

Why Save Tropical Rain Forests?

Some Arguments for Campaigning Conservationists.

by

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There is a problem in communication.

Saving the tropical rain forest is presently high on the list of priorities of many international conservation organizations. In the United Nations Environment Programme (UNEP) it is a priority subject area. IUCN and WWF are also making big efforts in this regard, 1975 and forthcoming years will see considerable funds being devoted to this end.

Tropical rain forests (and tropical cloud forests) still cover large expanses throughout the world, but they are fast dwindling for a great variety of reasons. To be successful in the campaign, it is important that conservation officials be prepared for a series of questions, and often adverse reactions, from people with different backgrounds who sincerely do not think that it is really worthwhile spending so much energy on safeguarding the tropical rain and cloud forests, and indeed would rather see large tracts disappear - the sooner the better. The following short and incomplete analysis is intended to provide some answers which hopefully should be easy to convey to an unsophisticated audience. Needless to say, the answers should not be considered as testproof everywhere, much less comprehensive of the various prevailing conditions. Undoubtedly there are many more and often better arguments which can be advanced, depending on the specific prevailing conditions, the audience and other factors, and there will be further evolutions concerning arguments and emphasis with changing conditions. Therefore, great caution should always be exercised in the presentation of arguments, in providing satisfactory answers, and in pointing out the significance of tropical rain forests in their various aspects.

A great number of papers have been produced on the subject, some of them in various publications of IUCN and WWF. Examples are the Viewpoint in the August 1975 issue of the IUCN Bulletin, the background papers of the Yellowstone and Grand Teton National Parks' Conference (published by IUCN), the published Ecological Guidelines for Development in Tropical Forest Areas of S.E. Asia (IUCN Occasional Paper No. 10) and The Use of Ecological Guidelines for Development in the American Humid Tropics (IUCN Publication New Series No. 31) resulting from the IUCN Bandung and Caracas meetings respectively on tropical rain forests, and the forthcoming similar publication on ecological guidelines for the

whole of the humid tropics.

For many people the tropical rain forests are considered as useless unless they are removed or modified and forestry is likely to achieve this goal.

It should never be forgotten that tropical rain forests, quite unlike animals like the panda, the vicuña, the tiger, the deer, or birds like the whooping crane, or the flamingoes do not enjoy a "love at first sight" sympathy from the public, and in fact there is a lot of suspicion in the minds of many people who sincerely believe that the tropical rain forest is basically "useless", it harbours "wild" and "dangerous" or "noxious" animals or at the least uncomfortable creatures such as leeches and mosquitos. For many city dwellers it is clearly linked with the notion of a "savage" and/or "uncivilized" world in opposition to the urbanized and "man-dominated" world. More than anything else, it has been for centuries the traditional area to be "opened up" to increase the area for crops and pasture for domestic cattle. Of course, harvesting timber and other products by extraction has also been practised since time immemorial. Some people including foresters, have advocated its replacement by other tree crops, because what is called exploitation amounts to "high-grading", that is, taking out the worthwhile species to leave the defective or non-commercial species. Millions of hectares of formerly timber-rich forests have been left in such conditions. Foresters intent on sustained yield production have devised other methods to replace high-grading, notably "refining" the heterogeneous mixed forest into a more easily managed forest with fewer species but of higher commercial value. This has been the basis of much past and on-going research: in fact, different silvicultural systems have been developed towards this very end by scientists and technicians. Their use is not yet widespread; successes, if objectively assessed, are extremely scarce, and failures (economic, technical, silvicultural) are much more common. The few cases which are usually considered as being successful by the forestry profession ("Malayan" system, "tropical shelterwood" system etc.) are far from being applied over vast areas.

A careful assessment of what can be promoted - and under what conditions - and what should be resisted, is badly needed.

The results so far appear to indicate the following trends: -

- the more the tropical rain forest is heterogeneous, with a high proportion of non-commercial species, the less the silvicultural systems (of any type) are likely to succeed. Success stories refer to cases on waterlogged areas, river banks where special soil (and water) conditions prevail, bringing the number of different species in a unit of area to a relatively low number. Certain old secondary forests also fall into this category. This makes logging and other forms of exploitation an economically attractive operation, particularly if one single species makes up over fifty per cent of the timber. With so many seed trees, regeneration is also likely to be abundant. This is, for instance, the case with the Malayan dipterocarp forest of the tropical American *Virola*, *Carapa* or *Irianthera* trees;
- the more the conditions of the forest are linked with drier (or deciduous) conditions, the more some very careful silvicultural interventions have a likelihood of succeeding. Conversely, the more rainfall increases, the fewer successes have been achieved. This

latter premise is important because it disqualifies from any intervention large areas where annual precipitation is above 3000 or 4000 millimeters a year, and provides a good argument for opposing excessive extrapolation from success stories derived from different - drier - conditions.

Land-use - the key factor.

Many of the policies involving replacement and modification of the tropical rain forest are defended by people who sincerely believe that tropical rain forests - at least large extensions of them - are an "obstacle to development". This cannot be sufficiently stressed.

These arguments should under no circumstances be ignored by defenders of tropical rain forests. Any campaign to save tropical rain forests must, therefore, be linked with the best possible land-use for tropical areas where rain forests are - or were - found. It implies comparing rain forest in its original state with other uses, facing political, social, and economic realities, short and long-term goals, the possibility of retaining future options and an assessment of changing values, particularly those that relate to the somewhat elusive concept of "quality of life". Conservationists however possess certain vantage points. They know that above political, social and economic imperatives, which are man-made, there are ecological factors, natural laws that cannot be changed, which must be considered; they must obviously precede the man-made factors which at most can be grafted on them. After all, soil, water, plants, animals, form intricate relationships which obey certain rules. Interventions in nature lead to consequences, many of which we can foresee. How can these ecological interrelationships best be used for campaigns?

Strategies which lead to the conservation of tropical rain forests.

A first approach to our objective may therefore advantageously centre around the various land-use alternatives. This can often be very effectively achieved through a counter-question. Conservationists may, for instance, request that a careful assessment be made of alternatives which imply the removal of the forest in comparison to its maintenance. This has the merit that it discreetly challenges an assumption that has been passed on through generations by tradition, perhaps even by inertia, and may help to remove a deep-rooted "mental block". People who want to replace the forest by something else considered more "productive" should give as clear as possible an indication as to what they would like to have instead, and how they hope to achieve it. How much of it is based on fact, and how much on gamble? How does the end result compare with what was there before? Cannot the same objectives which are aimed at by these people be achieved by other programmes or initiatives which do not imply the removal or modification of the tropical rain forest? In a way, this puts the burden of demonstrating better land-use on those who oppose the tropical rain forest. This need not be presented in any polemical fashion. Promoters of rain forest removal may not have had a good chance to present their views. Sometimes they themselves will discover weaknesses, and they will be more willing to listen to the conservationists' alternatives. Let us examine a few, presented as positive suggestions, which may lead to advantageous positions for decision-making, such as the following: -

- a) Instead of increasing agricultural output at the expense of tropical rain forest, has every effort been made to increase agricultural output on existing farm land? Often this can be achieved more effectively and more economically. For instance, good soils close to rivers are often used for poorly managed pastures when they could be converted into food crops. Have these solutions been sufficiently explored? How do they compare with more clearing of forests?
- b) Can forest plantations on nearby degraded land (for instance very poor savannas) for production of timber, fuel or other forest products, achieve the desired objectives and actually relieve the pressure on the tropical rain forests? This could convert foresters, who take a dim view of the tropical rain forests, into strong allies.
- c) Have sufficiently accurate long-term assessments been made as to the various physical, social, biological and economic consequences that rain forest removal or modification imply when seen in a local, national, regional and world context? Many examples throughout the tropical world show that the economics of national parks compete favourably with other alternatives. Universities, scientific programmes, even prestige, can be drawn in when weighing the alternatives.

Other questions can be asked in a similar fashion implying that past policies, traditional attitudes, a priori assumptions, e.g. the building of roads, are always a good thing for the people in the region, should be seriously questioned. However, these arguments alone will not change most mentalities. The root of the problem lies in avoiding the very reasons which presently lead to forest destruction.

A better knowledge of the reasons for tropical forest removal is essential.

A careful and objective analysis will often show that if the forest is replaced by crops or grazing, this may produce immediate profits - often small, for a short time only, and only for some people, while for others, often very large numbers, it may imply a considerable loss - and for a considerable period. Most of the time it has led to residual wasteland such as degraded, man-made savannas, and this can be witnessed in most of the tropical rain forest countries. These prospectives for short-term profits, even if they ruin the capital - virtually killing "the hen that lays the eggs" - are presently allowed because of prevailing land tenure practices allowing indiscriminate use and abuse, in fact often promoting it. In some countries destructive practices are actually stimulated by tax laws, the heavier tax being levelled on "virgin" or unused forest with lesser impositions on lands that are being "used" i.e. have been cleared. Rarely is a long-term comprehensive assessment made prior to the clearing action. And, at another level, who is willing to blame the poor peasant with a large and ever-growing family who needs more land for shifting agriculture to feed his family on a day-to-day basis? Actually, short and quick profits, regardless of the consequences, are at present the main reason for the widespread destruction of the Amazonian forest, while clearing by poor peasants to extend their areas for shifting cultivation - with population growth dominating this expansion - are most prevalent in the rest of the tropical rain forest regions of the world.

It must of course be admitted that all removal of tropical rain forest should not be condemned a priori. There are, sure enough, certain areas of good soils (fresh volcanic, alluvial) on relatively level land where rainfall is not excessive, but these are very scarce and most of them are already occupied by agriculture and grazing, some of which could possibly be improved considerably. And, even on these soils, it is extremely important to maintain some adequate samples of natural forest, precisely because their indicative value can be of great

benefit for choosing the best land-use.

It may be worthwhile knowing, for instance, that in the whole Brazilian Amazon, probably less than two per cent, perhaps even less than one per cent of soils are considered as appropriate for permanent or sustained yield agriculture. However, there is still some discussion on this and it is not wise to advance definitive percentages. Many alluvial soils are situated close to the rivers and most of them are subject to more or less frequent flooding. This considerably limits their permanent utilisation. Others require very careful management practices to maintain their capacity to produce crops for an extended period.

Moreover, there is no doubt that in Brazil, at least, opening of roads allows mineral exploitation and may have other advantages, be they military, political, or "psychological" - the "conquest" of hitherto "unproductive jungle" and, as the Brazilians say, "the affirming of our sovereignty". These factors should not be ignored especially if a conservation campaign that has an origin or strong participation from outside Brazil is staged.

The problem is admittedly complicated. Road builders, for instance, are not exposed to ecologists and vice versa. Under our present system, they are not supposed to assess the consequences; neither are the medical doctors who save babies and children from such killers as measles, diarrhea, parasites and other infectious diseases, presently expected to deal with the consequences of population explosion - even if they should. Military and political considerations such as "we must populate our borders" and "affirm our sovereignty" are leading to decisions which, much too often, completely ignore ecological backlashes.

Agronomists and cattle specialists will of course continue to experiment with new techniques for increasing food production through trials with crops, new grasses, new breeds of cattle, new management practices, etc. Foresters will doubtless also try to devise better silvicultural methods. This should, of course, not be systematically opposed, but extreme caution should always be exercised when the results achieved on small experimental stations are extrapolated over large regions, a practice all too frequent which is politically very rewarding but can be disastrous when seen from an ecological angle.

These problems have been analysed carefully in various meetings recently, including three recent IUCN publications (1.2.3.) some are relatively short and are written in simple language, particularly designed to appeal to decision-makers and their advisers. These publications are presently being widely circulated in tropical Latin America and tropical South East Asia and are being very well received. More popular articles on tropical rain forests and their conservation have also been issued in the "New Scientist" and "Development Forum" (4.5.).

Conservationists who want to defend tropical rain forests may therefore be well advised to promote interdisciplinary discussions among people or organizations connected in one way or another with "development" projects affecting the rain forests - including of course other conservationists since conservation must be considered as a way of development.

A better use of ecological guidelines and a better assessment of ecological impacts prior to decision-making is always desirable.

The maintenance of the status quo as opposed to destructive alternatives.

In order to defend the maintenance of the tropical rain forest against other alternatives, it is necessary to have at hand the best possible arguments. The following is a list, but

it is by no means exhaustive.

Forests as regulators of water regimes for maintenance of fertility and structure of the soil.

The presence of trees and the intricate life web upon and under the soil's surface proves to be by far the best possible mechanism for transforming rainfall into steady flows of water of the highest possible quality for human consumption, industries, as well as for the aquatic life within the forests and downstream, indeed for the coastal areas close to the river mouth.

Removal of the forest would greatly alter the water regime: stronger floods would result after heavy downpours since all the rainfall would flow down with only a small amount penetrating into the soil; landslides would be much more common, and erosion would be widespread. Relative droughts (leading to very low river levels) would appear after periods of lack of rain, since wells not sufficiently provided with underground water, would dry up. All these harmful effects would not take place under the protective presence of forests, or at least the negative impacts would be considerably reduced, especially on slopes.

Fish and other aquatic animals, both riverine and from nearby lagoons fed by rivers as well as coastal areas, would undoubtedly suffer from these extremes of water regimes. So would the vegetation exposed to much sharper and more intense fluctuations (both through greater floods and droughts). And so would many animals dependent on relatively stable vegetation communities and more stable water conditions.

Microclimatic changes are also likely to occur. The temperatures on exposed soils are greatly increased during the daytime and somewhat decreased during the night. Fluctuations in relative humidity are much sharper and wind and convectional phenomena and turbulence close to the soil are of course greatly increased.

Moreover, as a result of forest removal, a secondary vegetation of a completely different nature will come up. If cleared again and/or burned - and burning is possible after only a few weeks of drought, something which does not happen under the original rain forest which remains too moist - a drought resistant grass takes over. Such grass communities which replace former tropical rain forests are nowadays a most common phenomenon throughout the tropical rain forest region. They are very aggressive, fire resistant, but make very poor grazing land. If left alone and not burnt or grazed, they will eventually revert to forest after many years depending on the stage of degradation. But a complete return to the original rain forest is practically impossible.

As a result of such degradation processes, most tropical soils devoid of their original forest vegetation and being replaced by grasses will rapidly lose organic matter and transform the favourable "crumb" structure they maintain in the forest and which is particularly suited to root penetration, into a hard upper crust, particularly if exposed for longer periods. The soil thus becomes progressively less appropriate for plant growth, and what was formerly a very productive system, rich in productivity species, scientific, educational, and aesthetic features, is transformed into a biological desert.

Forests and rainfall: the case of the cloud forest.

There is still considerable discussion whether the presence or absence of tropical rain forest on level land will significantly affect rainfall. Much inconclusive debate has taken place and more research is needed. Most experts seem to agree that over large surfaces there will be some effect, but more hard evidence is needed badly. It is not wise at this stage to use this as an argument, neither is it sufficiently clear how the removal of rain forests might affect the earth's oxygen balance.

However, concerning rainfall, there is one very important exception: the various tropical cloud forests at elevations varying between 500 and 3000 meters, depending on latitude, land-mass and exposure. Here the "mist-trapping" property of the branches heavily covered with mosses, ferns, bromeliads and other epiphytic vegetation is known to considerably increase the condensation from clouds which pass through or otherwise produce a friction with the mechanical barrier offered. Differences of up to three times the precipitation have been recorded in cloud forests, in comparison with nearby open grasslands. Removal of the cloud forest therefore will considerably reduce the flow of water into the soil and the rivers in many mountain regions. This will obviously affect the lowland plains where precipitation may be much less and water is often a precious commodity, producing droughts whenever there is a prolonged dry spell, and floods and erosion when heavy showers occur in the mountains, since the water will run down without being slowly absorbed and led into the soil.

Forests and agriculture.

The presence of protective forests on the slopes is a safeguard for agriculture on the plains. The relationship is not sufficiently understood or taken advantage of by conservationists. In India, for example, the campaign to save the tiger has found a warm reception assuring the cooperation of ecologically-conscious agronomists. Saving the tiger means saving its forest habitat through the creation of a network of extensive reserves, often in hilly regions, and this in turn saves valuable watersheds covered by protective forests, assuring a steady flow of water that is used for irrigation and other useful purposes. While this example applies mostly to drier forests, it is equally true for wetter areas. Much of the rice agriculture in South East Asia is dependent on the forests of the wetter slopes. Many of the present floods and droughts could have been avoided, at least in intensity, if the protective cover of the slopes would have been maintained. Present deforestation trends could even worsen this.

Forests and reservoirs (or dams).

From the foregoing descriptions it is easy to visualise that the life span of a reservoir also depends largely on the presence of the forest cover. This is mainly because of the erosion problem, filling up a reservoir. The more erosion of the slopes, the shorter the life of the dam. The role of forests as "preventers" of erosion is only too obvious, but this very fact is not sufficiently exploited by conservationists. And yet, this is one of the simplest

relationships that can be presented eloquently by numbers and economic realities.

Maintenance of the genetic capital.

This is one of the most common arguments advanced, particularly by the scientific community, but itself alone rarely produces a strong receptive feeling. The point is of course that important cultivated crops of domestic animals as well as a large variety of drugs, dyes, tannins, fibres, etc. come from the tropical rain forest. Many more remain to be discovered. To this must be added the ornamental value of many plants associated with the tropical rain forest; many of which are in use for house and garden plants or could be bred for such purposes. Moreover, there are good reasons to believe that many more applications will be found when better identification, chemical analysis and systematic testing take place. However, we are losing species at an increasing rate even before they can be discovered. This is obviously tragic but little has been achieved so far in using this fact to move decision-makers.

Maintaining the web of life.

A series of reactions are found to take place in tropical and cloud forests which effect life and conditions in often remote areas, not only water quantity and quality, but animals as well. Destroying one link of these reactions may have repercussions which we can sometimes foresee - migrant birds for example would no longer reach these areas - but most of which we do not know. Insects, rodents or other pests in nearby areas used for crops, grazing or human settlements may no longer be controlled - at least in part - when the forest is removed. Birds and other natural predators of these pests may need the forest for survival. Forests near human settlements play an important role for air purification, recreation, and education and inspiration.

The tropical rain forest as a source for scientific work.

Many basic processes in life can be better understood by studying the tropical rain forest, and in fact the amount of money spent towards such research already goes into huge sums and is constantly increasing. The scientific community has been extremely worried that the basic tools for research are being lost. A good part of UNESCO's Man and the Biosphere Programme is based, for instance, on the proper establishment and protection of biosphere reserves, with many of them located within the tropical rain forest, as basic tools for a multi-million dollar international programme. The whole exercise is aimed at producing better human conditions through the application of scientific knowledge to harness biological processes.

Educational implications

The tropical rain forest can be a marvellous live classroom as it has been increasingly discovered throughout the world. Nature trails and other devices can of course help in such education and training programmes but the main thing is the existence of the forest itself. Most schools situated in the tropics have long lost these valuable instruments and some tropical countries have to send their students elsewhere (eg. El Salvador).

Tourism, a possible alternative.

Scientific and mass tourism can be a valid land-use. It certainly proved to be extremely valuable in Puerto Rico where the Luquillo rain forest - most of it in fact of secondary nature - attracted about one million visitors in 1974. They all wanted to have a glimpse of the tropical rain forest.

Large scale scientific ventures were also undertaken in the area leading to fundamental knowledge of wide applications to understand biological processes and better adapt them to human needs.

The whole field of interpretation of tropical rain forest is in its infancy. A leading tropical forester, Dr. Frank Wadsworth, has recently written:-

"the natural tropical humid forests with their giant trees, spectacular animal life and background of mountains and rivers, are an undeveloped scenic resource of great potential economic value as an export to the entire world, possibly comparable to the animal life of Central-Africa. These forests, the world's most complex ecosystems, are prospective outdoor classrooms which could interest students from throughout the world and attract internationally financed scientific research projects on basic ecological problems of significance to all mankind".

Sure enough, one may not always see large animals, but the knowledge of interrelations between insects, lizards, frogs and vegetation can be very exciting. The various attack and defense mechanisms, the various associations between small creatures of one or different species and their feeding, nesting, or reproductive habits can be fascinating. How many people for instance, know that many birds feed or forage in groups with different species of birds actually enhancing with their presence at the same time in an area, the chance to find food for all? Or how systematically some insects and birds make the rounds to feed on nectar of certain plants?

A little knowledge of the fauna through simple publications will make all the difference to the visitor who walks through the tropical rain forest.

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