The Natural Environment

L. H. Cramer
National Herbarium, Peradeniya

Introduction

The natural environment, or the virgin landscape with with its complexity of ecosystems, is rapidly being modified or fast disappearing in Sri Lanka. The phenomenon is much the same in other developing countries — e.g. Indonesia. But in Sri Lanka it reveals the ingredients of a crisis, a potential danger to national security. Various development projects with their demands on new virgin land, illicit forest clearings for extraction of timber and the wanton destruction of coastal marine life have precipitated a dwindling of our natural resources; the vegetation cover, in particular, stands in proximate danger of being completely exterminated imperilling the existence of what tropical forests and grasslands yet remain. Despite this danger the establishment has not yet developed the machinery, not to say a policy, for the proper management of the environment. Appeals for a Central Authority for Environmental Management and a Department of Environment only evoked indifference.

The government has now suddenly awakened to the prospect of the impending catastrophe to the environment. Warning the nation against the unrestrained destruction of forests the Minister of Finance and Planning, Mr. de Mel, stated: "At the rate things are happening the frightening prospect of having a desert in this country is not very far off!" (3)

The consequent damage done to the productivity of the country's biological systems, notably the forests, grasslands and fishing coasts, is not a peripheral issue of concern to environmentalists. It touches the very national economy. Hence the note of disturbance today in the Ministry of Finance and Planning. Our forests and allied areas of vegetation, for example, support a vast and varied arsenal of biological, chemical and wood potential. The coastal aquafauna is a never-failing source of foreign exchange at least through their appeal to tourism. Anything, therefore, that reduces the viability of these systems erodes the national economy. In more general terms, any deterioration in the natural environment represents a weakening of the human prospect in Sri Lanka. The various ecosystems, therefore, must be judiciously managed as the national insurance against disaster and the rightful heritage of the generations to come.

A dilemma

The parlous condition of the environment in Sri Lanka reflects a practice of prodigious waste uncontrolled by a lack of planned management. An aerial reconnaissance of the island in February 1978 by Arthur Norman, Chairman of the World Wildlife Fund, showed the extent of impoverishment of our forest estate. Against a former knowledge of our forests, he remarked: "Where are your rich forests? It is evident you have lost a very great deal of your tropical rain forests." The following statistical data on the acreage of forests underline this sense of alarm:

Year	*Source*	*Wet Zone*	*Dry Zone*	*Interm. Zone*	*Total Acrg.*
1961	Canada-Ceylon Project	562,260	6,197,790	320,830	7,114,890
1966	F A O	560,000	5,624,211	315,789	6,500,000
1972	SLAAS Report	532,000	5,200,000	300,000	6,032,000

In the 10-year interval (1961-1972) the extent of forest has diminished by 1,082,890 acres.

Another aspect of this state of affairs is indicated by the vast amount of coral mined from the reefs. Statistics are not available on the quantities removed. But the vast mounds of coral heaped by lime kilns along the coasts from Balapitimodera to Gintota or from Batticaloa to Valaichchenai alone reveal only too clearly the colossal damage done to this living bastion of our environment.

There is, however, some justification for such exploitation of the environment. This will be discussed at some length in the following chapter. Here it is sufficient to say that to the general economist, the exploitation of the environment appears to be the only way out to a developing country to attain higher standards of material well-being. The pressures of urbanization and the various industrial and agricultural expansion projects, so linked to development, necessarily relate the environment as a factor subservient to national production. Hence it is that wild land around the rural areas, such as that in the North Central Province, has had to be the immediate targets of this short-term outlook. And drifting amid the opposing currents of soaring world prices and increasing food problems the country cannot but succumb to the need of utilizing yet more virgin land as the only alternate to drowning economically. The blue-print of the Mahaweli Diversion Scheme is a paradigm of this economic necessity.

On the other hand the natural environment has been improverished so considerably that further losses from it will cause serious detriment to the productivity of its ecosystems. Warns Odum (4): "For our own safety and protection some definite percentage of the landscape should be occupied by more or less natural communities. Just what this percentage should be in different climatic zones is unknown. But we do know that when man thinks only of production he goes too far in stripping the landscape ..... In many cases a shortage of water seems to have been the final cause of disaster for mankind." Odum's underlying reasoning is evident. The wild landscape amidst the diversity of habitats is the natural preserve of the biological productivity of ecosystems and represents the

limiting factor on whose survival agricultural and industrial development depend. Hence it is that the very pressures of development also stress the need to manage and control the important preserves of the environment. Else, its natural resources will dwindle and thus pave the way to economic want. The search for ayurvedic herbs in the Galle district, for example, has stripped the once famous Rumassala Kande of the medicinal plants which grew there years ago; and the hill is now nothing more than a sparse undergrowth of colonizing species.

The country has reached an impasse where two conflicting aims demand attention — one economic, of utilizing the natural environment for maximum production, the other ecologic, of ensuring the survival of its ecosystems with their potential of organic resources. This is precisely the dilemma in regard to the environment. At this juncture the situation demands careful handling in a spirit of give and take. It calls for more knowledge to determine new action on maintaining the balance between the quantitative capacity of the environment which concerns production and its qualitative capacity which concerns conservation. To contribute to this knowledge some data must be provided in the ensuing chapters.

Need for exploitation

The dominant factor creating overall pressures on the environment is the demographic problem. It is common knowledge that the population explosion in Sri Lanka has reached phenomenal proportions. Illustrating this phenomenon are the following census statistics (5) for the period 1965 — 1975 :

TABLE 2

Year	*Total Population*	*Birth Rate*
1965	11,164,000	3.3%
1970	12,516,000	2.9%
1975	13,514,000	2.7%

During this period the average growth rate recorded an increase of c. 2.7% at a period when the crude death rate had markedly fallen to a steady average of 0.8%. Sri Lanka is, in fact confronted with what Gourou (6) styled "une natalite du Moyen Age en face d'une mortalité moderne." Given the present rate of birth increase the population will reach over 25,000,000 in 1985. This will give rise to yet further food requirements than those in existence.

(b) Cultivation intensity

The demographic problem immediately creates demands for more food production. The demand has constantly induced a progressive expansion of the total area under cultivation. This emerges from the following statistical data on cultivation for the period 1963 — 1973: (5):

TABLE 3

Year	*Total area under cultivation*
1963	4,013,502 acres
1973	5,031,362 acres

The correlation between the acute demographic problem and cultivation trends necessarily leads to more alienation of wild land. This is seen in the progressive decrease in acreage under forest for more or less corresponding years. No environmentalist would deny this phenomenon as a necessity of a developing country.

(c) Land hunger

The other influence responsible for the diminution of the forest acreage is an allied social factor — land hunger. Stemming out of the population explosion, it reflects a need of holdings as a security in life. Out of it a new peasant mobility has emerged particularly in the wet zone. This expresses itself initially in encroachments of State lands and finally results in some form of settlement or colonization. Referring to this phenomenon in the Dry Zone, Farmer (7) points out to the resultant increase in the amount of illicit encroachments. According to latest investigations by the Ministry of Lands and Land Development over 50,000 acres of land, including forest reserves, have been poached upon in the past few decades. Underlying such illegitimate forms of land alienation is a social need for some priority for land. In acceptance of this need the Mahaweli Development Project has outlined a colonization scheme for the Dry Zone as one of its objectives.

(d) Industrial demands

The demographic problem with its accompanying phases of village expansion, colonization and local urbanization has also created industrial demands. These, in fact, coincide with the needs of development plans in the country. Factories of all types, research institutes and cottage industries exemplify the pace of this development. All the demands of such projects converge on the natural resources of the environment for fulfilment. A denial of the needed opportunity would invariably tax the reserves of foreign exchange.

The commonest natural resource in demand is the timber potential of our forests. The erection of new buildings everywhere creates stresses on this resource for meeting the increasing supplies of construction material and furniture. On an average yield from our forests, the State Timber Corporation gets c. 9,000,000 cu ft of wood a year; and even this volume falls short of the country's requirements.

Firewood for domestic consumption is an added need. The present oil crisis makes it the more significant today, especially when unlike most industrial countries Sri Lanka has no alternative source of fuel such as coal. The forests, therefore, become the only dependent means

of obviating the growing crisis. This is seen at Dolosbage, for example, where big extents of forest are being systematically denuded for wood fuel to feed the engines of the adjoining tea factories.

With the growing importance of ayurveda, a bigger search is on for medicinal herbs in forests and allied areas of vegetation. The Ayurveda Research Institute at Nawinna will require these plants for experimental and curative work. While providing these requirements, the natural vegetation at the same time will be advancing scientific endeavour in native medicine and illustrating a good use of the environment.

An island such as Sri Lanka needs not only the land resources of the environment. It depends equally on the resources of the sea. Among legitimate forms of a good use of the sea, every environmentalist will endorse those such as coastal fishing for food and the selective collection of sea weeds and coloured fish for export.

The varying needs outlined above have exerted admissible pressures on the environment. These all emerge from the travails of a country geared to development. In the context of the present situation, therefore, a certain degree of exploitation of the environment is justifiable; and no enlightened environmentalist will grudge the country its own resource requirements towards economic progress. Ecologists, indeed, would be ready to own that a certain selective exploitation of the environment for national development can be beneficial to its conservation.

Need for conservation

In the face of making a good and sustained use of natural resources for economic development due account must also be taken of conserving important preserves of the environment. To ignore this necessity would be tantamount to committing economic suicide. The natural environment, in fact, with its biological systems offers the only indigenous reservoir of the food, medicinal, and industrial products needed for national development. Its over-exploitation and misuse, therefore, will only erode this potential and hasten the dawn of complete economic instability.

(a) Terrestrial Ecosystems

Among the preserves of the environment meriting conservation, paramount attention must be attached to zones of natural vegetation. Vegetation forms the major component of the ecosystem, the vital pivot of the environment. An undisturbed zone of natural vegetation such as a forest or scrub represents a closed system of interrelationships between the various communities and the habitat. Any small change in one part of this zone is likely to be felt and compensated for eventually throughout its ecosystem. The least damage to a zone of vegetation, therefore, immediately alters the species structure of the ecosystem, creates an imbalance in its diversity and consequently reduces the pace of its biological productivity. This sensitivity of ecoystems where the vegetation is the predominant biotic factor emphasizes the necessity of conserving entire, significant areas of natural vegetation. To keep the ecosystem alive, then, stability through diversity is essential. This was the fundamental argument adduced by biologists to convince the former government to conserve the full expanse of Sinharaja Forest. "The more interdependencies in an ecosystem, as in a tropical rain forest, the greater chances there are that it will be able to compensate for changes imposed on it." (8)

(i) Forests

The wild life population, notably of elephants, deer and birds, forms another significant component of the ecosystem; and the vegetation provides the only natural habitat for this population. The denudation of such habitats in areas around Mahiyangana and Unichchai has been the ultimate cause of the emigration of elephant herds to the open country and of their menacing presence to cultivated fields. On the other hand, the parks of Yala and Wilpattu where the vegetation is fairly stable have confined the movements of wild animals to their forested habitats.

If, therefore, because of the stability of a zone of vegetation, precautions must be taken to preserve the greatest possible diversity of its flora and fauna, this must be done particularly to the more important forests such as those at Hiniduma, Gilimale and Gunner's Quoin. The argument holds more weight for the wet zone forests, particularly the tropical rain forests. Their rich floristic constitution amid a diversity of life forms renders them unique exemplars of efficient ecosystems.

The tropical rain forests especially, in the words of van Steenis (9), "form an expression of the greatest morphological diversity of a tropical flora." This is a reflection of a greater amount of speciation in their genera. The rain forests, such as those at Sinharaja and Gilimale, bring out this fact in many families such as the Dipterocarpaceae, Ebenaceae and Orchidaceae. This speciation is rendered more possible by the diversity of ecological niches. These, in fact, by their selective action rendered more fortuitous in area by geographical isolation have effected an evolutionary differentiation of species within certain endemic genera such as **Doona.**

In an analogous degree the same may be said of the montane forests. With an amount of habitat diversity amid a geographical isolation limited to the highlands these forests have evolved trypical genera such as **Kendrickia, Leucocodon** and **Hortonia** which are endemic not only to the island but also to the highlands themselves.

These forests of the wet zone support a fair amount of endemism amidst the variety and abundance of plant life. The endemic taxa, in fact, in these and other areas of vegetation account for c. 24% of the total flora. The figure is relatively high in relation to the surface area of the island, and confers a remarkable distinction on the related vegetation. So remarked Trimen (10) "On the endemic species the individuality

and interest of any flora depends." It is probable that research might reveal yet other endemics. Thus Kostermans is presently investigating the probability of a new endemic family in our flora — the Dichilanthaceae !

In the endemic flora, in addition, every new taxon is unique because it bears an identity of its own and is thus irreplaceable. Endemic plants, in other words, increase the diversity of organic life in the environment. They are, therefore, a heritage which neither the country nor the scientific world could afford to lose!

The richness and diversity in our flora further confers on the natural vegetation a degree of biological productivity. For every new genus or species marks an invaluable contribution to the total gene pool of plant material. The significance of this will be treated further down.

The representative flora endows the natural vegetation with another characteristic of rare significance. This derives from the existence of quite a number of genera which give evidence of a former land connection with the southern part of the Indian mainland in the recent, geologic past. The genera **Sterculia** and **Vitex** of the dry lowlands and others of the montane region such as **Strobilanthes, Impatiens** and **Michelia** commonly occur in India and underline a close affinity with the south Indian flora. Many of these genera are large in size and distribution. If one is to follow Willis' theory (11) these must be considered old. And Wait (12) maintains that the old elements of our flora are descendants and survivals of their Indian counterparts which migrated to Sri Lanka during the pleistocene epoch. From the point of view of evolutionary biology, therefore, the natural vegetation which supports an Asiatic flora of a geologic past as ours cannot be allowed to be destroyed without dire consequences to science.

(ii) Mangroves

Worthy of attention though of less floristic diversity and significance are the mangroves. Their uniqueness and complexity can best be studied in situations such as at Mangrove Island, Trincomalee, and around the Negombo and Batticaloa lagoons. Here, they show a mosaic of vegetation zones from algae and prostrate halophytic herbs to the tall sedges (**Cyperus** sp.), and then through the shrubby herbs such as **Acanthus ilicifolius** to the trees such as **Avicennia marina.** And because of the variety of plants and the saline water of the habitat the mangrove environment harbours a wide range of aquatic organisms from planton to large numbers of fish, crabs and shell-fish. Such complexity of organization in this ecosystem is still an unchartered field of scientific investigation. Yet the abundance of food alone it offers can, if husbanded on a scientific, sustained yield, afford a boon to the fisheries sector.

(iii) Patanas

No less important are the patanas or tussocked grasslands. They are not so widespread as forests; and being a unique type of ecosystem not commonly found in other parts of the world they merit with all the more reason to be conserved. With a floristic composition of their own the wet, black patanas, for instance, form a conspicuous and inseparable part of the montane vegetation, often extending for acres beside patches of montane forest. Since they are probably the products of a long period of evolution, to completely destroy their representative areas would create a permanent lacuna in the evolution of the indigenous flora; and without the patanas the attempt to assess the montane vegetation would be a monstrous piece of classification. And this would be the inconvenient impact to science were all patana land to come under cultivation.

The patanas, in addition, perform an invaluable function in their respective environments. Because of the high proportion of their biomass they possess a larger extent than do the montane forests, of the dead and decaying organic matter of the soil. Their herbaceous cover, besides, modifies the physical properties of the environment. According to Mueller-Dombois (13) during the monsoon seasons, the wet, black patanas intercept much more precipitation than the adjoining forests. Through the action of their heavy humous soils, these patanas serve as large sponges absorbing continuous quantities of water which are passed on to the water table and finally feed the the streams originating from nearby. This is well seen at Horton Plains. Interference with important sections of these patanas, therefore, will seriously affect the country's agro-economy and be equally a disfavour to national science.

Reasons for conservation

The forests, mangroves and patanas are, then, workshops of floristic and ecologic diversity which strengthen the stability and biological productivity of the natural environment. They are also habitats of a long process of microevolution. Keeping representative samples of these ecosystems alive is meaningful conservation — it secures their good use for the future of science and the national economy. The destruction of important ecosystems such as those at Sinharaja or Horton Plains or the Batticaloa Lagoon will compromise the intrinsic wealth of the country and spell the end of million of years of evolution. All this evidence summarises the pure scientific argument for the conservation of the terrestrial ecosystems.

There is on the other hand the economic argument, equally forceful and perhaps more so than the scientific one. Foremost in this argument stands the recognition of the wide diversity of plant potential in the natural vegetation. Collectively, this forms the base of the **gene pool** and bears great significance to agriculture and pharmacology. A wild species, for example, might provide the base of genetic resistance

to some fungal, viral or bacterial disease in a related crop plant, or the source of some steroid alkaloid to medicine. The significance of any wild species therfore to applied science cannot be disregarded. In this context Hegnauer (14) points out "it will never be possible to forecast the potential value of a taxon to different branches of science or to future plant utilization."

The related importance of the indigenous vegetation to such agricultural ventures as the Mahaweli Scheme is indisputable. If the vast areas of monoculture farming envisaged in the Scheme are to be viable it is important to preserve them from the ravages of plant diseases and pests. The earlier discussion made it clear that the natural vegetation remains the indispensable base against such disaster.

In addition to its genetic value the vegetation lends an insulating effect againt heat and excessive transpiration to agricultural crops in the dry zone. It gives rise, further, to natural **crop barriers** against the translocation of disease and pests from one monoculture field to another.

The natural diversity of the wild vegetation, then, becomes the essential prerequisite for the efficient functioning of agricultural schemes in the country. If properly managed and conserved within its total ecosystems, the vegetation could lessen the necessity of insecticide and pesticide controls and diminish the danger of soil pollution, while at the same time lowering strains on foreign exchange. To completely clear the vegetation around argicultural areas is therefore, an abuse of an asset of the natural environment. It is up to the government, however, to take cognizance of this warning for the long-term benefit of this Scheme.

The other aspects of the economic importance of the environment emerge from the treatment of forests and fisheries. Particular attention, however, must be paid here to the natural vegetation as a means of controlling the country's water resources. If this natural resource is not to be lost it is important to maintain in perpetual flow the many streams which originate from the hills. This supply can be ensured only if the related vegetation is conserved. The validity of this argument is well illustrated by the denuded forests at Dolosbage. The absence of a vegetation cover there has given way to ugly gaps of soil erosion and dried up its streams for good.

The same argument reinforces the significant impact of the hydrological forests of the Peak Wilderness, Horton Plains and Namunukula on the management of catchments and watersheds of the big rivers. By regulating stream flow, this dense cover prevents the risk of flash floods in the lower reaches of these rivers and checks soil erosion. Hence the wisdom of Joseph Hooker in advising the Colonial Government in 1873 to keep undisturbed all montane forests above the 5,000 ft. contour. The recommendation deserves serious attention today against the disclosure by the Chief Conservator of Forests (15) that only 8.5% of the total catchment area in the montane region is under forest cover. The catchment vegetation in these areas is, therefore, vital if the physical infrastructure of the Mahaweli Scheme is not to founder.

(b) Marine Ecosystems

An important aquatic ecosystem which concerns national security are the stretches of coral reefs around our coasts. Together with our tropical rain forests, these colonies represent the maximum organization of a balanced ecosystem in that more species and kinds of organisms together with a larger number of individuals inhabit a given amount of space than any allied ecosystem.

Reasons for conservation

The corals form a complex hive of numerous species of varying fantastic forms and hues. For this aesthetic reason alone, they merit to be conserved. Their additional value lies in their habitat, the home of curious coral fish, molluscs, crayfish and lobsters. With many of these, the coral polyps live in symbiotic relationships.

Because of the peculiar sociology of these coelenterates, our reefs are a paradise to the enterprising collector and tourist alike. They also offer the marine biologist a fertile field of research. Their importance is further enhanced by the natural protection their colonies afford the island's coasts against wave action and sea erosion especially in seasons of strong monsoons.

In spite of the fact that the polyps are very active and their colonies form endless reefs along our shores their rates of regeneration are very slow. According to Jonklaas (communicated) the Staghorn Coral grows to no more than 22 cm high a year, while the Sea Fan may take as much as 35 years to attain a height of about 1.25 m.!

This regenerative rate is slackened by changes in the intensity of wave action. The mining of coral is, then, not only destructive of entire colonies but also lessens the pace of their regeneration by the removal of the very barrier against wave action. The consequent effects on the marine ecosystem are obvious. The repercussions on fishing and tourism invariably follow.

These valid reasons underline the necessity of husbanding and conserving the coral reefs as very sensitive and useful bastions of the environment.

Destruction of Environment

National science knows only a bare fraction of the technical, mechanical, biochemical and medicinal properties of the hundreds of species of animals and plants of the environment. It is ironical, however, that many sectors of the environment have been destroyed for good before their potential could have been adequately

explored! The reduction of forests alone is an index of the situation. Whereas in 1961 (Canada-Ceylon Project) 44% of the total area of the island was forest, today barely 20% (unofficial estimate) remains of it, far below the minimum standard requirements of forestry.

Losses such as these have produced a diminution in the population of animal and bird life. An index of this appears in the increase in the number of protected species. Concomitant aspects of destruction are seen in the enormous quantities of coral quarried from reefs for quick-lime.

Results

The consequencies of such destruction are revealing. The disappearance of the diversity of animal and plant life immediately causes the erosion of the genetic bank with the breakdown of available resources. Reduction of the tropical wet zone forests has thus caused a rarity of important timber species such as **Diospyros quaesita** (Calamander) and **Canarium zeylanicum** (Kekuna). Valuable species such as **Cryptocoryne walkeri** are threatened with extinction while yet others such as **Verbascum chinense** are now extinct! With the disappearance of endemics such as these, national science will soon lose a unique part of its flora and the economy a rare source of genetic material.

On the other hand, deforestation has let loose in places an aftermath of erosion with its attendant risks to soil stability and water storage. Obviously such effects damage the development stage of the country as seen around the catchment areas of the Mahaweli, and in the enormous silting of Lake Gregory, Nuwara Eliya.

Solutions

Any precautions taken to obviate the damage to the environment of a technico-agricultural culture will depend ultimately on political decisions. If our ecosystems are really a vital asset to national development and if environmental policy is finally a political decision, then the basic philosophy for resolving this difficult issue must rest on the recognition that the aims of conservation of the environment cannot be discarded as only incidental to a national land use policy. These must be incorporated into such a policy. Towards securing this end the following solutions are proposed.

(a) Environmental policy

The implementation of the rights of ecosystems cannot be achieved without a national environmental policy. The Biosphere Conference (1968) stressed this recommending that "member states of all the United Nations Organization develop comprehensive and integrated policies for the management of the environment."

Upholding the natural environment as the primary resource of national development this policy will situate the rights of ecosystems as very valid to national land use planning. To be proof against errors, the policy must formulate a system of proper environmental management based on sound physical and biological surveys. To render it effective, the policy must be supervised by a Department of Environment set up under the Ministry of Finance and Planning. This department must be vested with statutory powers to assess the requirements of any project for new virgin land in relation to the quality of the natural environment.

(b) Land Alienation

An environmental policy will not be complete if it is not correlated with planned land allocation. This is important in the context of a rapid increase of population amidst a scarcity of employment opportunities; and as a result landlessness has emerged as a social need.

Landlessness however, inevitably leads to encroachments; from these follow illicit fellings, soil erosion and the destruction of forests. All these are foreboding dangers to the environment. While it is opportune to control alienation of wild land it also remains a necessity to make land allotments to keep people away from wild land. It will assist conservation measures if these allotments are restricted to marginal lands and are strictly supervised by the Department of Land Development.

(c) Nature Reserves

Against the present state of the environment, the safest way of preserving valuable ecosystems are nature reserves. Their value to science lies in the fact that they not only circumscribe in restricted areas the existing species of animals and plants but also serve to retain for future generations representative samples of biological diversity and resource material.

These reserves serve a relevant need today. National science, for instance, has hardly probed the biological processes of ecosystems that are functional to man. To safeguard this opportunity for science IBP plots have been established in the country. Some of these have been interfered with. There is urgent need therefore, to have these plots supervised by the Department of Wild Life.

Too rapid deforestation in the country renders the creation of more reserves an urgent necessity. These should be located in the more important ecosystems. Meijer (16) recommends the establishment of reserves of 200—300 acres in the more southern rain forest areas and in the highlands above the 5,000 ft. contour, inclusive of the Peak Wilderness.

(d) Field Stations

The lack of complete surveys of animal and plant diversity brings out a great need for biology field stations. This becomes all the more obvious from the fact that biology is learnt not in the lecture hall but in the field.

A field station of the kind will at once provide the requisite base camp from where explorations and collections could be made in a particular locality. The feasibility of such field activities will only stimulate research, particularly among university graduates, and have it based on first-hand observations and critical study. Beside securing this end, biology field stations will attract foreign scientists to come and work on our ecosystems and help in the exchange of information with local scientists.

Conclusion

The collective evidence of the preceding account leads to the inevitable conclusion that the environmental situation in the country is alarming. The depletion of some of the notable preserves of the environment is well known; and there is danger that the enthusiasm for development might capitalize on what viable sectors of the ecosystems yet remain. Hence the grave concern in regard to the environment and the need for restraint in its management.

The restrained use of the natural resources and their conservation are, in fact, two concomitant processes of national development. Its basic requirements are not only the indigenous resources of the natural environment; they also include the preservation of the very physical and biological systems which produce such renewable resources, to render the former yet viable for the future. There is need, therefore, for maintaining a reasonable balance between the excessive expansion of technology and agriculture into the environment and the conservation of its ecosystems.

The country, unfortunately, has failed to maintain this balanced attitude. In spite of repeated warnings from the scientific community, administrators and politicians have unwittingly allowed sections of the environment to be exploited before the claims of various projects and popular demands, relegating the conservation of ecosystems to the future on the grounds that there are other matters of greater urgency.

If, against the alarming situation this attitude continues to prevail the country will be engulfed before long in an economic vacuum created by its own misuse of the environment. Fresh thinking, then, is needed to formulate an enlightened land use policy reinforced with sanctions against violations of its laws. Its foundation can be laid only by a strong policy of environmental management. It should be the duty of biologists of all specializations to ably assist such an environmental policy by their technical expertise and experience.

REFERENCES .

1. National Science Council of Sri Lanka (1976). Man & His Environment. Report of a Seminar. Colombo.
2. Cramer, L. H. (1976). Overdue — a department of environment. **Ceylon Daily News,** 30 November.
3. de Mel, R. (1979). Address to Land and Water Resources Development Conference.
4. Odum, E. P. (1963). **Ecology.** New York.
5. (Edited) (1978). Statistical Abstracts of the Socialist Democratic Republic of Sri Lanka. Colombo.
6. Gourou, L. (1948). **Les Pays Tropicaux.** Paris.
7. Farmer, B. H. (1957). **Pioner Peasant Colonization in Ceylon.** London.
8. Weaver, J. E. & F. E. Clements (1938). **Plant Ecology.** New York.
9. van Steenis, C. C. G. J. (1969). Plant speciation in Malaysia with special reference to the theory of non-adaptive saltatory evolution. **Biol. J. Linn. Soc.** 1 : 97—133.
10. Trimen, H. (1885). Remarks on the composition, geographical affinities and origin of the Ceylon Flora. **J. Roy. Asiat. Soc. (Ceyl.)** 9 (2) : 139—159.
11. Willis, J. C. (1922). **Age and Area.** Cambridge.
12. Wait, W. E. (1933). Nature's Workshop in Ceylon. **Spolia Zeyl.** 18 (1) : 165—179.
13. Mueller-Dombois, D. (1972). Nature vegetation and agricultural development in the hill country of Ceylon. **Loris** 12 (5) : 262—263.
14. Hegnauer, R. (1975). Secondary metabolites and crop plants. In "**Genetic Resources of Plants.**" Oxford.
15. Perera, W. R. H. (1975). Administration Report of the Conservator of Forests. Colombo.
16. Meijer, W. (1972). Conservation of primary forests in Ceylon. **Loris** 12 (5) : 227—230.