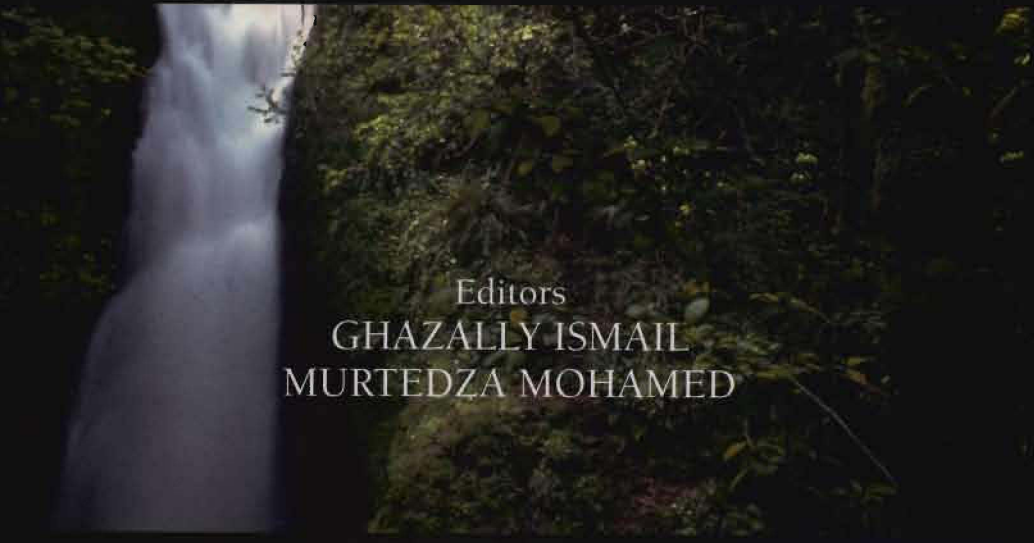




# BIODIVERSITY CONSERVATION IN ASEAN

*Emerging Issues & Regional Needs*



Editors  
GHAZALLY ISMAIL  
MURTEDZA MOHAMED



INSTITUTE OF BIODIVERSITY & ENVIRONMENTAL CONSERVATION  
UNIVERSITI MALAYSIA SARAWAK  
ASEAN ACADEMIC PRESS

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# INTRODUCTION

As we speed into what certainly feels like a new, yet still undefined, world order, we need to make sure that we shoulder our common responsibility of cleaning up the unfinished business of our 20th century, and that we are on course to fulfil the high hopes the world has for us in the next millennium. The vast majority of the world today can be said to be at peace. Building peace means building a better quality of life. We have also come to realise that the quality of human life depends ultimately on the quality of the environment we live in. In the final analysis, what matters most are the ability of our own environments to provide food, shelter and the natural resources needed to generate employment. It thus should be obvious that contribution to the development of a better quality of life for human beings just cannot be done or achieved in ways that damage our own environment.

Concern for the capacity of our own environment to sustain human life must accord our priority attention and action. In the early 80's the Brundtland Commission coined the term "sustainable development" and in 1992, the Earth Summit in Rio de Janeiro enshrined the principles of sustainable development in its Agenda 21. Simply, it means building a better life for more of the world's people by staying in harmony with nature. Indeed development is about growing better, not growing bigger. If our way of life is not sustainable, if it will not endure, it is just simply hopeless for us to aspire for a better quality of life and to build everlasting peace in this world.

Yet, despite all that has been said and agreed on this subject, we find that much of what we humans have done and continue to do in the nearly concluded 20th century in fact jeopardises the prospect of our attaining a better quality of life and enduring peace. We have unwittingly stretched nature beyond its capacity. And the sad irony is, we all know this! Our own common sense tells us that planet Earth can not be the repository for all our industrial wastes and still provide clean water, air and soil sufficient to support an exploding population. The planet can not sustain 20 percent of its population consuming 80 percent of its resources. Humanity can not survive one third wealthy and two-thirds poor.



The rapid clearance of tropical rainforests, the destruction of fragile coral reefs in our tropical waters driving hundreds of living species to extinction on a daily basis, the disappearance of fish stocks, the creation of holes in the ozone layer and warming of the global climate are all clear signs that our environment is in deep crisis! We in ASEAN are all aware of this environmental predicament we are in and the consequences we are about to face in the next century. Unfortunately, more so than in other parts of the world today, our agenda is set by economics. This is reality. As developing nations, we constantly find ourselves trying to draw links between environment and economics. No matter what our common sense tells us about the needs of the environment, we are constantly under pressure to show it in the form of bottom lines...in dollars, ringgits, bahts, pesos, dong, rupiahs etc! In other words we are constantly drawn into engaging in cost-benefit analyses, putting monetary values on all aspects of the environment. But, by doing so, are we really coming to grips with the reality of the problems? Would we ever be able to reverse the tide of environmental destruction amidst us in the developing nations? Comparing to the scope of the change that is needed, in actuality we are just tinkering in the margins. We are unwilling to deal with the real causes and confront the forces of our own making that are destroying the planet Earth. Have we been merely deluding ourselves and successfully avoiding the real issues?

For our part, we must respond to the predicament we are all in by discussing in pragmatic terms the environmental issues and regional needs of ASEAN member countries so that we are fully aware of the critical role we can play in protecting our slice of the world's rainforest cake and contribute to stabilising the global climate. Within the same breath, we must be also mindful of the inevitable and realistic considerations that we have to take into account to bring about development and progress to our own people. It is a well recognised fact that in the early stages of developing any country's economy, for instance, the exploitation of natural resources nearly always play a crucial role. In the past four decades, most of our exploitative methods of benefiting from our natural resources have been carried out in a manner that have indeed impacted adversely on our own environment. In recent years however, greater public awareness and concerns have emerged among ASEAN people on the environmental issues that are affecting their livelihood and subsequently lowering their quality of life. This fresh mind-shift has

prompted calls and demands for conservation measures and pollution abatement practices on the part on the governments in ASEAN countries either individually at national levels or collectively at the regional levels. Suddenly the environment and biodiversity conservation have been recognised by many of our ASEAN leaders as issues of central rather than peripheral importance. We take encouragement from this mind-shift. It is a mind-shift that is precisely needed to challenge the legitimacy of our social, economic and political institutions whenever they mitigate against life on Earth. An awareness and caring attitude for the environment and biodiversity that must continue to be tested and advocated to bring about real improvements in our quality of life. We must be prepared to debate spiritedly, to criticise constructively and to reach a consensus collectively on how effectively we ought to deal with these issues together as a region and making a difference on the global scenario.

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# I

# Biological Diversity, Conservation and Resource Management

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## INTRODUCTION

There are many environmental issues ranging in scale from local to global. They are extremely varied in nature and their relative importance is very often a matter of debate. Ask any person to list what they consider to be the five most important environmental issues and you will almost certainly get different answers. Ask them to list the five global issues most important to them and the five most important regional issues and there will still be a lot of different answers. There will be less agreement about the global environmental issues. For those with knowledge about global environmental issues, it is likely that climate change and loss of biological diversity would be commonly mentioned. Other issues mentioned might include, inequity of resource use, pollution and waste management, desertification and of course unsustainable use of resources.

Sustainability is one of many words which is commonly used in discussions about environmental issues. The 'Brundtland Report' (WCED 1987) promoted the popular use of sustainability and in particular the term sustainable development which has been defined as '*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*'. Sustainability means many things to many people; there are social, economic, cultural, ecological and political perspectives of sustainability. But underlying and indeed fundamental to all of this, is the sustainable use of biological diversity. Indeed in the objectives of the 1992 Convention on Biological Diversity we find '*the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits ...*'.

Biological diversity is fundamental to sustainability and not surprisingly there are many initiatives taking place right now to establish national and re-

gional biological diversity policies and strategies. However, it is not an easy task to establish and implement these strategies. There are many challenges, there are many gaps in knowledge, there is no single area of knowledge, no single discipline which alone can achieve these strategies. There are monumental tasks to be faced, tasks of a magnitude equal to any technological challenges facing us today or that has ever faced humanity in the past.

In this paper some of the issues, problems and questions which arise when establishing policies and strategies for conservation and sustainable use of biological diversity are briefly addressed. Some topics relevant to the 1992 Convention on Biological Diversity including: access to genetic resources, access to and transfer of technology; handling of biotechnology and distribution of benefits; financial resources and mechanisms; relationships with other international conventions; and the Conference of Parties will not be addressed here.

## BIOLOGICAL DIVERSITY

This term is widely used by many people; it has become a popular term. However, its biological meaning and the reasons why it has been introduced are not widely known. In policy documents and in public discussions the term is often used when there is no need to use it. The term is being used by many people but all those people may have different interpretations of what it means. These are problems which may have serious implications for formulating and implementing policy.

The term biological diversity has been in existence for many years and was popularised by Edward Wilson in his many delightful and very important texts on diversity of life (Spellerberg 1996). It is defined in the 1992 Convention as follows:

Biological diversity means "the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems".

It is an all embracing term. Biological diversity is found at many levels in ecology, in genetics and of course in taxonomy. There is diversity within and

between populations, within and between species, within and between families, within and between ecosystems.

### **The Relevance of Biological Diversity**

Biological diversity is surely the foundation for all sustainability - whether that be cultural, social, economic, environmental, biological, genetic, ecological. The different levels of biological diversity provide us with the basis for new varieties and cultivars in agriculture and horticulture. The components (organisms, populations, species, habitats etc), processes (nutrient cycling, carbon cycles, ecological succession etc.) and properties (resilience, health, integrity etc) that make up ecosystems provide us with life supporting systems. The benefits and functions of biological diversity are many and can be grouped into a number of categories as suggested in Table 1.

### **What's Happening to the Diversity of Life?**

Resulting from human exploitation, pollution, and destruction of nature, the diversity of life (in its many forms) is being damaged, destroyed and lost forever. It is being damaged as a result of the introduction of alien and invasive species, loss and fragmentation of habitats. All of this is well documented in publications and reports from international agencies (IUCN/UNEP/WWF 1991; Groombridge 1992; Perrings *et al.* 1995; McNeely 1996). Of particular importance is the fact that there are many global and regional policies and activities which for many years and which are continuing to degrade nature. World trade agreements are particularly notable in this respect. Particularly worrying are those people and agencies which are questioning the integrity of the information and the integrity of the organisations involved in promotion of conservation and sustainable use of biological diversity. There is a resurgence of a 'green backlash', that is a growth in the number of occasions when the need for conservation and sustainable use of biological diversity is seriously questioned.

There is a wealth of information showing that nature is being degraded and lost forever. That loss has implications for human welfare, health and indeed survival. Monitoring what is happening, monitoring the state of the environment (including the biological environment) has become an important issue both globally and regionally. Since 1972, there have been global initiatives to monitor the state of the environment and the state of the world's re-

**Table 1: Suggested benefits and functions of the many components and levels of biological diversity (from Spellerberg 1992)**

- 
- A. Ethical and moral values
    - 1. Intrinsic value of nature
    - 2. Natural world has value as human heritage
  - B. Enjoyment and aesthetic values
    - 1. Leisure activities ranging from bird watching to walking
    - 2. Sporting activities ranging from orienteering to diving
    - 3. Aesthetic value by way of seeing, hearing or touching
    - 4. Enjoyment of nature depicted in art
  - C. Use as a resource for food, materials, research inspiration and education (utilitarian)
    - 1. As a genetic resource for some of the following
    - 2. As a source of food
    - 3. As a source of organisms for biological control
    - 4. As a source of pharmaceutical products
    - 5. As a source of materials for building
    - 6. As a source of material for making goods
    - 7. As a source of fuel for energy
    - 8. Source of working animals
    - 9. For scientific research
    - 10. Educational value
    - 11. Inspiration for technological development
  - D. Maintenance of the environment (ecosystems and climates)
    - 1. Role in maintaining CO<sub>2</sub>-O<sub>2</sub> balance
    - 2. role in maintaining water cycles and maintaining water catchments
    - 3. Role in absorbing waste materials
    - 4. Role in determining the nature of world climates, regional climates and micro-climates
    - 5. Indicators of environmental change
    - 6. Protection from harmful weather conditions: wind breaks, flood barriers
- 

sources. The International Union for Conservation of Nature (IUCN), the Worldwide Fund for Nature (WWF) and the United Nations Environment Programme (UNEP) have been major contributors to these efforts. There is a well established World Conservation Monitoring Centre (WCMC) which as-

sembles and communicates information on many aspects of conservation including protected areas, areas of species richness, centres of endemism and the status of endangered species.

There are also many regional environmental and ecological monitoring programmes (Spellerberg 1991). Monitoring the state of the environment has become a necessity for sustainability but there is much research to be done because state of the environment monitoring is both an art and a science. But monitoring the state of the environment is not enough. We should be aiming for something. Ecological monitoring programmes in particular should include standards; that is certain levels to aim for over a certain period of time. It is no use just recording what is happening, we need also to be aiming for a certain standard of an ecological attribute (Spellerberg & Sawyer 1996).

The huge amount of data being assembled, stored and communicated (as part of state of the environment reporting) is just one reason why we need to ensure that there is use of the best available in information technology such as GIS. The applications are many with regard to not just surveying, mapping, impact assessments, and identifying centres of biological diversity richness but also with regard to formulating priorities and strategies.

### **What's Being Done to Conserve and Sustain the Use of the Diversity of Life?**

The degradation and loss of nature and the rate at which this is happening is evidence of the unsustainable use of biological diversity in its many forms and levels. The loss is affecting us all and it will affect future generations. At the same time there is gross inequity in terms of: the use of nature; knowledge about nature and impacts on nature. We are a long way from sustainable use of it. A very long way from equitable use of it.

#### *Conservation in Practice*

There have been many thousands of conservation initiatives, there are many hundreds of thousands of people engaged in conservation activities and there are many hundreds of thousands of conservation organisations. For many years the following have been undertaken to conserve nature:

- i) *Ex situ* conservation: botanical gardens and zoos.

- ii) Efforts to control the extent of damage caused by alien and invasive species.
- iii) Restoration of habitats and reintroduction of organism.
- iv) Establishment of protected areas on land, water and in the sea.

*Ex situ* conservation has a direct but small educational role in conservation (Spellerberg 1996). It is a last resort and few organisms have been successfully returned to the wild by zoos. It is ironic that so many zoos around the world display animals from other biogeographical regions when there are many local endangered species. Most botanical gardens and parks (except those conducting biological research) have mainly educational and amenity functions only. Parks and city gardens do nothing for conservation. A specimen trees in park is ecologically sterile and is like a single instrument trying to play a symphony on its own. In nature, it is the individuals, the populations and the many interactions between species which make up the rich diversity within communities and ecosystems.

Species of plants and animals have been deliberately transported and accidentally transported from one biogeographical region to another. We have mixed and shaken the species of the world. Many of these introduced species are having devastating effects on local biological communities or are spreading at such rates on land and in water that their presence is causing major environmental problems. The costs of controlling and attempting to remedy the damage caused by alien and invasive species is huge. So huge is the problem (economically and ecologically) that some ecologists suggest that the effects of alien species is becoming the most important environmental issue of all.

Biological and ecological restoration is not new but it is in need of much more expertise, It is young in the sense of the resources available to deal with the growing immensity of the need and opportunities for restoration. The costs and the time scales of habitat restoration can be huge.

There are many hundreds of kinds of protected areas around the world and the growth in number has been exponential (Spellerberg 1992). The total area of land and water now protected may indeed seem impressive and so too is the number of marine reserves and sanctuaries. But numbers and area mean very little in term of contribution to conservation and sustainable use of biological diversity. Most protected areas are in places which are not used



for anything else. Most have come too late. Many exclude indigenous peoples and the traditional activities. In most cases not much is known about the state of the organisms let alone what is in the protected areas. There is lack of policy, lack of institutional frameworks and lack of management. We need those protected areas but we also need to improve the way we identify and manage them and what is in them. Ecological evaluation for conservation has important applications with respect to identifying priorities.

### *Biological Data and Assessments*

All of the above conservation measures cannot happen without biological and ecological data. We need to know what is there, where it is and what is happening to it. That requires surveys and classifications of biological data. That in turn requires taxonomic and ecological expertise.

Much is said about rates of loss of nature but very often that information is not substantiated. That may lead to suspicion and doubt about claims so often made in the name of conservation. We need therefore to ensure that biological surveys are undertaken with good science. There should be information not only about the methods but also about the reliability and accuracy of the data. The data needs to be communicated with care and with skill; it is often claimed that scientists are not very good at communicating with policy makers and others. Ecologists have a particularly important role in communicating not only good ecological science to a wider audience but also the complexity and uncertainty of ecology to a wider audience.

Perhaps some of the degradation of nature could have been avoided or remedied or mitigated. But it is not just the immediate damage, it is also the long-term consequences of impacts on the environment. Very worrying are the costs incurred as a result of previous projects for which there was no environmental impact assessment. Dealing with the consequence of many years of poorly designed waste disposal methods, landfill rubbish sites and major building projects has incurred huge costs. The costs of cleaning up the environment is the dreadful legacy of ignorance, greed and lack of communication between policy and science. The role of Environmental Impact Assessment (EIA) is now so important but at the same time there is a need for much improvement in the methods used and how they are used in EIAs.

*Information, knowledge and partnerships*

Even with good biological data and even with the very best of EIAs, together with the traditional methods of conservation, that is not enough to ensure that there is conservation and sustainable use of nature. We know (from many years experience) that we need:

- i) Information and knowledge (and be able to identify gaps);
- ii) Research, training and education;
- iii) Partnerships with local indigenous peoples and respect of their knowledge.

There are vast sources of information, but that information need to be converted to knowledge before it can be used. Information stored in many forms becomes knowledge when we use it. There is a lot we do not know about nature and there are many gaps. An important contribution to building up information is to identify gaps at the same time. Since the 1992 Earth Summit there have been many comments about the gaps in expertise needed for conservation; particularly taxonomic expertise. That need has implications for training and education. Knowledge comes in many forms and is communicated in many ways. It is unfortunate that only more recently has there been a growth for the respect of indigenous peoples and their knowledge. We need partnerships for conservation!

*Legislation*

Conservation and sustainable use of biological information can not be achieved by partnerships, knowledge, data and conservation methods alone. That is not enough. We need policies legislation, rules and agreements (and incentives). There are many world Conventions and Treaties which have been introduced to help conserve nature. For example there is CITES (The Convention of International Trade in Endangered Species), Ramsar (The Wetland Convention, particularly wetlands of significance for birds) and the Antarctic Treaty. There are many examples of national legislation, some protect named species, some protect special areas of scientific interest and some attempt to look after the environment now, for future generations. The 1991 Resource Management Act of New Zealand is of significance in respect of efforts to promote sustainable management:

**New Zealand Resource Management Act 1991.**

**PART II Purposes and Principles**

The purpose of the Act is to promote the sustainable management of natural and physical resources. In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well being and for their health and safety while-

- a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
- b) safeguarding the life supporting capacity of air, water, soil, and ecosystems; and
- c) avoiding, remedying, or mitigating adverse effects of activities on the environment.

*Policies and institutional frameworks*

But even with strong legislation, that is still not enough. Experience in many parts of the world tells us that we need:

- i) institutions and organisations;
- ii) strong institutional frameworks and regional cooperation.

There are many kinds of organisations with interests in conservation and in environmental matters; they range in scale from local to global. Some are NGOs (non governmental agencies) and some governmental. It is important to build partnerships between these organisations and not conflicts.

It is because of the huge and complex task involved that there has to be a strong institutional structure to facilitate and implement biological diversity strategies. Given all of the above, there could be successful national and regional biological diversity planning. There is much experience in developing such strategies and we have much to learn from experience (Miller and Lanou 1995).

**FROM THEORY TO PRACTICE**

Since the time when the 1992 Convention on Biological Diversity came into force, several signatory nations proceeded to design and implement national strategies. In the process, much was learnt and much advice is now available. There are guides to preparing national strategies and there is much advice

available about the steps in the process. Rather than trying to suggest yet another conceptual planning process, a number of questions should be addressed in the process of preparing a national strategy for conservation and sustainable use of biological diversity. This is a preliminary and pragmatic list of questions and it is expected that this check list would be modified and extended; thus the spaces after question 22.

1. Who is responsible for the process? Reach agreement as to who is the 'lead' agency. Need for a strong institutional framework. What international groups does the lead agency liaise with?
2. If the lead agency is a government agency, then do ALL other government agencies support the proposal to establish a strategy? If not why not?
3. Who should be involved? Undertake wide consultation and establish a partnership of representatives of groups including indigenous peoples, communities, NGOs and government agencies. Partnerships are crucial.
4. What are the existing policies and laws relevant to conservation and sustainable use of biological diversity? There is a need to know what is relevant and where the gaps might be. These could be at different scales; local, regional, national, international.
5. What is the 1992 Convention on Biological Diversity all about? Ensure that everyone in the process has read the Convention. Allow time for discussion and interpretation. Agree on the interpretation.
6. What other activities are under way or are being planned which are not directly related to the 1992 Convention (such as Agenda 21 projects) but which deal with aspects of biological diversity?
7. What is Biological Diversity and what is its value? What are the criteria for determining value?
8. How is the process to be resourced? Identify national and international agencies who may resource the process.
9. What are the objectives of the strategy? What is the timescale? Will there be standards set for biological diversity? Will there be monitoring to see if objectives are met?
10. What are the geographical boundaries for the strategy? Agree what area of land, water and sea will be included.
11. What is known about the biological diversity of the area? Where are the sources of knowledge? Where are the gaps and which gaps to fill?

12. Where are the richest areas and most vulnerable areas of biological diversity?
13. What has been happening to the biological diversity? What kind of monitoring procedure are in place and who is involved?
14. What are the threats to biological diversity now and in the future? Is there a policy to identify threats and impacts?
15. How does the strategy cope with uncertainty and lack of knowledge? Is adaptive management appropriate?
16. Who will contribute to the strategy and how will they do that?
17. Communication of drafts of the strategy. Consultation on the draft and then communication about the strategy. How can this best be done?
18. What are the costs of implementing the strategy? What are the costs of not implementing the strategy - in not just monetary terms?
19. What are the implications of the strategy for education and training?
20. What are the social, economic, cultural political implications?
21. Who will implement the strategy and who will contribute to the work of the strategy?
22. Who does the lead agency report to and how often after the strategy has been launched?
- 23.
24. *et seq.*

This list of questions should not suggest that the process of establishing a national or regional biological diversity strategy is a linear progression. On the contrary, cycles and feedbacks within the process should be expected along with an iterative process.

### Some Key Points

In summarising all of the above, some key points can be identified as follows (Table 2).

### ACKNOWLEDGEMENTS

I am most grateful to Prof Murtedza Mohamed for the opportunity to make this small contribution to such a most important workshop and in such a beautiful and biologically diverse country.

**Table 2: Key Points for conservation and sustainable use of biological diversity.**

- 
- i) *There is a need to discuss the relative importance of biological diversity as a human issue and as an environmental issue. What are the concerns of the people and where do environmental issues feature?*
  - ii) *The integrity and reliability of scientific information must be without question. It is not just the science but also the way the data is obtained and analysed.*
  - iii) *We can't conserve all of nature at once and therefore there is a need for prioritising and evaluation. Science has a role to play but so also do human values.*
  - iv) *We must use the best in available information technology and computer technology. GIS technology is becoming a particularly powerful tool for handling large and complex sets of data.*
  - v) *Inequality. For example, reduce the inequality in the distribution of knowledge and in terms of opportunities to share knowledge.*
  - vi) *Gender. The gender issues - the value and the role of women in conservation and in environmental management is poorly recognised.*
  - vii) *Socio-cultural issues. There is cultural and social diversity - a rich characteristic of humanity - which should be recognised.*
  - viii) *Communication and knowledge. There are gaps between the traditional disciplines. There is a need for more interdisciplinary environmental education, particularly between economics, policy and ecology.*
  - ix) *Working and learning together. Everyone has something to contribute to conservation and sustainable use of biological diversity. Policy makers, scientists, local communities should work and learn together - many wonderful examples where local resource issues have been addressed successfully by local and regional communities with the extra help and expertise made available where necessary.*
- 

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# Tropical Ecosystems: Environmental Impacts

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## INTRODUCTION

Ecosystems include all of the individuals, populations and species in a given area, the interactions among them, and the interactions of the organisms with their physical environment (Heywood 1995). Natural ecosystems supply humanity with a wide range of 'free' services, including clean air and climate regulation (Lovejoy 1995; Mooney *et al.* 1995a; MacKinnon *et al.* 1996). In addition, ecosystems are the 'storehouses' of an immense array of natural goods on which humans depend (Table 1). The complex biotic and abiotic environment in which species live and reproduce, is a direct consequence of ecosystem functioning. The ability of ecosystems to supply these goods and services depends on their continued functioning. Clean air is dependent on the balanced gaseous exchange of forests and other vegetated ecosystems, and the ability of these systems to absorb aerosols and sequester small amounts of pollutants. Recent dramatic changes in atmospheric composition may seriously compromise the ability of ecosystems to continue to provide this essential service (Vitousek 1994). A critical issue facing ecologists and resource managers is the extent to which ecosystems can continue to provide the quantity and quality of goods and services in the face of dramatic changes being experienced by ecosystems.

This paper attempts at assessing the extent to which environmental disturbances and perturbations influence tropical ecosystem and community processes. Initially, consideration is made on the consequences of and differences between natural and human-induced disturbances to tropical ecosystems and some of the main global and regional human-induced environmental impacts affecting tropical ecosystems. The discussion also focuses particularly on regional changes in diversity and the effects of fragmentation and degradation of ecosystems on both ecosystem and community proc-