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**Protection of Traditional Knowledge, Innovations and
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PROTECTION OF TRADITIONAL KNOWLEDGE, INNOVATIONS AND PRACTICES : THE MALAYSIAN EXPERIENCE

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ABSTRACT

Malaysia being in the humid tropics is greatly blessed with rich and diverse biodiversity which has been in the custodian of indigenous communities for ages. The three levels of biodiversity, namely ecosystem, species and genetic diversity have been utilised, exploited and valued by the indigenous communities in many ways over thousands of years. Hence biodiversity affects their lives more than it does to the more affluent urban communities. Much of the advances in agro-industries, fisheries, forestry, bioprospecting, supply of clean water and electricity, flood control and maintaining of ecological functions and balance had impacted the structure, organization, traditional practices and culture of rural communities that had contributed to impoverishment of their life style. Indigenous culture is often kept out of the definition of physical and social development. If human behaviour and culture are included as an integral component of biodiversity, their implications would change drastically. There are evidences that diversity has become tenets of great religions, traditions and beliefs. There are also examples both at global and local levels where the diverse culture, through uses of resources have contributed to our understanding of human's dependence on the complexity of biodiversity. There is parallelism between scientifically significant keystone species and socially selected key species and its value in enhancing ecosystem functions. Nowhere else is this linkage between ecological and social processes more obvious than in tropical ecosystems, especially in shifting cultivation and ethnobiology as practiced by the various ethnics in Malaysia. Thus biodiversity is not only an important regulator of agroecosystem functions but also is valuable in satisfying a variety of other needs of the local community, especially the social needs. Due on the rapid onslaughts of such resources, the Malaysian government and state governments had taken certain measures of protecting these traditional knowledge.

INTRODUCTION

In 1992 the Convention of Biological Diversity (CBD) was held at Rio de Janeiro , Brazil, in conjunction with the United Nations Conference on Environment and Development (UNCED). Among the agenda of CBD, Agenda 21 being the most important document had been discussed and negotiated by many countries and parties. Subsequently it paved the way for establishing the Global Environmental Facility, a global-scale funding mechanism, Conference of Parties (COP), a global negotiation forum, among others. As of February 1995, a total of 168 countries have signed this Convention, while in April 1995, already 118 countries had ratified it. Malaysia signed it on 29th December 1993, thus become a party to it. The CBD has been considered as one of the most significant and far-reaching environmental treaties ever developed. However, from the on-set of negotiation of CBD until to-day there is an underlying dissension between countries of the North and of the South which lies on the fact that for the former biodiversity is essentially a global issue, thus belonging to the world community. Conversely, developing countries of the South tend to show a strong 'country-driven' approach in order to make use of their biodiversity for their national economical and developmental benefits and to ensure some forms of equity in the transfer of appropriate technology for subsequent application in agriculture, forestry and industry.

From the on-set of CBD, Malaysia played a significant role among the developing countries in ensuring that equitable sharing of the benefits derived from the biodiversity-rich countries go to improve the standard of living of especially the poor rural communities in the countries of the origin of biodiversity (Anon., 1997, 1998). This rationale was adopted in lights of the rigorous bioprospecting processes involving pharmaceutical companies of the developed countries in the megadiversity countries of the South, including Malaysia. It is based on the assumption that if ever a product is developed and commercialized any financial gains derived from that should be equally shared by the country that develop it and the country of origin of that resource, in particular the indigenous communities that own the resource. Malaysia also realised that the rich biodiversity that is inherent to the developing countries may not be beneficial to the world's community without equal partnership between countries.

The fact that biodiversity is the backbone for agriculture, animal husbandry and forestry species selection, as well as for aquaculture utilisation is well known. The present domesticated animals and cultivated plants owe themselves to intense selection by man from the wild. Thus, new varieties, strains and breeds have to be constantly discovered, because of decreased resistance to pests or in order to reduce the use of pesticides and herbicides. Similarly, in developing countries the land use and the development are now subject to very rapid and dramatic changes because of

the globalisation of trades and markets. These development bring with them other facets; more pesticides and herbicides are used in order to improve the crop yield. In most cases this results in a strong intensification of the human impacts which leads to deforestation and ultimate transformation of land-use pattern. Biodiversity has its instruments and intrinsic values inherent in it. Meffe and Carroll (1994) reiterated that biodiversity provides us with goods (foods, fuel, fibres, medicine), services (recycling, nitrogen fixation, homeostatic regulation, watershed), information (genetic engineering, applied and pure sciences) and psycho-spiritual experiences (aesthetic beauty, religious awe, scientific knowledge).

Biodiversity is also considered a tool with which to establish a bridge within the social and cultural world. The globalisation of information and communications will be a major feature of the next century. More and sophisticated information are needed by consumers and policy makers in safeguarding these traditional knowledge. In this context, the current status of taxonomy is perhaps the most difficult constraints to overcome. Only some 1.5 million species are described and known thus far. Still the most conservative estimate of the total number of species range from 5 to 30 millions, with the extreme estimate that go even up to 100 million species. It is felt that the world does not have the capacity to address this issue, let alone other more pertinent issues such as the values and function of each species and the various function of many ecosystems that are prevailing in rural areas.

Another constraint is the current dichotomy between the biodiversity agenda and priorities of industrialised countries of the North and the developing countries of the South. The developed countries which have more sophisticated technologies would like to share the rich biodiversity in the developing countries for various services and products but they are not ready to transfer those technologies to the developing countries. And those in the developing world are asking for equitable partnership which some of the developed countries are not willing to compromise these cutting-edge sciences and technologies without a proper negotiation and agreements.

TRADITIONAL KNOWLEDGE IN MALAYSIA

Malaysia, having ratified the CBD is working towards incorporating into its national policies and planning a set of commitment under the treaty. Thus it is facing this global challenge with a few initiatives at national and institutional levels. By far the most significant steps taken by the country is to initiate a Biodiversity Country Study and to formulate the National Policy on Biological diversity. One of the important aspect of the Biodiversity country study is to present the state-of-the art of the socio-economic factors affecting biodiversity. With increasing population there will be increasing demands for infrastructure development, lands and resources. And cultural factors can play a significant role in the utilisation of biodiversity and

the conversion of forest lands to agriculture and infrastructures. This conversion may have a major effect upon the appearance of the landscape especially in rural areas.

The national policy on biological diversity includes a policy statement, "to conserve Malaysia's biodiversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation". This motherhood statement is formulated in such a manner that it observes the ethics and the inherent right to existence of all living forms which is deeply rooted in the religious and cultural values of all Malaysians. One of its objectives is to enhance scientific and technological knowledge and educational, social, cultural and aesthetic values of biodiversity.

Malaysia has been identified as one of the world's megadiversity areas with extremely rich biodiversity. The tropical forests, the oldest and most biologically diverse ecosystem on earth, cover much of the country. Floristically, Malaysia is rich; there are well over 15,000 species known to occur. There are 286 species of mammals, c. 150,000 species of invertebrates, with insects being the largest single group, 1,200 species of butterflies, 12,000 species of moths and over 8,000 species of fishes. As with other cultures, it is assumed that much of the traditional knowledge about these flora and fauna are heritage of the many traditional societies and communities that are dependent on them for their very survival (Osman, 1995).

CULTURAL AND RELIGIOUS ASPECTS

When discussing and considering biodiversity either at international or local fora most people especially scientists often focus on aspects concerning taxonomy, ecology, botany, zoology and genetics. These are in fact fundamental facets of biodiversity which most scientists are at ease when discussing about it. However, they don't encompass all of the areas of life influenced by the presence and absence of biodiversity such as the social and religious dimension affecting biodiversity, which are enshrined in our traditional knowledge. Later the scientists and biodiversity negotiators moved their attention to applied aspects of biodiversity such as biotechnology, biosafety, bioprospecting, biodiversity evaluation, assessment, etc. However, there are a multitude of cultural and ethical issues inherent to biodiversity that seldom get discussed and these aspects need to be addressed as well.

In essence, issues on biodiversity should also include both the social and cultural aspects. Social dimension requires that exploitation of biodiversity must be carried out in tandem with strengthening community involvement and cultural dimension requires that exploitation of biodiversity be compatible with the culture and values of the people affected by it (Nijar, 1995). It is often argued that many countries do not have the legal instruments or standards that protect indigenous peoples from certain biopiracy of their knowledge. In CBD Article 8(j) is clear on this issue. Nijar (1995)

also discussed at length the conceptual framework of mechanisms of empowerment on the traditional knowledge and the “Rights Regime” concept. After all most societies give animals and plants special place in their cultural and social activities. They have special roles in death, birth, marriage rituals, and these are irreplaceable with modern symbols. In many primitive societies, plants act as homes to various spirits, destroying these gigantic plants for instance represent chasing away spirits which are important in their social and belief systems. And these aspects must be respected by all concerned while using these resources.

Biodiversity is a basic concept for the understanding of nature as well as human behaviour (Latiff, 1997). Such understanding may include the preservation of sacred groves of trees, constraints on the killing of certain wild animals, or social practice that may impact the carrying capacity of social status. In some places in Sabah, *Cordyline fruticosa* plants are used by Dusuns to demarcate land belonging to different families, hence they are sacred in a way. Destroying these plants tantamount to subject oneself to certain punishment according to their social regulations and laws.

In Malaysia, we are endowed with many ethnics with diverse religions, beliefs and cultures. Though we share many common uses of biodiversity such as the use of plants, animals as food sources, drinks, clothings, dwelling constructions, and in rituals, the diversity of ethnics itself guarantee diversity of ethnobiology. For example, the dependence of Melanau on sago (*Metroxylon sagu*) for carbohydrate source has been documented for ages. The Penans are hunters and they depend of various wild animals for protein source. In Sabah, the Orang Sungai of Bukit Garam, are known to use many varieties of plants for medicine (Ajik, 1990) (Table 1).

Table 1. Some examples of medicinal plants used by Orang Sungai, Sabah.

Local Traditional Use	Local name	Species
Chest pain Tubers are ground to paste, applied.	Ubi kayu	<i>Manihot esculenta</i>
Rhizomes are ground to paste, applied.	Tapako	<i>Drynaria sparsispora</i>
Whole plant are ground, applied.	Atai-atai naluot	<i>Lindernia crustacea</i>
Whole plant dried, burnt to ashes, add edible oil, applied.	Lado	<i>Capsicum frutescens</i>
Shoot ground, dried; when warm, applied.	Undoruyoi	<i>Conyza sumatrensis</i>

<p>Boils Seeds taken internally Stem ground, applied Leaves ground, applied</p>	<p>Sembiling Pulutan Timbeleu</p>	<p>Scleria laevis Artocarpus integer Sapium baccatum</p>
<p>Headache Shoot ground, wrapped in banana leaves, heat, applied Leaves ground, applied Leaves ground, applied.</p>	<p>Puson dumarun Ambung-ambung kapal-kapal</p>	<p>Tetracera indica Callicarpa longifolia Bryophyllum pinnatum</p>
<p>Eye sore Leaves are heated, when warm, spread across eyes.</p>	<p>Pagil</p>	<p>Vitex pinnata</p>
<p>Cuts Whole plant ground, applied. Leaves cut, ground, add water, applied. Roots boiled, wash cuts</p>	<p>Sukab lungun Gosing Bawing</p>	<p>Ageratum conyzoides Melastoma malabathricum Ocimum basilicum</p>

Various ethnics of Sabah and Sarawak have practiced shifting agriculture for thousand of years and their interaction with biodiversity in their life is immense.

THE VALUE OF BIODIVERSITY IN THE SOCIO-POLITICAL PERSPECTIVES

To-day we are engaged in speeding up losses in species and their ecosystems, some knowingly and others unknowingly. Our understanding of the value of ecosystems, species and genes is so low that we sacrificed most of the components that may ensure our survival. Until the industrial revolution, the effects of human activities were local, or at worst regional, rather than global. All the great civilisations of the past have cleared land for cultivation, introduced plants and animals from elsewhere, and caused lasting change. The consequence of such industrial revolution include population growth, huge growth in food consumption of the resources and saturation of its sinks, notably the river systems and oceans. Higher standards of

living inevitably involve higher consumption of food and more waste. Higher consumption of resources in rich countries and heavy pressure in poor ones have already change its face. Similarly, at the local level higher consumption in towns put pressure on rural areas. Demand for more water and energy give similar effect on the rural populations. These are the issues that have the social and political implications.

Ethical - Do the exploiters have the right to exterminate plants, animals fungi and planktons, etc. that are used in many traditional societies. This has the basis that the capitalist man see humans as separate from the rest of nature. But respect for life as such has always been a central tenet of Buddhism, Taoism, Christianity and Islam, among other systems of belief.

Aesthetic - The rural populations are used to the beautiful greeneries and landscapes. With certain development activities these rural landscapes may be changed forever and representing a total loss. Examples of such loss are the construction of roads and highways across the rural villages, factories in rural areas, new townships, etc. In reality these kind of development affect the livelihood of traditional communities.

Direct economic - Malaysians have realised the direct economic importance of biodiversity, especially plant and animal species diversity. The exploitation of various timber species as source of hard tropical wood is a testimony of our understanding of the potential of diversity. More and more lowland dipterocarps forest are being logged to obtain foreign exchange needed to develop the nation. In such as development in many instances, the traditional communities are sidelined. The question of sustainability does not arise because we believe we still have plenty of the resources. Many people still do not comprehend the concept of susustainable development, let alone the sustainability and renewal of natural resources.

As well as conserving biodiversity at the level of species and ecosystems through in situ conservation, we also need to cherish the genetic diversity that occurs within them. The wild relatives of useful strains of our economic crops, fruit trees, vegetables, domesticated animals etc. are often loss when natural habitats are converted for other land uses (Osman et al, 1995). Without a large natural genetic reservoir, we make our food supplies vulnerable to diseases.

Table 2. Total Gross Domestic Products contributed by agro-forestry sector in 1990.

Sarawak	Sabah	Peninsular Malaysia	Total
1606.2	2436.2	10,778.0	14,820.4

Indirect economic - The same issues arise with still greater force over the indirect economic benefits provided the diversity of life. To-day we take every services as cost-free - We rely on forest and vegetation to produce soil, to hold it together and to regulate water supplies by preserving catchment basins, recharging ground water and buffering extreme conditions. We rely on soils to be fertile and to absorb and break down pollutants. We rely on coral reefs and mangrove forests as spawning grounds for fish and wetlands as shock absorbers for flood.

LINKAGE BETWEEN BIODIVERSITY CONSERVATION AND CULTURE

To-day the values of biodiversity has become the major determinant of the international system. For instance, eco-labelling has been proposed by the developed countries to hinder exploitation of rich timber by the developing world because of the difference in perception of developmental processes adopted by those countries. In many instances they are based on biased considerations. For instance the eco-labelling of *ramin (Gonystylus bancanus)* and *merbau (Intsia palembanica)* was based on wrong facts and figures made available to the western agency concerned. If one party does not understand the cultural practice of another party many such incidence may occur resulting in losses on both sides.

It is felt that culture and biodiversity should become the main determinants of the international system. A partnership between the two may help to solve many issues. Contrary to the practice of to-day that economic returns is the main consideration in the exploitation of biodiversity, cultural dimension affords many transactions be made in a manner congruent to social obligation of one country to the other and vice versa.

Chin (1985) studied the ways the Kenyah (one of the ethnics in Sarawak) treat the plants in his environment. Basically plants could be classified into the following categories, (I) domesticates, (ii) semi-domesticates, and (iii) non-domesticates. The cultivates include all those plants that provide their staple food, such as rice (*Oryza sativa*) and maize (*Zea mays*). Some examples of the cultivated plants in that community are given (Table 3) .The semi-domesticates are those which though never planted are often preserved or protected when other plants are cut and burn. The non-domesticates are those in the wild, neither planted nor protected.

Table3. Some of the domesticated plants of the Kenyah.

Kenyah name	Scientific name	Usage
bawang	Allium cepa	flavouring
usan	Ananas comosus	side-dish
lian alok	Annona muricata	snack food
pinang	Areca catechu	social
badok	Artocarpus heterophyllus	snack food
nakan	Artocarpus integer	snack food
basut	Artocarpus odoratissimus	snack food
ulep	Baccaurea motleyana	snack food
la'bai	Canarium odontophyllum	snack food
sebe	Capsicum annum	side dish
manjan	Carica papaya	snack food
limau sem	Citrus aurantifolia	side dish
limau latak	Citrus grandis	snack food
upak	Colocasia esculenta	staple food
timon	Cucumis sativus	side dish
peng	Cymbopogon citratus	side dish
keramu	Dacryodes rostrata	snack food
belak	Durio kutejensis	snack food
nanga	Eugeissona utilis	staple
kalem	Mangifera indica	snack food
alim	mangifera pajang	snack food
ubi	Manihot esculenta	staple food
dalo	Metroxylon sagu	staple food
beletek	Nephelium lappaceum	snack food
pa'dai	oryza sativa	staple food
beta	Parkia speciosa	side dish
ayep	Piper betle	social
tepu	Saccharum officinarum	snack food
jelai	Zea mays	staple, snack food
liar buke'	Zingiber officinale	side dish

HUMAN INFLUENCES ON BIODIVERSITY

Man has been appointed and acknowledged as the custodian for the earth. He is allowed to use all other species of plants and animals, for his benefits in a sustainable manner. Prior to Industrial Revolution, most things apparently were in harmony and equilibrium.. Since the Industrial Revolution, man has succeeded in accelerating the rate of producing products for consumption in a massive form that has threatened

food security and health. As a result an important ecological resource has suffered in the pursuit of economic advancement is the forest (Mannion & Bolwby, 1994) . Much of the degazetted forests have been converted to agriculture and when agriculture proved less competitive these lands are converted to industrial or housing estates. Each step of conversion would result in some losses of biodiversity, especially the vegetation types, plant species and animal populations. Some are replaceable but most are not.

Human activities affecting the sustainability of the biosphere was well discussed by Lubchenko *et al.*, 1991) and some of the pertinent components that affect the traditional communities and knowledge are shown (Table 4).

Table 4. Relationship between human activities and ecological functions.

Activities	Intended results	Improved quality of life
Land clearing Agriculture Forestry Fisheries Water diversion Mineral extraction Fuel consumption Industrialisation Urbanisation Recreation	Food production Shelter Consumer goods Culture	Fibre production Water supply Enjoyment Knowledge
	Unintended results	Environment costs
	Habitat destruction Deforestation Acid precipitation Climate change	Soil degradation Pollution Eutrophication Loss of biotic Diversity

BIODIVERSITY AND THE QUALITY OF LIFE

Biodiversity has both the positive and negative aspects. When we look at the diversity of life within and between countries, we are struck by huge inequalities. The developed countries by and large have lost their biodiversity through industrialisation and the developing countries are still rich with their natural endowment. The former now focused their endeavors in bioprospecting in the developing countries which need the financial resources to develop their countries. These inequalities make it very difficult to preserve biodiversity because of the rate of consumption and of pollution of the privileged minority on Earth have been made burden of the developing world. How can one ethically give first priority to biodiversity as long as the problem of poverty has not been solved? In the world about 1500 million people live in a state of absolute poverty, have no drinkable water or electricity and are illiterate. On the other hand we find 20% of the world population earning 150 times more than the poorest 20%. There are more than 1100 million persons who earn less than 2 ringgit per day (equivalent to US 60 cents). We just wonder for how long can the ethics of biodiversity endure the consequences of inequitable economic diversity within and between countries?

THE CHALLENGES AHEAD

From the above deliberation it becomes apparent that it is important to bring in the cultural perspectives, especially the traditional knowledge in biodiversity issues. The indigenous culture is more important in conserving and protecting the environment, whether locally or nationally. One of the major challenge is to incorporate the cultural and ecological aspects in the planning for the development of natural resources. Optimal economic development has to be integrated with cultural and ecological consideration and understanding to enable sustainability to be achieved (de Beer & McDermott, 1996). It is felt that in future scientists should play a more positive role in planning and management processes affecting the environment and biodiversity, in particular, rather than withdraw from all the planning and bureaucracy. Dassmann et al. (1974) has long called for a partnership between the scientists and policy makers in working towards a sustainable development, especially in issues affecting the traditional societies.

Another challenge lies in effective communication between all concerned with the environment. For example, in the management of forest, there are many sectors involved in influencing the decision. Developmental, agricultural, forestry, industrial sectors and public also play a role in determining the quality of forest, it is not the sole responsibility of the forest department anymore. An awareness towards the relationship of a healthy environment and the well-being of all communities need to

be enhanced, so that each and every party realise that we need one another, working together, to conserve the environment.

LEGISLATIONS

In Malaysia the general assumptions of biodiversity loss are never substantiated by any scientific data or concrete evidence. The potential loss is very clear as more and more pristine habitats are transformed and converted to other uses. But the actual loss is difficult to come by until extinction of a particular species is shown. If ever there are losses occurring, there is no accurate quantification or account of such losses although one is bound to believe that many species are lost before they are ever described. However, at global level, since the year 1600, an estimate indicates that 724 known species have become extinct (McNeely *et al.*, 1991). Another estimate places the

NATIONAL POLICY ON BIODIVERSITY

The national Policy on Biodiversity was prepared by an *ad hoc* task force initiated by the National Technical Committee on Plant Genetic Resources based on the resolution of the National Workshop on Biodiversity held at ISIS in February 1993. The draft document was prepared for circulation to the respective federal government ministries and agencies, state governments and other authorities by August 1994. Basically it contains three important parts (I) the policy, (II) the strategy and (III) the action plans.

The policy consists of a national vision, policy statement, principles, objectives and a set of rationale. Simply put the vision reads, “to transform Malaysia into a World centre of excellence in conservation, research and utilisation of tropical biodiversity by the year 2020”. The policy statement reads, “to conserve Malaysia’s biodiversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation. The policy recognises a total of 11 guiding principles in biodiversity conservation and sustainable utilisation. The objectives consist of six statements and the rationale centres around the economic benefits that could be derived from biodiversity, the principle of food security, environment integrity and stability, the concept of national biological heritage, scientific, educational and recreational values, biosafety, biotechnology and sustainable development guidelines (Anon., 1998).

The Strategy consists of the status of the biodiversity conservation and management statements and the strategies for effective management of biodiversity. An overview of both the *in situ* and *ex situ* conservation, sectoral policies, the current legislative framework and the international cooperation and linkages were given. For effective management of biodiversity a total of 14 strategies were outlined

The action plan consists of a set of programmes that should be undertaken by various implementors. The plans of action follow the strategies closely. It starts with the proposal to improve the scientific knowledge base with 11 programmes and ends up with a proposal to establish funding mechanisms which consists of just three programmes. Altogether a total of 86 programmes were identified and proposed.

OTHER RELATED POLICIES AND LEGISLATIONS

It is a common knowledge that protection of the environment is the central issue in the preservation and conservation of biodiversity. It is widely accepted that Malaysia has enough laws and regulations to protect its environment, but there is no single legislation which relates to biodiversity conservation and management until the just approved National Policy on Biodiversity (Table 5). Much of the present legislations are sector-based, for instance, the Fishery Act 1985 deals with the conservation and management of fisheries resource alone; the Protection of Wild Life Act 1972 deals with the protection of wildlife and the National Forestry Act 1984 deals with the management and utilisation of forests alone. However, what is more pertinent is not the number laws and regulations but the mechanism of strict implementation and enforcement of such legislations to achieve the required objectives and expectations. In order for the legislations to be more effective, not only the government agencies should adhere to them but also the public must participate actively to ensure its accountability. In this context the communities, and in particular the indigenous communities who are directly associated with the protected areas and traditional knowledge should be aware that they are not only the rightful users of the resources but also the custodian of the biodiversity and its traditional knowledge.

The most distinct feature of the legislative framework relating to biodiversity is that under the Federal Constitution, the authority to legislate for matters relevant to biodiversity does not fall under one single authority (Nijar). Most responsibilities relating to biodiversity conservation are shared between the Federal and State authorities; some others do fall under the responsibility of one authority alone, be it the Federal or State authority. This is specified by the Federal Constitution under the Federal, Concurrent and State List of the Ninth Schedule (Table 6). Thus there are some matters, for example, protection of wild animals and wild birds and the National Parks fall under the legislative authority of both the Federal and State governments. There are other matters, for example, forests and agriculture, which fall under the legislative authority of the respective state alone.

To-day as a direct response to the Rio Summit, in particular the Convention on Biodiversity, is the formulation of the National Policy on Biodiversity. Of the existing national policies and regulations, the national Forest Policy 1978 is one of the important one in ensuring the survival of ecosystems and forest species. However,

the National Forest Policy 1978 is only applicable in Peninsular Malaysia, whereas the National Forestry Act 1984 , as a federal legislation is deemed to apply nationwide only provides the classification of the forests. As land is the state matter, gazettelement and degazettelement of forest reserves are within the power of the various state governments. In the past there were instances whereby the states degazetted some of the protected forests without prior consultation with the Federal government. However, there are other Federal legislations which are supposed to complement and support the above policies. These include Land Conservation Act 1960, Protection of Wildlife Act 1972, National Park Act 1980 and Environmental Quality Act 1974.

Table 5. Partial list of legislation relevant to biodiversity

Legislative authority	Legislation
Federal	Environment Quality Act 1974 Fisheries Act 1985 Pesticides Act 1974 Plant Quarantine Act 1976
Peninsular Malaysia	Customs (Prohibition of exports) 1993 water Enactment 1920 King George V Enactment 1938/39 Aboriginal Peoples Act 1960 Land Conservation Act 1960 National Land Code 1965 Protection of Wildlife Act 1972 National Parks Act 1980 National Forestry Act 1984
Sabah	Parks Enactment 1984 Forest Enactment 1992
Sarawak	Fauna Conservation Ordinance 1963 National Parks Ordinance 1956 Wildlife Protection Ordinance 1958 Forest Ordinance 1954 Natural Resources Ordinance 1949 Natural Resources & Environment Ordinance 1993 Public Parks and Greens Ordinance 1993

LEGAL ASPECTS AND GOVERNANCE

Malaysia is a federated state. The constitution under the federal system provides a division of power between the various level of government. Each government has its own legislative and administrative body to exert control over the respective spheres of jurisdiction and is independent from each other, as specified in the constitution. The distribution of power can be divided into the federal list, state list and concurrent list (Table 4). With regard to the matters of the environment and biodiversity in particular, the respective list provides a clear power to the respective government to enact laws and legislation. However, in the concurrent list there exist a certain degree of overlapping in authority; hence laws could be made by either levels of government. To resolve any potential conflict arising from the overlapping of authority, there is a provision under Article 75 of the constitution which states that if any state law is inconsistent with a federal law, the latter shall prevail and the state law shall, to the extent be void

NATIONAL LAND CODE

The basis of land laws and administration is the National Land Code. However, the states of Melaka, Pulau Pinang, Sabah and Sarawak are governed by their own land enactment. Legally and administratively land is a state matter and thus under the jurisdiction of the respective state government. The federal government and thus a federal policy such as that of biodiversity does not apply to the state, though the federal government can exert a certain influence. Land laws have no direct bearing to biodiversity but indirectly they provide certainty in tenure in terms of ownership rights. Security of tenure encourages land to be used rather than left idle. The absence of a single central authority on land use would mean that the maintenance of reserves such as VJR for enhancing biodiversity would be left to the decision of individual states. Normally the Director of the Department of Land and Mines has the right to issue directives and regulation for the purpose of coordinating land administration. Like-wise the Director of the Departments of Forestry and Agriculture would direct and regulate the administration of forestry and agricultural matters, respectively.

As all levels of biodiversity lie mostly within the forest ecosystems, the Department of Forestry of each individual state would be the most important government agency to ensure the conservation and sustainable use of biodiversity. However, in a number of aspects and circumstances, especially with regard to land and biodiversity, the respective offices neither have enough or appropriate trained officers to undertake these responsibilities. One of the pressing problems that would determine the implementability of the biodiversity policy is the inadequacy of the respective state departments to comprehend the various facets and services of our rich biodiversity. This problem is liken to the similar problems faced by the federal

Departments of Environment, wildlife and national parks (Table 5), economic planning unit , others at state level.

Table 6. Matters related to biodiversity under the Federal and State laws

No.	Item	Matters
1	8	FEDERAL
2	9	Trade, commerce and industry
3	20	Fisheries Control of pesticides, pest protection
1	2	STATE
	2(a)	Land Land improvement and Soil conservation
2	3	Agriculture and forestry
3	12	Turtles and riverine fishing
1	3	CONCURRENT
2	9	protection of wild animals and wild birds; National Parks Rehabilitation of mining land, soil erosion

With regards to the national parks in Peninsular Malaysia, the Department of Wildlife and National Park (PERHILITAN) is the authoritative agency. Similarly those in Sabah and Sarawak, they are under the jurisdiction of the Sabah Parks and Forest Department (Sabah) and the Department of Forestry (Sarawak). The grey areas are the various state parks and Virgin Jungle Reserves (VJR). Since its inception in 1950, a total of 125 pockets of Virgin Jungle Reserves (VJR) covering a total of 110,624 ha of virgin forests had been established. These VJRs which range in size from as small as 3 ha to 1600 ha represent various types of forests were established to serve as permanent nature reserves and natural arboreta. In Peninsular Malaysia and Sabah, 77 and 48 VJRs covering an area of 22,325 ha and 88,299 ha were established. However, most of them now have become forest islands, fragmented by agricultural development and their survival is uncertain.

SARAWAK STATE INITIATIVES

It is accepted that among the states in Malaysia, Sarawak has the richest and most diverse natural resources, the most number of ethnics and traditional culture and hence the traditional knowledge (Mamit, 1997). After the discovery of a few bioactive chemical compounds (calanolides) from the local plants, by National Cancer Institute, USA, and the IPR as well as equity awareness created among the local communities, the state formulated and later passed Sarawak Biodiversity Centre Ordinance 1977 and later Sarawak Biodiversity (Access, Collection and Research)

Regulations 1998. In this particular case, it only required a collection permit from the Prime Minister's Department for the NCI scientists to go to Sarawak and collect plant materials for screening. After the discovery of the bioactive compounds, NCI and Sarawak State government signed a Letter of Collection (LOC) permitting subsequent collections. In lights of widespread awareness not only among the indigenous communities, scientific communities and the state government, the Sarawak Biodiversity Centre Ordinance 1977 and later Sarawak Biodiversity (Access, Collection and Research) Regulations 1998 came into effect on 1 January 1998 and 1999, respectively. Under the provision of the Ordinance, the Sarawak Biodiversity Council was established in February 1998 and is responsible to regulate access to, collection of, study and research on, experiment, protection, utilization and export of the State's biological resources. To implement these duties, the Council set up the Sarawak Biodiversity Centre in July 1998 (Chua, 2000).

With the legal backing of the Ordinance and the Regulations, the Sarawak Biodiversity Centre has put in place the Research Permit System to ensure the conservation, sustainable utilization of the state resources as well as fair and equitable benefit sharing among the stakeholders. The Research Permit System has the following components:

- Definitions of Terms (Appendix II)
- Types of Permit
- Eligibility of Permit
- Local sponsor and local collaborator requirement
- Penalty for non-compliance
- Research agreement
- Application process

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