indonesian government in order to justify a switch in agricultural policy.

But Indonesia has no intention of bowing to industry pressure. The government plans to train 2.5 million farmers by 1994. And other Asian countries—including such important rice producers as China, the Philippines, Malaysia, Thailand, and India—have recently developed similar projects with FAO assistance. □

Kay Treakle is the director of Greenpeace pesticides campaign, and John Sacko is a freelance writer working with the Washington, D.C., canvass program.

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New York Zoological Society

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focus

MAY/JUNE 1988 VOLUME 10 NUMBER 3



Koyo Tanaka WWF

Giant panda.

IN THIS ISSUE:

- Poaching Threatens China's Wild Giant Pandas
- U.S. Economic Sanctions on Japan Increased
- SPECIAL REPORT: Rain Forests

World Wildlife Fund

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Ideas in Ecology

Robert M. May
Jon Seger

The word "ecology" means different things to different people. For example, during the last 25 years or so the word has been used to label attitudes, life-styles, consumer goods, political parties, and college courses. In the 1960s one university renamed its "Home Economics" course "Home Ecology." (But our own biology department reacted to the growing visibility of its conventional "Ecology" course by renaming it "Population Biology.") It is often said that Thoreau coined the word "ecology." He certainly ought to have done so, given the Rousseauesque yearnings that surround the word, and this may be why the myth lives on, even though it stems from a 1958 misreading of the word "geology" as "ecology" in one of his letters (James 1985). The German biologist Haeckel was actually the first to use the word "Oecologie," in 1866.

Three complementary approaches have shaped the scientific discipline of ecology in this century

The scientific discipline called ecology is more coherent intellectually than the spectrum of popular movements of the same name, but in many ways it is even more diverse. Here we make no attempt to give a balanced or comprehensive account of the many lines of inquiry that have been pursued during the last hundred years or so. Instead, we comment on some problems that have long been of central concern to workers in the field, and that are likely to remain so. Our remarks are organized under three headings that correspond to what we see as distinct approaches that have shaped the thoughts and research programs of ecologists.

First, we discuss an approach in which the world is seen to consist of diverse roles and relationships that are acted out by individuals and species. Then we examine a somewhat newer approach in which populations are thought of as mechanistic dynamical systems with characteristic ways of reacting to disturbance. Finally, we look at a currently very fashionable approach that focuses on the unconscious motives and strategies of individual actors on the ecological stage.

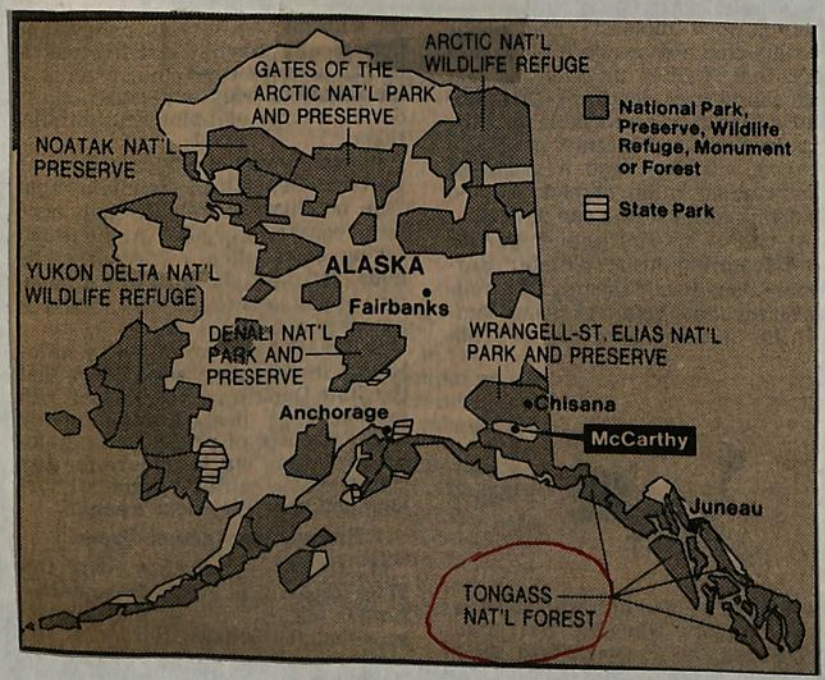
Robert M. May is Class of 1877 Professor of Zoology and Chairman of the University Research Board at Princeton University. After receiving his doctorate in theoretical physics at the University of Sydney in 1960, he spent two years in the Department of Applied Mathematics at Harvard University and then returned to the Physics Department at Sydney. In the early 1970s, his interests turned to problems arising in community ecology. Jon Seger is Instructor in the Department of Biology at Princeton. He received his doctorate in biology from Harvard University in 1980, and then did postdoctoral work at the University of Sussex and the University of Michigan. In collaboration with J. W. Stubblefield, he is currently engaged in a long-term study of the population biology of the bee-wolf Philanthus sanbornii, *a nonsocial predatory wasp. Address for both authors: Department of Biology, Princeton University, Princeton, NJ 08544.*

Roles and relationships

Fascination with the habits and life histories of individual creatures goes back at least to Aristotle, and continues to motivate a host of amateur naturalists, particularly in Britain. Gilbert White's *Natural History of Selborne* stands as a landmark in that it is arguably the first work to see individual plants and animals not simply as isolated curiosities, but rather as parts of a community of living organisms, interacting with the environment, with other organisms, and with human beings. Often thought of as the first book on ecology, *Selborne* was originally published in 1789. It is today the fourth most reprinted book in the English language. Its roughly 200 different editions provide a capsule history of changing tastes in book illustration and design during two centuries of apparently unflagging curiosity about the countryside and its inhabitants.

Darwin was a product of this tradition. Although the *Origin of Species* (1859) is primarily an evolutionary work, it also represents an advance in the definition of ecological questions. Darwin gives us the image of variously shaped wedges being pushed and hammered into a barrel as a metaphor for the way a set of species fit together to form a community. In outline this metaphor anticipates Hutchinson's definition (1957) of the niche as an abstract hypervolume situated in a space whose axes correspond to the biological and environmental variables affecting the organisms in question. The metaphor may also be taken to anticipate the still-unanswered questions of how communities are assembled and what controls the number of species/wedges we tend to find in a given environment/barrel. Elton's more concrete version (1927) of basically the same metaphor invokes the stylized village familiar to readers of Agatha Christie or Dorothy Sayers. Such a community is peopled with distinctive characters playing fixed roles—squire, doctor, lawyer, clergyman, postmistress, and so on—each role being in some way essential to the harmony and well-being of the entire community. The view that there exist fixed ecological roles is supported by the observation that ecological communities often bear striking resem-

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Conservation International Board and Mexico Advisory Group Meet in Yucatan

Conservation International's Board of Directors convened its fourth regular meeting in March in Mérida, the capital of Mexico's Yucatan province.

Led by Vice Chairman Andrés Marcelo Sada of Monterrey, Mexico and Board Member Dr. José Sarukhan of Mexico City, the 14-member governing board hosted a broad cross-section of Mexico's conservation leadership and enjoyed the special hospitality of Yucatan's Governor Victor Manzanilla-Schaffer, local representatives of Ducks Unlimited/Mexico (DUMAC) and Mexico's national conservation organization, PRONATURA.

The meeting focused attention on the direction of CI's expanding Mexico programs and included the first strategic session of its Mexico advisory group. Chaired by Dr. Sarukhan, the voluntary advisory panel was established to assist ongoing development and implementation of CI's Mexico programs. Advisors include public and private sector scientists, administrators and policy makers. As keynote speaker to the meetings, Dr. Sarukhan spoke on "The Importance of Science to Conservation in Latin America."

The preliminary results of Conservation International's comprehensive overview of the status and distribution of Mexico's biological resources (to be published jointly with Mexico's National Autonomous University and INIREB in August, 1988) were presented. In addition, the organization's three-year action plan for its Sea of Cortez Regional Ecosystem Program was reviewed. The Sea of Cortez program is currently one of three priority demonstrations designed to integrate resource conservation and economic development objectives; in this case, emphasizing ecotourism, sustained-yield fisheries and management planning for the 53-island Midriff archipelago.

The Board of Directors approved the first "Strategic Concepts" statement describing the organization's purpose and approach. A version of this document will be published later this year and made available to CI members and the public. In addition the board voted unanimously to elect its newest member, Mr. Paul Hawken. Mr. Hawken, a resident of Mill Valley, California, is president of Smith & Hawken, Inc. and author of several books including *The Next Economy* and *Growing a Business.*

Following its business meetings, board members and special guests visited Ducks Unlimited's Celestun preserve on Yucatan's Gulf coast as well as Palenque National Park in the state of Chiapas.

CONSERVATION CALENDAR

Orion Nature Quarterly
June Issue

"Conservation in the Neotropics" is the theme for the June issue of this nature quarterly published by The Myrin Institute and Conservation International. Contributors include Nobel Laureate Murray Gell-Mann, who outlines the actions necessary to protect neotropical diversity; Harvard University's Richard Schultes, "father of ethnobotany," on new information about medicinal plants; and Mark Plotkin on the experiences of an ethnobotanist in the field. Pulitzer Prize winner E.O. Wilson contributes an essay on the Sea of Cortez in Baja, Mexico. With photography by Eliot Porter, Loren McIntyre, Dave Bohn, Tupper Blake and others, the issue also includes a Conservation Access Directory which tells where to go for information, travel, or environmental action.

SITES Tropical Rain Forest Exhibit
Smithsonian's Quadrangle Complex/International Gallery, Washington D.C., May 21, 1988 through January 2, 1989

"Tropical Rain forests: A Disappearing Treasure" combines images, objects, videos and slide presentations, to present a creative exhibit that explores the vast beauty and diversity of rain forests and the alarming consequences of their current destruction. Visitors will learn about the ecology of the rain forest human inhabitants, the everyday products that come from these fragile ecosystems, the causes of rain forest destruction and the search for lasting solutions and alternatives to preserve these great lands.

Conservation International Anniversary Celebration
Meridian House International, Washington D.C., June 16, 1988

The evening before its June board meeting, Conservation International will host a Special Anniversary Celebration to commemorate our first year by sharing with friends and supporters the nature and progress of our approach to conservation.

As a special feature of the event, CI will present its first conservation achievement award to the people of the Beni region of Bolivia for their outstanding leadership and commitment to conservation and sustained development.

Dr. Bernard Lowy
Louisiana State University
Botany and Department
Baton Rouge, LA 70803

Conservation International
1015 18th St., NW, Suite 1000
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(202) 429-5660

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Trōpicus

Volume IV *Fall 1988*

A quarterly report to the members of Conservation International

As a Mexican, a scientist and a member of Conservation International's board of directors, I am pleased to introduce this issue of TROPICUS—which describes the key points of our organization's Mexico program—and to explain how the program relates to critical changes taking place today in Mexico.

In this country, as elsewhere, formerly technical terms like "ecology," "environment" and "conservation" are now part of the common language. This change signals a growth in public consciousness of environmental limits—there is not enough potable water, clean air and fertile soil to meet the nation's needs for farm and forest products. Every day we hear about more of these shortages. The public is beginning to make connections between human behavior and damage to the natural, ecological systems that support life. So is the Mexican government, which is beginning to take steps to address the needs.

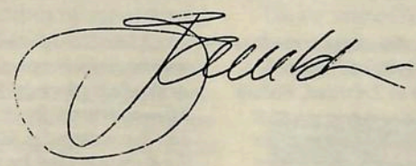
Six years ago, the Mexican government created a Secretariat of Urban Development and Ecology. A new forestry law was adopted in 1986, and in March of this year a "General Law for Ecological Equilibrium and Environmental Protection" was enacted. The actions together strengthen the legal base for conservation in Mexico. In addition, state governments are playing a more active role, treating environmental conservation as a more integral part of the local and regional development process. During the recent elections, candidates at all levels discussed the need for a firm commitment to continue and strengthen environmental conservation policies and programs.

Perhaps the biggest needs now are to increase research, to enlarge Mexico's pool of qualified personnel at all levels, and to promote the spread of scientific knowledge about the environment to those who plan development, manage natural resources and monitor the nation's ecological systems. A growing number of Mexican universities and independent research institutes are taking up this challenge. Also encouraging is the impressive growth in the number of grassroots environmental organizations during the past ten years. Private groups are a new source of energy to promote and sustain conservation programs at the local level.

Conservation International has focused on developing needed local capacity to address Mexico's environmental challenge. In the past it has emphasized partnerships with the academic community and civic organizations. As you will read here, CI is now building on this foundation to create programs that will increase and strengthen: the use of biological knowledge for government planning and decision-making, collaboration by the private sector in specific conservation initiatives, and public awareness about the need for conservation that relates to development.

During the past 18 months, CI's efforts have resulted in the creation of two conservation data centers in Mexico—one at the National Autonomous University of Mexico's Center of Ecology and the other at the Institute of Natural *History in Chiapas. CI has made an important contribution* to Mexico by spearheading the design and production of "An Assessment of the Biological Resources of Mexico". We've also launched our first regional ecosystem conservation program in the Sea of Cortez, and have begun to plan another such program in southeastern Mexico' s tropical forest region, beginning in the state of Chiapas.

Read further in this issue for the details about some of these promising efforts.



José Sarukhán Kermes
Coordinator for Scientific Research
National Autonomous University of Mexico

IN THIS ISSUE . . .



- The challenges in conserving Mexico's biological richness.
- A marine ecosystem first discovered by Hernán Cortez in 1534.
- Partnerships that conserve the natural resources of Chiapas.
- Financing conservation for the long term.

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* Dates in parentheses indicate years spent on the Amazon and tributaries.

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Growth of Tourism Is Benefiting Fragile Environments

Poor countries find economic gains in preserving nature.

By JAMES BROOKE

MANAUS, Brazil

Dotted with monuments from a 19th century rubber boom, this Amazonian river capital eagerly looks forward to a new boom: ecological tourism.

Worldwide concern over the Amazon rain forest is reaching this remote city, bringing waves of American and European tourists and fueling $150 million of new hotel construction.

"In the 1990's, tourism will emerge as the largest single source of income in Amazonas state," Rômulo José de Paula Nunes, president of the state tourism agency, predicted in a recent interview here.

Gaining popularity among Americans and Europeans, "ecotourism" gives third world countries economic returns for preserving nature.

Birding, Hiking, Sightseeing

"Ecotourism is protecting the natural resources by stressing the tourism value of those resources over their exploitation or other development," said John Kusler, American coordinator of the Ecotourism and Resource Conservation Project.

Ecological tourism includes birding, hiking, sightseeing and visits to cultural sights. Several examples from third world countries were cited at a workshop held by the Ecotourism Project last April in Mexico.

In Belize, Central America concern for tourism prompted the government to create aquatic parks along coral reefs and to set aside a forest park to protect black panthers. New hotels in the interior are often of rustic design, resembling native villages.

In Africa, Kenya recently proposed a complete halt to world trade in ivory. Some Kenyans have profited from ivory sales, but officials evidently calculated that elephants are worth more alive than dead. In the last two years, tourism jumped ahead of coffee and tea to become the largest source of foreign exchange for the East African nation.

Business Is Booming

"Many of these countries considered environmental considerations a luxury of rich nations," said Arthur Heyman, of the development office of the Organization of American States. "Now they can't afford not to be conscientious about protecting their environment. If that goes, then tourism follows."

It is not known how many "ecotourists" travel every year. But tour operators say business is booming.

"Trips that used to sell out at the last minute now sell out months in the advance," said Victor Emanuel of Victor Emanuel Tours of Austin, Texas. "More often than not, we have to organize a second group."

In Brazil, tourism is creating a local economic lobby in favor of protecting the Amazon, the world's largest rain forest.

On a recent morning, a Manaus tour boat, the Uruna, nosed through the silt-laden waters of an Amazonian tributary. Watching the lush riverbank foliage slip by, Dionisio Borghi, the boat owner, spoke of the growing economic argument in favor of greenery.

'You Hear Chainsaws'

"You take tourists up a new part of the river, and all of a sudden you hear two chainsaws around the bend," he said "The tourists see the trees cut down and then they turn to me and say, 'Why are you taking me here?' Eventually, there is going to be a conflict. Both the tour operator and the lumberman have to survive."

In June, the governor of Amazonas state announced that he would resume a controversial policy of distributing free chainsaws to jungle settlers. The state accounts for one third of the 1.9-million-square-mile area that Brazilians call "legal Amazonia."

Although still small, Amazonian tourism runs counter to chainsaw development.

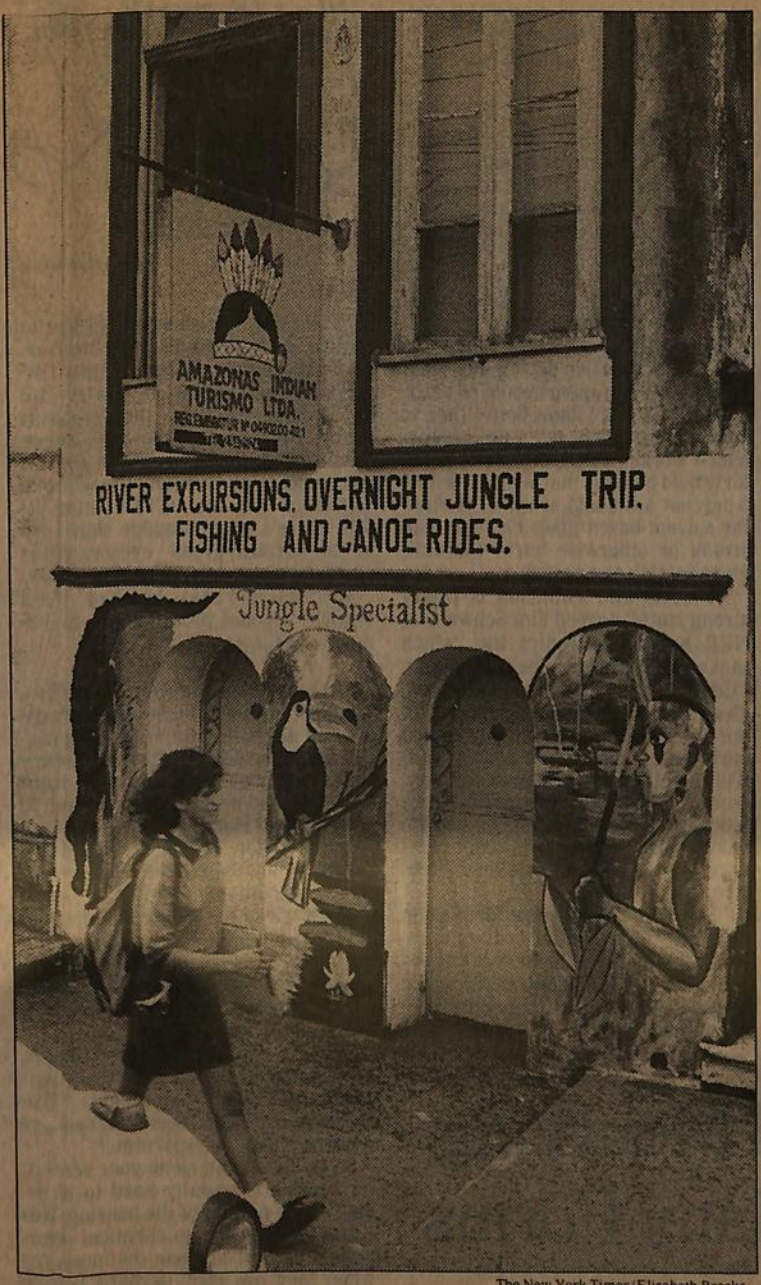
Indeed, the growing worldwide interest in ecological tourism may be most visible in Manaus, a state capital of one million people reachable by a five-hour airplane flight from Miami.

The number of foreign tourists arriving in Manaus increased to 70,000 in 1988, from 12,000 in 1983. In a decade, the number should hit 200,000, Mr. Nunes of the state tourism agency, said.



The New York Times/Aug. 8, 1989

Manaus, Brazil, is a gateway for tours of the Amazon rain forest.



The New York Times/Elizabeth Brooke

Travel agency in downtown Manaus, one of at least 13 companies specializing in Amazon River and jungle trips.

A recent edition of the city's bilingual Portuguese-English tourist guide listed 13 companies offering tours of the surrounding jungle, including Amazon Odyssey Tours, Amazon Safari Camp, Amazon Village and Jungle Trips.

Fears about global warming seem to be prompting some tourists to visit the Amazon.

"It's almost paradoxical," Senator Dale Bumpers, an Arkansas Democrat, said after a recent two-day Congressional fact-finding visit here. "The more the greenhouse effect makes the front page, the more tourism increases." Deforestation of the Amazon, among other things, is thought to increase carbon dioxide in the atmosphere and accelerate global warming.

"In Amazonas state, hotels are now getting the tax incentives that 10 years ago went to cattle ranches," said Thomas Lovejoy, an American ecologist with more than 20 years' experience in the Amazon.

Long the preserve of jungle lodges slung with hammocks and of rustic riverboats in the style of the African Queen, Amazonian tourism is expanding into large-scale luxury operations run by multinational corporations.

During the 1988-1989 winter season, 21 Caribbean cruise ships anchored here, up from one in the 1982-1983 season. Eying the projected tripling of luxury hotel rooms here, Eastern Airlines, a subsidiary of the Texas Air Corporation, recently acquired rights to serve Manaus

The Sheraton Coroporation, a subsidiary of the I.T.T. Corporation,in conjunction with a local Brazilian partner, is building a 330-room hotel here. Hilton Hotels Corporation has also shown interest in building here, Mr. Nunes said.

Henry Maksoud, the owner of one of Sao Paulo's most opulent hotels, the Maksoud Plaza, explained in a recent interview why he decided to build his second hotel in Manaus.

In a Brazilian state, hotels get the tax breaks that used to go to cattle ranches.

"The idea is to show the world that there is nothing in the world like the Amazon," he said of the 350-room Maksoud Manaus which is to open in 1992. "There is nothing like the size of those rivers, those forests. This is the last frontier of tourism."

Advocates of ecological tourism caution that too much tourist development can be counterproductive. In Manaus, two large hotels with inadequate sewage treatment have fouled a swimming beach on the Rio Negro.

"If you begin to open up areas based on the ecotourism argument, it may get out of hand and you might end up destroying what you are trying to preserve," said Mr. Kusler of the Ecotourism Project.

Training for Guides

Furthermore, the successful melding of tourism and environmental protection depends on enlisting the support of local populations. Priority for employment should be given to local inhabitants, especially for training as guides.

In Manaus, the National Institute for Amazonian Research, a government study center here, has agreed to train guides for ecological tours. The guides will learn how to bring tourists to an area without disturbing it.

"Most of the time areas are ruined by people who don't know any better," said William Wendt of the United States National Park Service who often works with foreign park officials. "Destruction is rarely malicious or intentional."

"Ideally, tourists leave footprints and money and only take photographs out," Mr. Wendt said.

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THE DISEASE OF DEVELOPMENT:

DDT THREATENS AMAZON

BY KAY TREAKLE

AS IF BRAZIL'S AMAZON JUNGLE WEREN'T already under enough pressure, a new World Bank loan for an "Amazon Basin Malaria Control Project" will add to its woes. The $99 million loan, matched by the Brazilian government, will provide, over a five-year period, a total of $51 million to spread about 3,000 tons of DDT throughout the Amazon Basin to stanch the spread of malaria. In 1990, malaria is expected to infect more than a million people in Brazil. Although DDT has been used in the Amazon since at least 1983, the new loan expands the existing program to cover approximately 2 million square miles—almost the entire Amazon basin.

During the 1970s and 1980s, the World Bank and other international financial institutions have undertaken massive development projects in the Amazon. Road-building projects, construction of large dams, timber and mining operations, cattle ranching and agricultural colonization schemes have devastated the region. These schemes have opened up the frontier areas of the Amazon to an enormous influx of people. Since 1980, more than 600,000 "pioneers" have entered the Northwestern state of Rondonia alone, and other Amazonian states have experienced unprecedented population explosions.

All aspects of the development of the Amazon basin—the dams, mining, cattle ranching and colonization—have eliminated large tracts of the species-rich rainforest. International concern is focused on these primary development effects, raising doubts about the wisdom of Brazil's plans for the region. Secondary effects, such as the spread of malaria and other problems associated with living in the rainforest, have been largely neglected. Looking beyond the initial destruction, one can see that the ill-considered road, mine and dam-building projects are just the first in a chain of assaults on the Amazon.



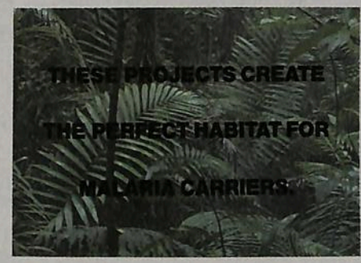
DDT and the Amazon jungle don't mix. The World Bank's $51 million pesticide loan is throwing good money after bad.



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DURING THE 1960S AND 1970S, AFTER IT BECAME clear that the chemical was producing significant problems in wildlife, particularly birds, DDT was banned in most developed nations. In the rest of the world, however, DDT continues to be the pesticide of choice because it is extremely effective against certain species of mosquitoes, at least at first. DDT has been used in malaria-eradication efforts sponsored by the United Nation's World Health Organization (WHO) and national health agencies throughout Asia, Central and South America, and some areas of Africa since the early 1950s.

There are two significant reasons for the increase in malaria where development has occurred. First, the projects create the perfect



habitat for malaria carriers (several species of Anophelene mosquitoes). Road-building and mining projects create stagnant pools of water in which mosquitoes breed prolifically. And deforestation exposes mosquito breeding areas to sunlight, which speeds their development.

Second, new settlers moving in and out of the Amazon frontier become carriers and spread the disease. About 280,000 cases of malaria were reported in 1983, 500,000 in 1987. For Indians, malaria is increasing due to the destruction of their environment and the increased contact with non-Indian settlers.

DDT's persistence—one reason why ecologists don't want it to be used—is the feature health officials find most appealing. Because it is so long-lived, DDT need not be sprayed as often as other chemicals. It is nearly six times cheaper to use than malathion. In poor countries, DDT provides a quick, cheap, and initially effective hedge against malaria.

Yet the effectiveness of DDT and other chlorinated pesticides wears out, particularly in areas where the insecticide has been used for both agricultural pests and mosquito control. India, Sri Lanka, Indonesia, and parts of Central America and the Caribbean have all witnessed an alarming and unexpected resurgence of malaria after the mosquitoes have become resistant to DDT. In Sri Lanka, 3,500 cases of malaria were reported in 1967. But in 1968, only one year later, 1.5 million people were infected. India now spends half of its health budget on malaria control.

As early as 1970, resistance to DDT was considered a major setback for the control of malarial mosquitoes. That year, the WHO's expert committee on insecticide resistance reported that 38 Anophelene mosquito species where resistant to one or more chemical insecticides, including 15 species resistant to DDT. At least one species of Anopheles—a. albitarsis—is already resistant to DDT in Brazil.

Among other things, the World Bank's DDT plans include spraying DDT on the interior walls of millions of homes over a five year period. But in many places there are simply no interiors to spray. Houses frequently have no walls, or if there are walls, they have windows with no covering. For them, the Bank's loan proposes curtains and sleeping nets impregnated with a synthetic pyrethroid insecticide, deltamethrine.

The loan also will provide money to assist SUCAM, Brazil's public health agency, and improve health services in the region. Clinics are to be established, health workers trained, and "environmental sanitation" and biological control projects undertaken in urban areas.

But while insecticide use is only one component of the plan, it represents about 26 percent of the entire program. The budget for research, which is where alternative control methods would be investigated, will receive a paltry three percent of the $198 million total. Moreover, research for other control methods is only one of the research papers specified in the loan, thus representing only a fraction of a fraction of the program's budget.

Considering the environmental and resistance problems guaranteed to accompany DDT use, it is discouraging that alternative control methods do not have a higher priority in the program. The World Bank seems unconcerned about the environmental consequences of using DDT, claiming that "the area to be sprayed is small." They assume that DDT use will be limited to indoor spraying by trained applicators.

But it is unlikely that the use of DDT will be limited. The spread of DDT and other available insecticides to use in agriculture will be difficult, if not impossible, to control. Dr. Michael Hansen, a researcher with the Institute for Consumer Policy Research, says, "Once DDT is available, especially in agricultural areas, it will be only a matter of time before the pesticide is used—albeit illegally—for pest control in food crops.

"Despite the World Bank's proposal to train applicators and restrict the chemical's use, there is simply no guarantee that the pesticide will be kept under lock and key." Hansen argues. "When such broad-spectrum, immediately effective pesticides become available for 'limited' uses, local agricultural use nearly always follows."

DDT use will have a profound impact on the Amazonian environment. Non-target species, including birds, fish, insects, and soil organisms will likely fall victim to DDT's acute and chronic effects. In an ecosystem dependent on an incredible diversity of species, widespread DDT use in the Amazon will generate a new wave of development problems, with unforeseeable consequences. □

Kay Treakle is the international coordinator of the Greenpeace pesticides project.

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U.S. Aides See No Victory in American's Release

By MAUREEN DOWD
Special to The New York Times

WASHINGTON, Dec. 13 — United States officials, reflecting the uncertainty about Jennifer Jean Casolo within the Administration, said privately today that the Connecticut woman's release from prison in El Salvador was not seen as "a victory" for the Administration.

A State Department official suggested that there are still doubts about Ms. Casolo's innocence. "There are real, compelling issues about how the weapons got there and why her personal effects were found with them," said the official.

The official said: "We had hoped she would stay down there and cooperate in the case, but she did not. Our position was not to lean or pressure or strongly urge or condition assistance to El Salvador on her release in any way."

The Administration's muted, if chilly, response today was in keeping with the response of Bush officials in the days after Ms. Casolo was seized.

Ms. Casolo's release and deportation followed intensive lobbying by Senator Christopher J. Dodd of Connecticut, who said today that he had been in almost constant contact with the Salvadoran President, Alfredo Cristiani. The Senator, an influential lawmaker on Central American policy, persuaded Mr. Cristiani that it was not in the best interests of El Salvador, a major recipient of American aid, to pursue a trial.

U.S. Signals on Casolo

The day after her arrest, Marlin Fitzwater, the White House spokesman, was unsympathetic and sarcastic about the American woman. "There are indications of her involvement, that's for certain," he said, adding, "We're talking about tons of equipment and mortars and dynamite and rounds of ammunition and explosives. This is hardly a case of someone having a few things flipped in their shopping bag on the way home."

Senator Dodd, a leading advocate for Ms. Casolo, was furious at Mr. Fitzwater. The spokesman apologized for his remarks, but Mr. Dodd said today that it was extremely damaging because "it signaled open hunting not only on Jennifer but on hundreds of other legitimate Americans working with poor refugees."

At the same time, the Administration sent other signals that Ms. Casolo was suspect. A Justice Department official said the department would seek to determine whether she should be charged with violating the Neutrality Act, which prohibits American private citizens from taking sides in wars in which the United States is not involved.

Also, an American Embassy official in El Salvador was notified by the police of the raid and was present as the yard was searched. One senior United States official who helped prepare the raid told a reporter, "It's a good bust." Embassy officials were also with Ms. Casolo throughout her initial detention and interrogation.

Today, State Department officials said there was nothing injurious to Ms. Casolo in the presence of the consular official during the police search. "We were asked by the police to come to the scene as a courtesy," the official said. "The more access we get, the more we take."

But Monday, President Bush became involved in the Casolo case, saying he had asked the Salvadoran President to make sure that the American woman received a fair trial. Senator Dodd said today that the Bush comments raised the profile of the Casolo case and helped somewhat in getting Ms. Casolo released.

Although the Administration seemed to keep Ms. Casolo at arm's length, Senator Dodd praised the American Ambassador to El Salvador, William J. Walker, for being "tremendously helpful" in gaining her release.

Reflecting the ambivalence about Ms. Casolo's protests of innocence in the case, in which she was accused of storing weapons for Salvadoran rebels, a White House aide said, "We certainly shouldn't suggest that the Salvadorans look the other way while someone violently overthrows their freely elected Government."

Awkward Position for Washington

In comments that mirrored the view of other senior Administration officials, he said the American position had been to tell the Salvadorans to look after Ms. Casolo's "physical well being and legal rights," but to stay out of the case and leave it to the Salvadoran judicial system.

"Our job is not to get every American out of every jail," the White House official said. "We just have to make sure that they get fair treatment and due process, and the Salvadoran Government assured us that that would be the case here."

Beyond the uncertainly about Ms. Casolo, State Department officials acknowledged that they were in an awkward position in their dealings with the Salvadoran Government. "It's complicated because we have been pushing, urging, cajoling and beating on the Salvadorans for the last five years to construct a viable judicial system that impartially imparts justice," said a State Department official. "That made it difficult for us to say 'Release her because she's an American.'"

Ms. Casolo, a 28-year-old resident of Thomaston, Conn., went to El Salvador in 1985 to work for a Christian group that organzies tours for Americans to learn about the civil war there. She was arrested with two Salvadoran friends Nov. 26 after a police raid on her house. The police said they uncovered a large cache of grenades, dynamite, detonators and other weapons, as well as some of Ms. Casolo's personal effects.

Cristiani's Doubts on Evidence

Senator Dodd said that shortly after Ms. Casolo was arrested, Mr. Cristiani told him that he had doubts about the evidence in the case.

The Salvadoran authorities had been tipped off to the cache in Ms. Casolo's yard, the largest discovered in the war, by guerrillas they had captured.

Mr. Dodd said in a telephone interview that, while he did not threaten Mr. Cristiani with a possible cut-off in American aid, he was candid with the Salvadoran leader. Mr. Dodd has considerable leverage since he is chairman of the Foreign Relations panel on Latin America, which oversees American aid to El Salvador. That aid is currently $1.4 million a day.

"President Cristiani told me last week that he had been going back and looking at the evidence and he was concerned that the testimony from the captured guerrillas was not terribly reliable," said Mr. Dodd, speaking from his office in Wethersfield, Conn.

Mr. Dodd said that in his many conversations with the Salvadoran President since Ms. Casolo was arrested, he tried to communicate the concerns in Congress and the possible implications for Salvadoran aid in light what he called "eroding support" for the Cristiani Government after the slayings of six Jesuit priests last month.

Ms. Casolo's case worsened the situation, he told Mr. Cristiani. "I didn't say, 'I'm going to cut off millions of dollars in aid to you,'" he said. "I merely tried to give an accurate picture as I read it talking to my colleagues in the Senate and listening to others of their deep concerns being expressed by conservative Republicans as well as liberal Democrats."

There was scant Congressional reaction, partly because Congress was in recess.

Senator Joseph I. Lieberman, Democrat of Connecticut, said the release of Ms. Casolo "certainly avoids what could have been a disaster in terms of their relationship with the United States."



Associated Press

Jennifer Jean Casolo, an American arrested in El Salvador on charges of harboring arms, was ordered released yesterday and deported. In Wethersfield, Conn., her mother, Audrey, appeared at a news conference with Senator Christopher J. Dodd.

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The New York Times

Decline in Births Eases Brazil's Population Worries

Continued From Page 1

cording to Bemfam, Brazil's largest private family-planning agency. The two most popular methods, contraceptive pills and sterilization, have suddenly become universally available.

Surveys show that a vast majority — 93 percent — of women who use birth control pills buy them over the counter without a prescription.

About 27 percent of married Brazilian women are sterilized, well above the American level of about 17 percent. There has been no parallel trend toward sterilization among Brazilian men, however. Of married men in Brazil, 0.8 percent have undergone sterilization.

Seated on a wooden bench in a family-planning clinic here, Maria Izete Costa Marinha recounted a personal childbearing history that somewhat resembles Brazil's: Her mother had 12 children. She had three children. Her daughter wants to have two children.

Napoleão Teixeira Leão Jr., a doctor at the family-planning clinic visited by Mrs. Costa, said Brazilian attitudes toward the sterilization of women had changed radically.

"My father, who is also a gynecologist, tells me that in the 1960's a doctor who performed the operation was a 'tube-tier,' almost a criminal," Dr. Leão said at the clinic run by Bemfam.

The operation, which is virtually irreversible for women, is often performed here without adequate counseling, he said.

"There are lines of women at the university hospitals trying to get the operation reversed," Dr. Leão said.

When planning fails, about three million Brazilian women resort each year to illegal abortions. In one of the first such protests here, an American, Joan Andrews, led an anti-abortion demonstration last month outside a clinic.

Economic uncertainty has also played a role in pushing down Brazil's birthrate. In the 1980's, Brazil's per capita income remained largely stagnant.

By contrast, in the United States and Europe, decreases in family size generally coincide with improved living standards. In Brazil, where family size now approaches that of the United States in the 1960's, 300,000 babies still die annually before their first birthday.

Wants to Stop at One

"The lower class can't afford to have more children," said Solange Ribeiro, who also waited her turn at the Bemfam clinic. At age 28, Mrs. Ribeiro, the wife of a bank clerk, said she wanted to stop at one child.

"You have to buy yogurt, medicines, clothes, doctor visits," she said of her year-old son, Silas.

But in the past, poverty did not stop Brazilian women from having children. Another woman at the clinic, Margarida Peira, mother of four, said her mother, a farm worker, had 28 pregnancies.

Many social scientists say they believe that television, which now covers Brazil, has created new aspirations and new standards among Brazilians.

"Television transmits images, attitudes, values and habits of a modern, urban, industrial and middle-class Brazil," Mr. Martine wrote recently in Ciência Hoje, a Brazilian scientific monthly. "They are images of the small, affluent, consumer-oriented family, of a divorce between sexuality and procreation."

Márcio Ruiz Schiavo, executive secretary of Bemfam, agreed, stressing the powerful influence of Brazil's evening television dramas.

"The soap operas very rarely show couples with lots of children," he said. "When they do, the families are poor and miserable."

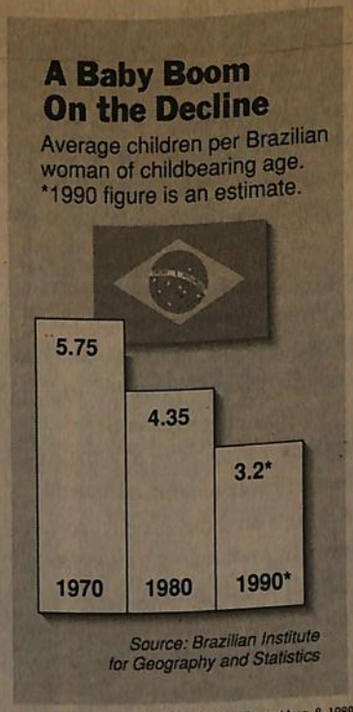
Penalized in Job Market

In addition, a clause in Brazil's 1988 Constitution that stipulates four-month maternity leaves appears to be penalizing fertile women in the job market. Women's groups report that some employers have demanded that young women seeking jobs show certificates of sterility.

Last month, workers at a lingerie factory where women were forced to undergo regular urine tests went on strike. Women found to be pregnant were dismissed, the strikers charge.

Although all trends point to continued decline in growth rates, demographers are sure that Brazil's population bomb was not a dud.

Because of the large number of women entering childbearing age and because of continued immigration from the countryside, planning officials calculate that the population of greater São Paulo will increase from about 18 million today to 25 million by the year 2000.



The New York Times/Aug. 8, 1989

Contraception, the economy and TV are credited.

Arafat's Group in the P.L.O. Backs His Strategy on Israel

TUNIS, Aug. 4 (Reuters) — Al Fatah, the largest group in the Palestine Liberation Organization, gave its leader, Yasir Arafat, approval today to continue with his diplomatic campaign for a Palestinian state alongside Israel.

The action was taken at a congress of more than 1,100 delegates, the movement's first such meeting since 1980. Delegates said that Mr. Arafat, who is also chairman of the P.L.O., won 90 percent support in a vote and that the 10 percent who voted against, most of them hard-liners, said they would abide by the majority decision.

Texts of the political resolutions were not immediately available.

Hussein Meets U.S. Envoy

AMMAN, Jordan, Aug. 7 (AP) — King Hussein conferred with an envoy from the United States today on Palestinian aspirations, the civil war in Lebanon and the hostages held there, the official Jordanian press agency reported. The agency said the envoy, John Kelly, Assistant Secretary of State for Near Eastern affairs, delivered a letter from President Bush during the two-hour meeting. The agency gave no details of the talks. Mr. Kelly visited Israel and Egypt last week, and he briefed the King on his meetings with Israeli leaders.

U.N. Team Is in Cambodia

BANGKOK, Thailand, Aug. 7 (AP) — A United Nations team arrived in Cambodia today to investigate the possibility of forming an international body to monitor the withdrawal of Vietnamese troops, Cambodia's press agency said. The fact-finding mission, headed by Lieut. Gen. Martin Vadset of Norway, was sent by the international conference on Cambodia that began meeting in Paris about a week ago. It is to report back this month to the conference.

Don't overlook the special International Report every Monday in Business Day

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