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A Strategy for Preserving Tropical Rainforests

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Some scientists predict that by the year 2000, 50 percent of the world's remaining tropical forests will be gone. Drawing: T Newlin.

Tropical forests are assailed by a host of unrelenting and remorseless enemies. If unchecked, these forces will eliminate 50 percent of the world's remaining tropical forests by the end of this century. Associated with these forests, the greatest diversity of plants and animals found on earth will also become extinct. And mankind will lose, forever, the opportunity of domesticating or harvesting these organisms for his own benefit. Many species will become extinct before their existence is recorded and their potential benefits and usefulness are assessed.

In this article I propose a plan to preserve a sample of the world's remaining moist tropical forests through the establishment of an internationally financed system of Tropical Moist Forest Reserves. The preservation of large tracts of the world's remaining tropical moist forests would provide a partial solution to one of the most critical resource destruction problems that we will otherwise experience during the last two decades of this century. It is urgently needed because of the rapid rate at which the destruction is advancing and the irreversibility of its effects. The threatened resources cannot be replaced. No technological solutions will permit their recycling.

Forty-two percent of the tropics—some 1.9 billion hectares, twice the land area of the United States—contain significant forest cover. Over one billion hectares are closed moist forest; the remainder is relatively open, drier forest of the sort found in much of the southern parts of Africa or the Mato Grosso of Brazil. The world's remaining tropical moist forests are located in three regions: South and Central America, 42 percent; Asia, Australia, Oceania, 21 percent; and Africa, 37 percent. Already Latin America has lost 37 percent, Asia 42 percent, and Africa 52 percent of their original areas of tropical moist forest (1, 2). Between eleven and fourteen hectares of both forms of tropical forest are being cut worldwide each minute. An area of tropical forest greater than the United Kingdom or half the size of the state of California (245 000 km^2) is being lost each year. Not all of this cleared land is necessarily left entirely without forest. In some cases we witness a substitution of plantation or second growth forests for the original high diversity forests.

It is obvious that the tropical forests will become increasingly scarce and more valuable in years to come because many of the developing nations which possess these forests are under heavy pressure to exploit them immediately for foreign exchange and to accommodate growing populations. It is unreasonable to expect developing nations to reverse, unaided, the conventional economics which stress immediate, short-term goals at the expense of long-term, less quantifiable benefits.

It is equally unrealistic to expect tropical nations, solely on the basis of small grants from private conservation organizations, to be effective custodians of parks and reserves called for in some of the elaborate global schemes. The great numbers of reserves enacted on paper and never supported on the ground bear grim testimony to the uselessness of conservation ethics without the concomitant financial resources to implement them.

A number of solutions have been suggested to solve or ameliorate the problems of tropical deforestation including: adoption of a new world-wide economic order; increased cooperation among nations to protect valuable resources; increasing the commodity price of timber through the formation of hardwood-exporting cartels (a solution which might turn out to be counterproductive by making it profitable to invest in the equipment necessary to extract timber from the most remote and inaccessible areas); the rental of tropical forests by developed nations; increased research and development of tropical forest resources; increased education and public awareness about tropical forests; development of alternate technologies to reduce demands for tropical forest products; and an attack on the cause of the pressures upon tropical forests including poverty, underemployment, food and energy deficiencies, and uncontrolled population growth (3–8).

Among the most promising of the various studies purporting to deal with the problems of future resources is *Global Future: Time to Act,* published in 1981 by the Council on Environmental Quality and the Department of State (USA). A series of refreshingly specific and comprehensive recommendations are made in order to counter the loss of biological diversity in certain ecosystems. Perhaps most significantly, this report recognizes the need for the richer countries "to pay part or all of the costs of protection and management of critical areas that are unique to mankind." However, the amount suggested—one billion dollars over ten years—for establishing an international fund to assist developing nations manage reserves is clearly insufficient to have a significant impact on the future of tropical forests.

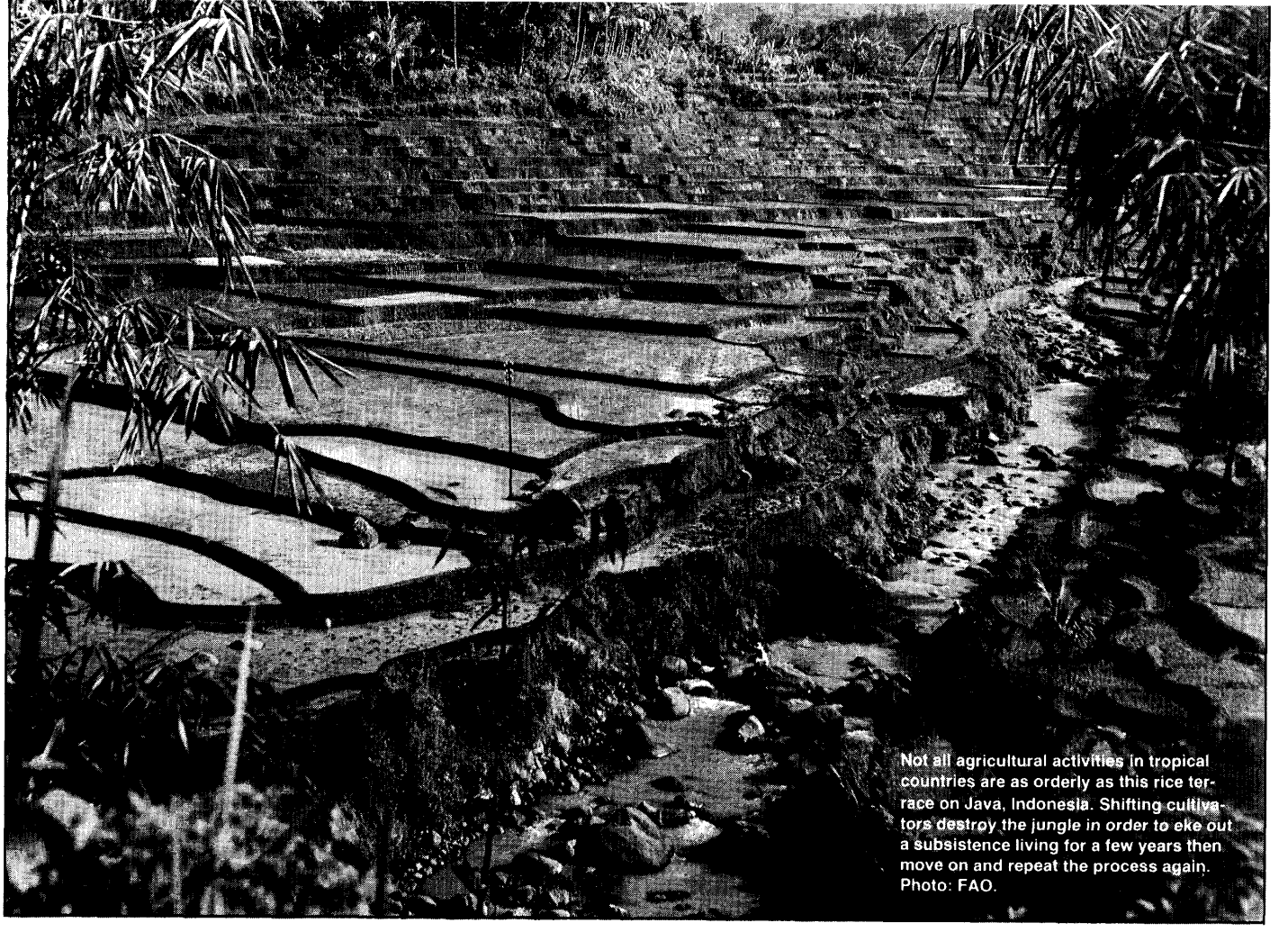
Most of the recommendations in these studies embody admirable objectives and need to be urgently pursued. However, they are neither individually nor collectively capable of being pursued at a rate sufficient to prevent the elimination of 50 percent of the remaining tropical moist forest resource base by the end of this century. Nor will the nations possessing the tropical forests, for the most part fully aware of the rare and fragile resources which they possess, be able to defer the immediate economic exploitation of these resources.

INTERNATIONAL PROGRAM

The strategy I propose requires establishment of a system of tropical moist forest reserves financed by all of the developed temperate zone nations. Payments for this system of reserves should not be regarded by the developed nations as altruistic but rather as self-serving expenditures; a vaccination now against potential future infection. In effect, we are already paying the oil-exporting nations for more than the cost of finding, extracting, transporting and refining oil. Instead, we pay, and rather handsomely, into a trust for the social security of those nations when the oil runs out. It is therefore proposed that the developed nations pay now for their own future security, by investing in a trust whose aims would be to protect the diversity of life embodied in the tropical moist forests of the world.

The payments for a system of reserves must not be perceived to be an attempt on the part of the rich nations to meddle in the internal affairs of the developing countries. Participation in the program must be voluntary and should not be viewed in any way as affecting these nations' sovereignty over their forest reserves.

According to the proposed plan, each host nation would receive annual payment, the amount based on the area under protection, to act as custodian of reserve areas



Not all agricultural activities in tropical countries are as orderly as this rice terrace on Java, Indonesia. Shifting cultivators destroy the jungle in order to eke out a subsistence living for a few years then move on and repeat the process again. Photo: FAO.

of tropical moist forests. Maintenance of the reserves would be monitored by annual inspections. If the area under protection had been reduced or there were more squatters than initially specified, then the payments would be substantially reduced. Thus, there would be a direct economic incentive for rigorous protection of the reserves.

The capacities of forestry and park service institutions in many countries will be inadequate to absorb large amounts of external funds. In some cases it may prove necessary first to finance small technical assistance programs to build up the infrastructure of the organizations charged with the custodianship and management of the reserve system within each country.

The funding each participating nation receives should exceed the requirements of simply developing or enriching the infrastructure of national park or forestry conservation services in the participating countries. The proposed funding should cover the intensification and diversification of agriculture in other areas so as to ease the pressure on the reserves to provide new agricultural land. Funds could also be used to develop plantation forests in other areas in order to provide employment, firewood, and other needed forest products. They should also be sufficient for public education programs in the participating nations so as to broaden acceptance of the concept of forest preservation and to develop respect for the reserve's borders, rules, and regulations. The payments should be made without any conditions on use other than the protection of the agreed-upon area at the time of registration.

Some nations participating in the program may lack sufficient technical personnel to prepare the necessary surveys for registering their new reserves. In these cases, a program of "start-up" grants should be administered, which could employ consultants to prepare surveys, mapping, inventories, legal reviews of the relevant local and environmental laws, and the preparation of new legislative packages where these are a prerequisite for participation.

Clearly detailed surveys and inventories will not be accomplished in the relatively short-term allotted for preparing the registration documents—this would normally require a long-term activity of research and analysis of each reserve. The preparation of the application would require approximately one year—less for reserves where much of the requisite data already exists. Registration should be left open for approximately five years after the program is initiated or until the goal of 1000 tropical moist forest reserves of approximately 100 000 hectares each is established. Some reserves will be considerably larger; as in Amazonia, for example, where the Brazilian government is already establishing reserves, some of which are over one million hectares. Others may be considerably smaller.

It is, of course, recognized that many of the reserve boundaries will be a compromise based upon administrative and political constraints. Clearly, boundaries that include natural barriers such as mountain ranges or rivers are usually much easier to patrol than those which abut urban areas. Since selection of the areas to be included in the international reserve program must be left up to the individual nations, areas can be selected for which there are a minimum of conflicting development plans. The hostility frequently associated with reserve establishment as being antidevelopment can at least be partially avoided (9).

WHAT WILL THIS PLAN ACCOMPLISH?

A goal of one hundred million hectares of the world's tropical moist forests established into a system of effective and carefully monitored reserves, and financed by contributions from the developed nations may seem ambitious. Actually, this represents only about 10 percent of the remaining tropical moist forests. The proposed plan for a system of tropical forest reserves will not stop the process of deforestation. What would be accomplished instead would be the establishment of a safety valve. Some diversity is preserved. Some options for the future are maintained. If we have erred, if 10 percent of the earth's remaining tropical moist forests is found to be insufficient to protect watersheds or maintain climatic balance, then at least there will be a reservoir of plants and animals adapted to life in the tropics to provide the source material with which to attempt to recolonize other areas. This process, should it prove necessary, would require vast scientific and technological developments. It is hoped that part of the revenues derived from the international reserve program would encourage the more effective preservation of already existing parks and reserves, and thus indirectly contribute to the ultimate preservation of an area greater than the 10

percent of the tropical moist forests envisioned to be supported by this plan.

One criticism of the proposed scheme is that it could, by its existence, take pressure off extant national programs, encouraging nations merely to register parks and reserves they had planned to declare anyway. This may not necessarily be bad. If any given nation is serious in its conservation commitment, and is prepared to allocate natural resources toward this end, then it would be likely to use the released funds to strengthen the infrastructure of extant parks, enlarge them, or establish new ones. If, as is too often the case, economic realities and/or lack of commitment only result in the establishment of new "paper parks," then the registration of a previously planned park in the new program would at least insure its protection. The revenue derived would help capitalize other immediate programs and perhaps contribute to an ambience in which conservation imperatives receive a greater priority and are more broadly appreciated within the nation.

There are about one thousand national parks, from the equator to the poles, listed in the *1980 United Nations List of National Parks and Equivalent Reserves*, IUCN, (1980). Unfortunately, in compiling this data, it was found that the informtion about the "area of some of the parks varied by as much as 50 percent depending upon the source of information," and the compiler of the list for the United Nations claimed there was too little data available in order to judge the quality of management of many of the reserves on the list. Parks and reserves presently make up less than 1 percent of the remaining tropical moist forest biome; and, even that 1 percent is at risk.

Table 1. Sources of funds for the proposed international tropical forest reserve system.

	Population (A) (million)	GNP/ capita (B)	Contri-bution/year (C) (million)	Devel. Asst. (D) (million)	% Increase (E)
Australia	14.2	7,990	49.7	690	7
Austria	7.5	7,030	26.3	174	15
Belgium	9.8	9,090	44.1	714	6
Canada	23.5	9,180	105.8	1,151	9
Denmark	5.1	9,920	23.0	448	5
Finland	4.8	6,820	14.4	104	14
France	53.3	8,260	213.2	3,836	6
F. R. Germany	61.3	9,580	275.9	3,581	8
Greece	9.4	3,250	14.1		
Iceland	0.2	8,390	0.8		
Ireland	3.2	3,470	4.8		
Italy	56.7	3,850	85.1	320	27
Japan	114.9	7,280	402.2	3,070	13
Luxembourg	0.4	10,540	2.0		
Netherlands	13.9	8,410	55.6	1,547	4
New Zealand	3.2	4,790	6.4	65	10
Norway	4.1	9,510	18.5	491	4
Portugal	9.8	1,990	4.9		
Spain	37.1	3,470	55.7		
Sweden	8.3	10,210	41.5	1,125	4
Switzerland	6.3	12,100	31.5	218	14
United Kingdom	55.8	5,030	139.5	2,453	6
United States	221.9	9,590	998.6	4,567	22
			Subtotal = $2,613.6		
Organization of Petroleum Exporting Nations*					
Iran	35.8	2,160	35.8	21	170
Iraq	12.2	1,860	6.1	861	1
Kuwait	1.2	14,890	6.0	1,099	1
Libya	2.7	6,970	8.1	146	6
Qatar	0.2	12,740	1.0	251	1
Saudi Arabia	8.2	7,690	28.7	1,970	2
U. A. Emirates	0.8	14,230	4.0	207	2
			Subtotal = $89.7		
Middle Income Countries					
Argentina	26.4	1,910	13.2		
Hong Kong	4.6	3,040	6.9		
Israel	3.7	3,500	5.6		
Singapore	2.3	3,290	3.5		
Uruguay	2.9	1,610	1.5		
Yugoslavia	22.0	2,380	22.0		
			Subtotal = $52.7		
Centrally Planned Economies					
Bulgaria	8.8	3,320	13.2		
Czechoslovakia	15.1	4,720	30.2		
German D. R.	16.7	5,710	41.8		
Hungary	10.7	3,450	16.1		
Poland	35.0	3,670	52.5		
Rumania	21.9	1,750	11.0		
USSR	261.0	3,700	391.5		
			Subtotal = $556.3		
			Total = $3,312.3		

Data from *World Development Report, 1980;* The World Bank.
(A), (B) adapted from *World Development Report, 1980*, The World Bank, Table 1, pp 110, 111. (C) calculated on a scale of GNP

$0–1,500	= 0	$7–8,000	= $3.5
$1,500–2,000	= $0.5	$8–9,000	= $4
$2–3,000	= $1	$9–10,000	= $4.5
$3–4,000	= $1.5	$10+	= $5
$5–6,000	= $2.5	C = A X B Scale	
$6–7,000	= $3		

(D) adapted from *World Development Report, 1980* Table 16; ibid.

(E) % increase in development assistance $E = \frac{C}{D}(100)$

* Includes countries with a GNP in excess of $1,500 per capita and excludes countries with a significant Tropical Moist Forest habitat.

WHERE WILL THE FUNDS COME FROM AND HOW MUCH WILL IT COST?

The strategy anticipates that the financing of the International Tropical Moist Forest Reserve System will be provided by those developed nations with per capita gross national products in excess of $1500 per annum (10). For purposes of this plan, a system equivalent to a progressive income tax (beginning at $0.50 for GNP $1500, to $5.00 for GNP $10 000 and above) on all nations with a GNP over $1500, and not possessing tropical moist forests, would yield over three billion dollars annually ($3 259 000 000). This system would require support from twenty-three of the nations in the OECD ($2 613 000 000), seven nations with Centrally Planned Economies ($556 000 000), seven of the OPEC nations ($89 700 000), and six other developing or middle-income countries with GNP's over 1500 dollars ($53 000 000) (see Table 1). The international resource mobilization must become automatic, independent of the good will of the individual contributors, and flow through a multilateral institution such as the World Bank. This seems a great amount, yet it represents only a relatively small increase in the 1980 development assistance provided by the OECD nations. For some countries, with the proposed additional contribution, this increase would still be below the 0.7 percent of GNP target for development assistance proposed by the United Nations.

In addition, the planned economy nations should not continue to shirk their responsibilities to contribute to this type of program. Whatever their contemporary perception of the contribution of the West's former colonialistic or imperialistic policies to the economics of tropical nations—the problem of deforestation will affect all nations, and all should contribute to this plan, regardless of ideology.

There is a possibility that some nations —which are middle income as classified by the World Bank and also possess tropical moist forests, such as Brazil—may wish to participate in the program both as a contrib-

utor and as a receiver of support from the International Tropical Moist Forest Reserve System. (For purposes of this model, nations possessing substantial tropical moist forests are excluded from the calculations of income. However, if Brazil and Venezuela choose to contribute, as well as register reserves, an additional $74 000 000 would be available for the program.)

Several possibilities have been suggested for the international organization necessary to administer such a plan. International Agencies such as the Consultative Group for International Agricultural Research (CGIAR) or the International Bureau of Plant Genetic Research (IBPGR) could serve as effective models for a new international organization to be formed with the specific mission of administering a program for the establishment, inspection, and disbursement of payments for tropical moist forest reserves. The United Nations is an obvious choice. However, many experts have pointed to the less-than-encouraging priority given to resource protection by some UN agencies.

A new institution such as the World Development Fund proposed in the study, *North-South: A Programme for Survival* would be a better choice (11). However, the machinery is not in place and once established would be concerned with all aspects of development. It thus could easily fail to provide immediately the priority necessary for preserving the rapidly diminishing tropical moist forests.

Of the traditional international agencies, the World Bank appears to be the best adapted to undertake the additional responsibility for establishing and financing a large network of protected areas. The World Bank has its purpose—the provision of funds and technical assistance for facilitating economic development in its poorer member countries. It has a global reach. The additional three billion dollars per year would not swamp its administrative capabilities, although additional technical people would be needed, probably in a separate division devoted to giving rather than loaning money. The Bank would also be in an excellent position to provide technical advice and additional loans, where necessary, to combine with the revenues from reserve payments for other development projects in areas such as agriculture, reforestation, afforestation, restoration of eroded lands, colonization schemes, forestry training, land surveys and institution building. The Bank has already developed a philosophy toward forestry development, and it understands the role of human encroachment, principally from unplanned and poorly planned agriculture, in the destruction of tropical forests (12).

An advisory committee of experts from organizations such as FAO, UNESCO, UNEP, IUCN, and WWF might be established to assist the World Bank with technical matters pertaining to the program and to lend their weight to encouraging the developed nations to subscribe. With broad and immediate support from the interested nations, this is a plan that can be implemented almost immediately, with major components in place within three years, under ideal circumstances.

Initially, the program will be applied only to natural, unmodified, tropical moist forest ecosystems. Later, as more subscriptions to the program from developed and middle-income nations are forthcoming, auxiliary reserves may be added, including those involving varying degrees of management of the drier, open-canopy types of tropical forests. The International Tropical Moist Forest Reserve System would accept registration applications from the following nations (broadly defined): *South and Southeast Asia and Melanesia:* Australia, Bangladesh, Brunei, Burma, Indonesia,* India, Kampuchea, Laos P.D.R., Malaysia,* Melanesia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Viet Nam; *Tropical Latin America:* Belize, Bolivia,* Brazil,* Colombia,* Costa Rica, Cuba, Dominican Republic, El Salvador, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Peru,* Puerto Rico, Suriname, Trinidad-Tobago, Venezuela;* *Tropical Africa:* Cameroon, Congo, Gabon,* Ghana, Ivory Coast, Kenya, Liberia, Madagascar, Nigeria, Sierra Leone, Tanzania, Uganda, and Zaire.*

An enormous area is contained within the political entities just listed; unfortunately, in many cases, the remaining torpical forests have already been disturbed and grossly disrupted. There are remnant forests in all of these countries which should be preserved, but 80 percent of the world's tropical forests are found in the nine countries asterisked (*) above and they would form the core of the new program.

DISCUSSION

There is clear-enough information about the seriousness of the conversion of tropical forests to justify the common interest of all nations in the selection and establishment of the forest reserve system. What is now needed is a change in political perceptions, a political breakthrough in the North-South dialogue—one that will make a significant contribution to the world's stability in both economic and ecological terms.

Is this possible?

It is almost ten years since the authors of *The Limits to Growth* presented their World Model of the relationships between industrialization, population growth, malnutrition, depletion of nonrenewable resources, and the deterioration of the environment (13). Their models generated much criticism and many world conferences, but very little in the way of new national or international policies designed to develop or even to question the need for viable alternatives to a global growth economy. Its publication did produce an increased awareness that some resources might indeed, by the end of the century, be reaching scarcity levels and that the limited regeneration potential and carrying capacity of the world's ecosystems might impair the quality of life the inhabitants of the developed nations of the world have come to expect.

It seems clear that, in the short run, the developed world will not help the developing countries in any appreciable way until the threat for not doing so is immediate and personalized to the extent that the quality of life of the developed world is immediately at risk or has already seriously deteriorated. At present, the Organization for Economic Cooperation and Development—Development Assistance Committee nations are only contributing 0.34 percent of their GNP annually with the objective of promoting economic development in low income countries. Indeed, the contribution of the United States has been reduced from 0.32 percent to 0.18 percent of its GNP during the last ten years, and there is even a threat by the present administration to further reduce its contribution toward multilateral organizations as the existing commitments expire.

Achieving the goal of enclosing some of the tropical forests will benefit everyone. The additional costs, while small in terms of the overall productivity of the developed nations, are nevertheless substantial. Three billion dollars annually will not easily be parted with, particularly at a time of high inflation and reduced government spending. To succeed, the plan will require the vigorous lobbying of nongovernmental conservation groups for the subscription of their nations to an International Tropical Moist Forest Reserve System.

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