

ADDENDUM TO THE BIODIVERSITY CONSERVATION IN SRI LANKA

A Framework for Action

CHAPTER REPORT - 09



BIODIVERSITY VALUATION & MAINSTREAMING ECONOMICS OF CONSERVATION

**Biodiversity Secretariat
Ministry of Environment and Natural Resources**

Addendum to the Biodiversity Conservation in Sri Lanka
A Framework for Action

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CHAPTER REPORT ON
BIODIVERSITY VALUATION & MAINSTREAMING
ECONOMICS OF CONSERVATION
(TASK FORCE NO-08)

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Biodiversity Secretariat
Ministry of Environment
Sri Lanka

July, 2006

ABBREVIATIONS

BCAP	Biodiversity Conservation in Sri Lanka: A Framework for Action
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CEA	Central Environmental Authority
EEPSEA	Economy and Environment Program for Southeast Asia
EIA	Environment Impact Assessment
GDP	Gross Domestic Product
GEF	Global Environment Facility
IUCN	The World Conservation Union
MENR	Ministry of Environment and Natural Resources
NAREPP	Natural Resources and Environmental Policy Project
NBSAP	National Biodiversity Strategy and Action Plan
NECB	National Expert Committee on Biodiversity
NPD	National Planning Department
PGIA	Postgraduate Institute of Agriculture
RUPES	Rewarding Upland Poor for the Environmental Services they provide
SANDEE	South Asian Network for Development and Environmental Economics
SPBAP	Strategy for the Preparation of a Biodiversity Action Plan

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SUMMARY

1. Introduction

The **Convention on Biological Diversity (CBD)** ratified at Rio in 1992 required signatory countries to formulate **National Biodiversity Strategy and Action Plans (NBSAP)** to conserve, utilize an equitably share the benefits of biodiversity in a sustainable manner. Sri Lanka being a signatory to the convention initiated its obligation by preparing a **Strategy for the Preparation of a Biodiversity Action Plan (SPBAP)** in 1966. Based on proposals of SPBAP (1966) the **Biodiversity Conservation in Sri Lanka: A Framework for Action (BCAP)** was prepared and published in 1998. The cabinet of Sri Lanka approved the BCAP 27th August 1998. Six years since approval of BCAP by the cabinet, the **National Experts Committee on Biodiversity (NECB)** convened by the **Ministry of Environment and Natural Resources Management (MENRM)**, was of the opinion that sufficient action has not been taken to implement the BCAP. A review was undertaken (Sanjeev, 2003) to study; the gap between recommendations of the BCAP and implementation and the reasons for the gaps if any. Based on the review the NECB was of the opinion, that BCAP was not effectively implemented because, among other reasons, it did not have an explicit action plan for implementation. The NECB decided to review through expert task forces, the BCAP, and prepare addendum with action plans on identified thematic areas. This report is on the thematic area of **Biodiversity Valuation and Mainstreaming Economics of Conservation**.

2. BCAP Gap Analysis

The following general deficiencies/ gaps of the BCAP were identified.

- Lack of specific emphasis on functional use of economics/ valuation of biodiversity. The functional uses of economics in biodiversity conservation are as follows.
 - I. Communicate (value of biodiversity) to individuals and public sector decision makers (by including biodiversity values in National Income accounts) and influence allocation of public sector funds for biodiversity conservation.
 - ii. Identify economic causes of biodiversity loss (market and policy failures) and introduce economic incentives and/or remove perverse incentives to conserve biodiversity (correct market and policy failures)
 - iii. Assess whether economic and conservation investments are socially worthy (EIA, Valuation and B/C analysis).
 - iv. Introduce mechanisms to finance biodiversity conservation (appropriation of values and allocation to conservation)
- Lack of emphasis on influencing individual/private behavior towards biodiversity conservation through use of economic instruments. The emphasis is more on influencing activities of the public sector. It ignores use of economics in provision of incentives (removing perverse incentives) for biodiversity conservation and sustainable use.

- Lack of emphasis on generation of finances and allocation of finances for biodiversity conservation and sustainable use. It is perhaps assumed that government would allocate finances to biodiversity conservation.
- Compared to the CBD in which use of economics in biodiversity conservation has been used as a crosscutting discipline linked to most conservation areas and strategies the BCAP has not linked use of economics to the different themes of conservation within the BCAP.

The BCAP has not provided an action plan specifying activities and who should undertake such in what period.

- Other than above gaps that have prevented the effective implementation of BCAP there are many other general reasons, though cannot be substantiated may be important explanatory factors. Some of these based on review of international experiences are: Political/societal obstacles such as lack of political will and support to implement the BCAP, limited public participation and stakeholder involvement, lack of mainstreaming and integration of biodiversity issues into other sectors, political instability, lack of precautionary and proactive measures, causing reactive policies; institutional, technical and capacity-related obstacles, lack of public education and awareness at all levels, lack of financial and human resources, lack of engagement of scientific community, lack of legal/juridical conditions to support implementations etc.,.

3. Recommendations

The report provides and Action Plan Matrix with the following main recommendations, to be achieved within five years, mainly by the MENRM with national budgetary allocations or where possible international funding sources.

- Improving national awareness on use of economics in biodiversity conservation
 - Introduce environmental economics to school economics curriculum
 - Strengthen EIA training undertaken by CEA including environmental economics
 - Introduce the link between economics and conservation to general public and politicians etc
- Improving capacity on economic valuation of biodiversity
 - Support research in environmental valuation
 - Support post graduate training in environmental economics
- Strengthening analysis on policy and economic incentives for biodiversity conservation
 - Recruit 4 officers trained in environmental economics and assign specific responsibilities (outlined in the report).
 - Study and establish the legal and institutional requirements to implement the use of economic instruments in biodiversity conservation
- Including biodiversity values in to national income accounts
 - Recruit 2 officers trained in environmental economics to appropriate institution and assign responsibility
 - Study and establish the legal and institutional requirements to implement the inclusion of biodiversity values to national income accounts.

- Financing biodiversity conservation
 - Recruit an officer trained in environmental economics and/or public finance to the environmental economics unit and assign responsibility on conducting the initial studies
 - Study and establish the legal and institutional requirements to implement the inclusion of biodiversity values to national income accounts.
- Cross cutting issues
 - Biodiversity secretariat to monitor applications of environmental economics in other sectors per guidance of the CBD

1. INTRODUCTION

1.1. Purpose of the Study

The **Convention on Biological Diversity (CBD)** ratified at the Rio Earth Summit in 1992 requires signatory countries to formulate **National Biodiversity Strategy and Action Plans (NBSAP)** to conserve, utilize and equitably share the benefits of biodiversity in a sustainable manner. Sri Lanka being a signatory to the convention initiated its obligation by preparing a **Strategy for the Preparation of a Biodiversity Action Plan (SPBAP)** in 1996. Based on proposals of SPBAP (1996) the **Biodiversity Conservation in Sri Lanka: A Framework for Action (BCAP)** was prepared and published in 1998.¹

Box 1

"Many of these documents (NBSAP) have never been implemented, but have merely led on to another round of environmental planning."

Emerton (2001) Pg. 49

The cabinet of ministers of the government of Sri Lanka approved the BCAP on 27th August 1998. Six years since approval of the BCAP by the cabinet, the **National Experts Committee on Biodiversity (NECBD)** convened by the **Ministry of Environment and Natural Resources (MENR)**, was of the opinion that sufficient actions have not been taken to implement the BCAP. A review was undertaken to study the gap between recommendations of the BCAP and implementation and the reasons for the gaps if any (Sanjeew, 2003). Based on the review the NECB was of the opinion, that BCAP was not effectively implemented because, among other reasons, it did not have an explicit action plan for implementation.² The NECB decided to review through expert task forces, the BCAP, and prepare an addendum with action plans on identified thematic areas. This report is on the thematic area of **Biodiversity Valuation and Mainstreaming Economics of Conservation**. Annex 1 provides the terms of reference for the review.

1.2. Objectives of the Study

The objective of the study is to review the BCAP, in relation to economic aspects of biodiversity and make recommendations on **Biodiversity Valuation and Mainstreaming Economics of Conservation** to achieve the following.

¹ The quotations in the boxes are adopted from a comprehensive study undertaken by Emerton, Lucy (2001) on The Use of Economic Measures in National Biodiversity Strategies and Action Plans: A Review of Experiences, Lessons Learned and Ways Forward, IUCN. Through out this report world experience based on Emerton (2001) is compared with the experiences of Sri Lanka.

² The BCAP acknowledges the lack of an action plan and provides reasons for such. It mentions (pg.2 of BCAP):
"The BCAP presents a framework for action. It has not attempted to spell out in detail each activity and to set out the financial budget and other resources needed. Such a step, it is argued would not only be impractical and would have been counter productive had it been attempted."

The BCAP had considered that biodiversity conservation programmes were on going and the need of further resources was mostly incremental. It had presumed that individual organizations would identify the specific activities required for Biodiversity conservation and would be able to attract the resources for implementation.

- i. Review the progress of implementation of BCAP.
- ii. Identify important areas missing in the BCAP.
- iii. Compile available information.
- iv. Prepare concept paper/ action plan to facilitate effective implementation of BCAP.

1.3. Methodology of the Study

A team of experts, namely; Prof. Hemesiri B. Kotagama, Dr. B.M. Suren Batagoda, Ms. J.M.Diana.D.J. de Alwis, Dr. Nisha Arunathilake, Dr. Prashanthi Gunawardena, and Mr. Shamen Vidanage, undertook the review.³

The study was carried out based on available documentary information, knowledge and experience of the team and the review of the recommendations of the BCAP in relation to implementation.

Box 2

"Experience has however also pointed to a number of challenges and constraints to using economic tools and measures for biodiversity planning. Major obstacles have been weak in-country capacity, knowledge and information about economic aspects of biodiversity, and insufficient involvement of economists and development decision-makers in the NBSAP process".

Emerton (2001) Pg. 25

A study had been conducted in 1996 to assess the potential of using economics in biodiversity conservation in Sri Lanka, by the **Natural Resources and Environmental Economics Policy Project (NAREPP)**. Several case studies on valuation of biodiversity and possibilities of integrating such to national income accounts and project evaluation had been done.⁴ These study recommendations had been made available to the authorities involved in the preparation of the BCAP. A summary of the recommendations presented in a schematic form is provided as Annex 2. Given the public availability of the information of the above mentioned reports and recommendations, this report does not dwell in to details and also avoids an intellectual discourse on reviewing the principles and theories of environmental economic related to biodiversity conservation. The report also does not review details of individual studies published on biodiversity valuation in Sri Lanka. A collection of such literature is submitted along with the report. The report has attempted to be brief in addressing the stated objectives in developing an action plan to be implemented during 5 years in the thematic area of biodiversity valuation and mainstreaming economics of conservation to meet the objectives of the Biodiversity Convention.

³. The order of names of team members is random.

⁴. De Silva. S. and H.B. Kotagama (1996) "Integration of Forest value to National Income Accounting in Sri Lanka". This study was done and the monograph produced to support the preparation of National Biodiversity Conservation Action Plan, Natural Resources and Environmental Policy Project, USAID, Sri Lanka (1996 Jan - May).

2. GAP ANALYSIS: REVIEW OF USE OF ECONOMICS IN THE BCAP

2.1. Generic Use of Economics in Biodiversity Conservation

This chapter presents a gap analysis: the gap between the ideal expectations and recommendations of the BCAP to seek reasons for the inadequate implementation of its recommendations. First the generic use of economics in biodiversity conservation is explained, which follows the review of use of economics in the CBD and in BCAP in Sri Lanka. The chapter concludes an identification of specific gaps in the BCAP in the area of using economics in Biodiversity conservation.

Emerton (1998 and 2001) have comprehensively reviewed international experience in the use of economics measures in NBSAP. This report is directly guided by the Emerton's review.

Box 3

Biodiversity as an economic resource ...

"Biodiversity-the variability within and among living organisms and the systems they inhabit-is the foundation upon which human civilization has been built. In addition to its intrinsic value, biodiversity provides goods and services that underpin sustainable development in many important ways, thus contributing to poverty alleviation. First, it supports the ecosystem functions essential for life on Earth, such as the provision of fresh water, soil conservation and climate stability. Second, it provides products such as food, medicines and materials for industry. Finally, biodiversity is at the heart of many cultural values."

CBD

Economics is the scientific study of human behavior with respect to use of resources. Biodiversity is an economic resource as its consumption (see *Box 3*) generates utility and is increasingly becoming scarce. Economics enables the scientific study of human behavior with respect to use of biodiversity, leading to the identification of human behavior related;

- causes of biodiversity degradation and
- possibilities of changing human behavior

towards biodiversity conservation, utilization and equitable sharing of benefits (see *Box 4*).

Kotagama, H.B. and Thushantha, N. (1996) "An Estimation of the Pharmaceutical value of Bio-diversity in Sri Lanka". This study was done and the monograph produced to support the preparation of National Biodiversity Conservation Action Plan, Natural Resources and Environmental Policy Project, USAID, Sri Lanka (1996 Jan - May).

Kotagama, *et al.* Biodiversity Valuation and Mainstreaming Economics of Conservation, Addendum to the Biodiversity Conservation in Sri Lanka; A Framework for Action

Box 4

“Economic forces underlie and explain much of biodiversity degradation and loss, and economic instruments provide a useful set of tools for strengthening biodiversity conservation, sustainable use and equitable benefit sharing.”

Emerton (2001) Pg. 2

Biodiversity valuation is an essential methodology in economics that facilitates economic analysis of biodiversity conservation. Specifically economics enables the following in biodiversity conservation, sustainable use and benefit sharing.

I. Identification of economic causes of biodiversity degradation (market and policy failures)

In a market economy prices determine the utilization of resources (what, how much and when etc.). In an idealistic situation referred to as a perfect market, the price is a perfect social valuation of the resources. Perfect market prices guide individuals to take decisions to use resources efficiently. Where markets are imperfect,⁵ as with biodiversity resources, prices of resources/ products either do not exist or are under-valuations. Hence individuals/society is guided to overuse biodiversity. Biodiversity valuation enables to guide optimal use of biodiversity through incorporating the values to resource use decision making processes of policy and project evaluations or directly to market prices.

Government too may administer prices by changing market prices, or change conditions of operation of markets through policy for reasons of guiding individuals and society to achieve social objectives other than efficiency of resource utilization such as equity, food self sufficiency etc. However policies although may be well-intended and targeted to benefit a selected economic sectors (such as agriculture) may have unintended adverse impacts on resource utilization of other sectors (such as biodiversity). These policies that adversely effect biodiversity could be identified and appropriately modified.

ii. Introduction of economic incentives (removal of perverse incentives) to conserve biodiversity (correction of market and policy failures)

Upon identification of market failures or policy failures as explained above these could be corrected through various means as supporting conditions for operation of markets, removing of policies that adversely effect biodiversity conservation and sustainable utilization. Such possibilities and experiences are widely available in economic theory and international research literature. Some economic instruments are taxes on environmental pollution, subsidies on environmentally friendly production and consumption, loans to adopt environmental friendly technology, funds for environmental management, environmental performance bonds etc. There is currently a plethora of international research and applied case studies in literature on the application of economic instruments for biodiversity conservation such as the CBD and the IUCN websites.

iii. Introduction of mechanisms to finance biodiversity conservation (appropriation of values and allocation to conservation)

Up to recent time environmental conservation in poor countries have been mainly financed through international aid/ grants. Whilst it is rational to attract international funding for biodiversity conservation given international benefits accrued to the international community it is necessary that in

⁵ Market imperfections are caused by; existence of monopoly, lack of attenuated property rights, existence of public goods, prevalence of externalities, inability to represent intra-generational and/or inter-generational preferences.

the long run local financing mechanisms are explored too (Kotagama, 2002). Economic methodology enables the social valuation of biodiversity resources. Appropriation of these values through appropriate institutional mechanism would enable socially justifiable allocation of finances to biodiversity conservation. For example currently values of biodiversity resource utilization are not accounted in the national income accounts, which guide public financial allocations. Appropriated environmental use values such as from use of nature parks, eco-tourism is most obvious possibilities to finance biodiversity conservation. Linking environmental use values to resource and product pricing such as linking watershed values to electricity prices is another example (Kotagama, 2002).

iv. **Assessing whether economic and conservation investments are socially worthy (Valuation and B/C analysis)**

The possibility for economic valuation of biodiversity enables unambiguous monetary comparison of economic and environmental benefits and costs of investments (particularly of projects). This enables decision-making on investments to recognize the potential trade-offs between economic and environmental cost and benefits entailed in investments. Such comparison of benefits and costs could be undertaken to evaluate policies too.

v. **Communicating the need (Value) to conserve**

As monetary values are commonly known, expression of value of biodiversity monetarily would be an effective means of communicating to the society and resource use decision makers both public and private, the real value of biodiversity.

2.2. **Use of Economics in the CBD**

Table 1 indicates (shaded boxes) the use of economics in the CBD in terms of purpose of use (valuation, incentives and financing) and article that contain reference. It is observed that **the CBD has suggested to using economics as a “cross cutting” discipline in biodiversity conservation, sustainable use and sharing of its benefits.** Further as depicted in table 2, subsequent deliberation of SBSTTA and COP has specified the use of economics in specific decisions taken on different issues. Information in tables 1 and 2 could guide the preparation of action plan on the use of economics in biodiversity conservation in Sri Lanka too.

Table 1. Use of economics in the biodiversity convention by article of CBD and purpose of use.

Purpose of use	Article of CBD											
	6	7	8	9	10	11	12	14	15	16	20	21
Valuation												
Incentve												
Financing												

Source: Emerton (2001)

Note: The reference to articles by numbers is as follows. Article 6: General measures for the conservation and sustainable use of biodiversity, Article 7: Identification and monitoring, Article 8: *In-situ* conservation, Article 9:*Ex-situ* conservation, Article 10: Sustainable use of the components of biological diversity, Article 11: Incentive measures, Article 12: Research and Training, Article 14: Impact assessment and minimizing adverse impacts, Article 15: Access to genetic resources, Article 16: Access to and transfer of technology, Article 20: Financial resources, Article 21: Financial mechanisms.

Table 2. Decisions of the conference of parties relating to economic measures

	Decision	Valuation	Incentive	Financing
I/2	Financial resources and mechanisms			
II/6	Financial resources and mechanisms			
II/7	Consideration of articles 6 and 8			
II/8	Preliminary consideration of components of biological diversity particularly under threat			
II/11	Access to genetic resources			
III/5	Additional guidance to the financial mechanisms			
III/6	Additional financial resources			
III/9	Implementing of articles 6 and 8			
III/10	Identification monitoring and assessment			
III/11	Conservation and sustainable use of agricultural biological diversity			
III/12	Programme of work for terrestrial biological diversity: forest biological diversity			
III/14	Implementation of article 8j			
III/15	Access to genetic resources			
III/18	Incentive measures			
IV/4	Status and trends of the biological diversity of inland water systems			
IV/5	Conservation and sustainable use of marine biological diversity			
IV/6	Agricultural biological diversity			
IV/7	Forest biological diversity			
IV/8	Access and benefit sharing			
IV/9	Implementing of article 8j and related provisions			
IV/10	Measures for implementing the CBD			
IV/12	Additional financial resources			
V/4	Progress report on the implementation of the programme of work for forest biological diversity			
V/6	Ecosystem approach			
V/8	Alien species that threaten ecosystems, habitats or species			
V/9	Global taxonomy initiative			
V/11	Additional financial resources			
V/15	Incentive measures			
V/16	Article 8j and related provisions			
V/24	Sustainable use as a cross cutting issue			
V/25	Biological diversity and tourism			

Source: Emerton (2001)

Kotagama, *et al.* Biodiversity Valuation and Mainstreaming Economics of Conservation, Addendum to the Biodiversity Conservation in Sri Lanka: A Framework for Action

2.3. Use of Economics in the Ecosystem Approach in Biodiversity Conservation

The recent acceptance is that biodiversity conservation should be based on principles of the ecosystem approach. The principle 4 of the ecosystems approach to biodiversity conservation explicitly refers to the use of economics in biodiversity conservation. It mentions that there is a need to understand and manage the ecosystem in an economic context. The following market tools of management have been recommended.

- i. Reducing market distortions causing loss of biodiversity
- ii. Aligning incentives towards biodiversity conservation
- iii. Internalizing cost and benefits of biodiversity conservation.

Above recommendations are congruent with the mainstream economic recommendations for biodiversity conservation and sustainable use, as outlined in section 2.1. Whether these recommendations have been included in the BCAP is considered in next section 2.4.

Box 5

“Even in cases where economists were involved in the NBSAP process, and economic analysis was carried out as part of the Biodiversity country study on national assessment, their recommendations and insights are often not included in subsequent NBSAPs.”

Emerton (2001) Pg. 36

2.4. Use of Economics in the BCAP.

As mentioned in section 1.3 a separate program was undertaken by NAREPP (1996) to study the potential use of economics in NBSAP in Sri Lanka. This program had provided comprehensive recommendations in congruence with the expectations of the CBD.

The BCAP has a relatively brief stand-alone section (section 6.12) on “Valuation of Biodiversity” which includes few of the recommendations provided by the NAREPP (1996) study (see *Box 5* on international experiences on the same). As Emerton (2001) has observed in many other NBSAPs of other countries, the Sri Lankan BCAP too has only made generic reference to use of economics in biodiversity conservation.

Box 6

“Unfortunately few country studies make detailed recommendations about economic aspects of NBSAPs. Most focus on describing the economic value of biodiversity and on outlining countries' broad economic context, without actually pointing to the needs and niches which exists for economic instruments to be used in support of biodiversity.”

Emerton (2001) Pg 29

The BCAP has briefly described the concept of economic value of biodiversity and has commented “skeptically” on the limitations of economic tools of biodiversity valuation in valuing the total value of biodiversity. It has provided general recommendations on:

- the need to develop expertise in biodiversity valuation and
- the need to apply biodiversity valuation in public sector planning (as including biodiversity values in national income accounts).

The following general deficiencies/ gaps of the BCAP could be identified, in the light of the review given thus far on the usefulness of economics (generic use, use referred to in the Biodiversity Convention and in the Ecosystem Conservation Approach) in NBSAP preparation.

- Lack of specific emphasis on functional use of economics/ valuation of biodiversity. The functional uses of economics in biodiversity conservation as given in section 2.1 are as follows.
 - i. Communicate (value of biodiversity) to individuals and public sector decision makers (by including biodiversity values in National Income accounts) and influence allocation of public sector funds for biodiversity conservation.
 - ii. Identify economic causes of biodiversity loss (market and policy failures) and introduce economic incentives and/or remove perverse incentives to conserve biodiversity (correct market and policy failures)
 - iii. Assess whether economic and conservation investments are socially worthy (EIA, Valuation and B/C analysis).
 - iv. Introduce mechanisms to finance biodiversity conservation (appropriation of values and allocation to conservation)

BCAP is very emphatic on the need of valuation of biodiversity but not on specifying the use of valuation (except the suggestion to include biodiversity values in national income accounting).

- Lack of emphasis on influencing individual/private behavior towards biodiversity conservation through use of economic instruments. The emphasis is more on influencing activities of the public sector. It ignores use of economics in provision of incentives (removing perverse incentives) for biodiversity conservation and sustainable use.
 - The need to provide tax concessions to the private sector is mentioned in page 83 of BCAP. Further the possibility to provide taxes/rebates on biodiversity related exports (bioprospecting, ecotourism) is mentioned in pg. 89 of BCAP.
- Lack of emphasis on generation of finances and allocation of finances for biodiversity conservation and sustainable use. It is perhaps assumed that government would allocate finances to biodiversity conservation as investing for any other public expenditure such national defense or public education and health.
 - The need of the government to finance biodiversity conservation through national budget is mentioned in pg. 82 of the BCAP. However methods of generating the finances have not been recognized. The same has been observed by Sanjeeva (2003), in the gap analysis of BCAP. Sanjeeva (2003) observes;

“Critical aspect almost totally absent in the current BCAP is the challenge of financing conservation in a manner that allows for focused and sustained actions over several years”.

- Compared to the CBD in which the use of economics in biodiversity conservation has been used as a crosscutting discipline linked to most conservation areas and strategies the BCAP has not linked use of economics to the different themes of conservation within the BCAP.
- The BCAP has not provided an action plan specifying activities and who should undertake such in what period (see Box 7 on international experience). The BCAP has explicitly mentioned that it expects relevant implementing organizations to further develop the given proposal to wards practical

implementation. The gap analysis of BCAP (Sanjeev, 2003) too, very clearly confirms above as it mentions that BCAP:

“Stops short of a strategy for implementing required actions”.

Box 7

“Yet, even given the emphasis accorded to including economic analysis and measures in NBSAP, these documents provide remarkably little guidance as to how to ensure that this happens”

Emerton (2001)

Other than above gaps that have prevented the effective implementation of BCAP there are many other general reasons, though cannot be substantiated may be important explanatory factors. Some of these based on review of international experiences are: Political/societal obstacles such as lack of political will and support to implement the BCAP, limited public participation and stakeholder involvement, lack of mainstreaming and integration of biodiversity issues into other sectors, political instability, lack of precautionary and proactive measures, causing reactive policies; institutional, technical and capacity-related obstacles, lack of public education and awareness at all levels, lack of financial and human resources, lack of engagement of scientific community, lack of legal/juridical conditions to support implementations etc.,.

3. PRESENT STATUS

BCAP RECOMMENDATIONS AND IMPLEMENTATION

Although not directly associated with activities implemented through BCAP, some of the recommendations of the BCAP have been achieved by activities undertaken by institutions and individuals independently. These are reviewed in this chapter.

Box 8

"There are very few examples of countries where the adoption of the NBSAP has actually been followed by the implementation of economic measures for conservation"

Emerton (2001) Pg. 36

As Emerton (2001) has observed (*Box 8*) based on experiences of many countries, in Sri Lanka too, implementation of economic measures for biodiversity conservation has not happened despite recommendations in the BCAP. This chapter reviews the present status of adoption of economic measures for biodiversity conservation irrespective of the BCAP on a framework of the functional use of economics in biodiversity conservation.

3.1. National Awareness on Usefulness of Economic Valuation of Biodiversity

The use of knowledge depends on how well it is understood and commonly accepted by society. Economics as a generic discipline is obviously well accepted and used in great many spheres. Economics has been a core subject in the school and university curriculum in Sri Lanka for many years. Economics is said to be one of the subjects most taught/learnt, in schools and universities in Sri Lanka.

Environmental economics is new, though it is an off-shoot of generic economics. The applied usefulness of environmental economics has been recognized in the past two decades in par with the interest on achieving sustainable development. Environmental economics as a subject of undergraduate and postgraduate curriculum was introduced first in 1988 in the University of Peradeniya. The Post graduate Institute of Agriculture has been offering M.Sc. courses in Natural resource Management and Environmental Economics for more than a decade. Environmental valuation is offered as a core course in the M.Sc. courses. Several other universities in Sri Lanka have initiated teaching environmental economics as undergraduate and postgraduate courses. Such initiatives have led to the production of professional experts who could appreciate the use of environmental economics in natural resources and environmental conservation. However there has not been a consistent program to productively employ the trained professionals to implement the BCAP recommendations on biodiversity valuation.

Number of programs has been undertaken independent of BCAP on introducing environmental economics to the general public through conduct of workshops and school programmes. Some of which were undertaken by the Center for Environmental Studies at the University of Peradeniya as part of an annual 10 day workshop on Environmental Impact Assessment. It is noteworthy that two textbooks on environmental economics have been published in Sri Lanka since BCAP. However much more need to be done to make people aware and accept the potential of environmental economic approaches to conserve biodiversity. Introducing environmental economics to school curriculums would be worthwhile.

Though the awareness among higher-level public sector officials on the usefulness of environmental economics in biodiversity conservation has improved. The same needs to be extended to political decision makers too, as environmental decisions are strongly influenced by political decision makers. Decisions guided by environmental economics require a strong political will for implementation.

3.2. Capacity of Expertise on Economic Valuation of Biodiversity

As mentioned above, the number received training on environmental economics, both nationally and internationally has increased substantially since BCAP though not due to BCAP. However they have not been employed in positions to implement recommendations of the BCAP at least to the main public sector organizations.

Most biodiversity valuations have been undertaken by individuals, particularly researchers in the universities. Such studies whilst may have contributed to biodiversity conservation or may contribute in the future efforts have not been taken to use such studies in an organized manner.

The environmental economics curriculum of the M.Sc. program of the PGIA has been upgraded, with introduction of environmental valuation as a separate module. Recent developments in environmental and biodiversity valuation have been introduced to this course. Training programmes of EEPSEA, SANDEE and other short-term training programmes have been substantially helpful in upgrading capacity of the expertise in environmental valuation.

A landmark achievement since the BCAP but independent to its influence is that an excellent textbook on environmental valuation has been published with Sri Lankan application (Gunathilake 2003).

3.3. Valuation of Biodiversity

Box 9

“Valuation has accounted for far the greatest volume of published literature on environmental economics over the last decade”

Emerton (2001) Pg. 17

Biodiversity valuation is a fundamental requirement in the application of economics to biodiversity conservation. Emerton's (2001) observation (Box 9) on environmental valuation with respect to internationally available environmental economics literature is equally valid to Sri Lanka. Substantial number of biodiversity valuation studies have been undertaken by independent researchers and published too. Although an organized Biodiversity valuation is a fundamental requirement in the application of economics to biodiversity conservation. Emerton's (2001) observation (Box 9) on environmental valuation with respect to internationally available environmental economics literature is equally valid to Sri Lanka. Substantial number of biodiversity

valuation studies have been undertaken by independent researchers and published too. Although an organized effort was initiated by the Environmental Economics Unit of the MENRM, through the EAIP to institutionalize environmental valuation, it did not materialize. The attempt was to compile and peer review environmental valuation studies already done and validate for official use and also undertake further valuation studies by the MENR to fill the gaps. The proposal forwarded by Dr. S. Batagoda in this regard is annexed (Annex 3).

3.3.1. Project evaluation

Biodiversity value estimates were successfully used in justifying investments in wildlife conservation projects in Sri Lanka as well as in guiding decisions on several other national projects (Kotagama et.al, 1997). An ADB funded technical assistance project (1996-1997) provided substantial training to potential users, on the methodology of incorporating environmental valuation in benefit cost analysis of projects. Detailed procedures were developed and institutionalized. Under the EAIP a manual on incorporating environmental valuation in benefit cost analysis of projects was prepared. Hence this is an area, though independent to the BCAP, some of the recommendations of the BCAP have been achieved.

3.3.2. Incorporating biodiversity values in the national income accounts

Though studies were done by NAREPP (1996) and recommendations provided, the recommendations were not implemented. The methodology is now clearer with international experiences. Upon discussion with the implementers it was felt that the implementers were yet not convinced with the usefulness of incorporating environmental values to national income accounts. An institutional mechanism too need to be established on regular data collection and updating of values parallel or integrated to that of national income accounting to achieve above.

3.4. Identifying and Rectifying Policy and Market Failures

Box 10

"However beyond identifying the broad need to set in place economic incentives for biodiversity conservation, and to overcome the perverse incentives and disincentives that drive biodiversity loss, very few NBSAPs actually specify which economic measures will be used or attempt systematically to include economic instruments as components of the programmes and projects they proposes."

Emerton (2001) Pg. 33

The identification and proposing measures to rectify policy and market failures in biodiversity conservation is a comprehensive exercise. Few adhoc studies have been undertaken (ex. Kotagama, 2003) but have not lead to concrete recommendations or implementation of recommendations (see *Box 10*). Further identification of effects of economic and other policy on biodiversity, is better if done proactively. This requires the institutionalization of this activity within the MENR.

Identifying market instruments for biodiversity conservation has not been done in Sri Lanka. This would again be a comprehensive study that would have to be undertaken by an institution that have capacity and also continue such studies, such as the Environment Economics Unit in association with the Biodiversity Secretariat of the MENR. An example of application of economic instruments in biodiversity conservation in Estonia, adopted from Emerton (2001) is provided for guidance in Annex 4.

3.5. Financing Biodiversity Conservation

It is an obvious but often neglected fact that development policies, plans, programs, projects that do not have reference to mechanisms of financing would only be wish lists of ideals to achieve but would not be operational (Kotagama, 2002). BCAP demonstrates this fact. A reason among other for the ineffective implementation of the BCAP is the lack of identification of financing mechanisms to finance the plan.

To be sustainable, it is best if possible that environmental/ biodiversity conservation is self-financed, i.e. finance biodiversity conservation on revenue generated pricing/taxing use of biodiversity-based resources. However, in the short-term, external financing (i.e. from revenue generated from domestic economic sectors other than biodiversity or from foreign sources) may be required to overcome cash flow problems and to meet some public costs and benefits of biodiversity conservation.

On the one hand, the availability of foreign financing, upon which Sri Lanka has up to recent times largely depended for biodiversity conservation, has been gradually declining. This is due to increasing per capita income in Sri Lanka and other global political economic changes that has made Sri Lanka less eligible to receive foreign finances. Further foreign financing of biodiversity conservation have often been tied up with perceived loss of national sovereignty, such as the case on 'debt for nature swap' offer by the United States America under the Tropical Rain Forest Conservation Act (1998) to Sri Lanka on the Sinharaja forest.

On the other hand, the availability of external domestic financing for environmental conservation may decline in the future. This is due to the increasing difficulty the Sri Lankan government is faced with in financing public investments. By end of year 2001 the debt servicing need alone (Rs. 295- 300 billion) has been higher than the government tax revenue (Rs. 275 billion). A sector that could be easily denied of financial allocations would be the environmental/ biodiversity sector, given that public financial allocations are done through a political process. Politicians would be interested in allocating finances to sectors that give direct, tangible and geographically identifiable benefits whilst benefits from biodiversity conservation are indirect, non-tangible and geographical dispersed beyond the electorate.

Therefore as much as possible finances for biodiversity conservation must be endogenously (nationally and within environmental sector) generated. Possibilities of financing biodiversity conservation through endogenously generated finances (i.e. through domestic environmental resource use) have not yet been studied in Sri Lanka. Hence it is considered prudent, to begin public discussions, to develop a policy and a mechanism to finance biodiversity conservation, with the expectation of reaching public consensus and implementation in the long-term.

4. RECOMMENDATIONS

Emerton (2001; Ch. 5-6) has provided an excellent guidance on the activities to be undertaken (activities of an action plan) in Using Economic Measures for NBSAP Implementation. This chapter presents recommendations that are specific to Sri Lanka.

4.1. National Awareness on Economic Valuation of Biodiversity

It is recommended to introduce environmental economics to the school curriculum on economics at GCE advanced level. The emphasis of the curriculum should be to impart that the cause of biodiversity degradation is based on human decisions and behavior and that the change of such human decisions and behavior is a means of biodiversity conservation. Technically the module should introduce reasons of market failure and economic instruments to address market failure in biodiversity conservation. The module could be designed for 10 hours of teaching. This will require teacher training and preparation and provision of support material as text books in local languages.

4.2. Capacity Building on Environmental Economics

The training on environmental economics has got sufficiently institutionalized within the University curricular. However sufficient environmental economic research is not being carried out. It is recommended that BCAP sponsor at least 2 M.Phil/PhD programmes on biodiversity economics in Sri Lankan universities annually.

It is recommended that BCAP, support and finance the EIA 10 day training workshop carried out by the Central Environmental Authority for 5 years, whilst strengthen the environmental economics module by allocating more time and case study based learning. Currently the IUCN has produced excellent literature and case study material that could be used in training.

Encourage and provide incentives, through scholarships sponsored by BCAP for officers of environment related ministries and departments etc to obtain higher level training in environmental economics in Sri Lankan universities. At least 2 officers per year for a period of 5 years are recommended.

4.3. Strengthening Institutions on the Application of Environmental Economics in Biodiversity Conservation

4.3.1. Strengthening analysis on policy and economic incentives for biodiversity conservation

The MENR has taken the credible initiative to establish a Biodiversity Secretariat and an Environmental Economics unit. However the staff of these units is inadequate in number as they are saddled with daily heretic work demands. They are unable to concentrate and work on specific areas that were outlined earlier in relation to using economics in biodiversity conservation. At least 4 professionally qualified (M.Sc. in Environmental Economics/ Natural Resource Management) should be recruited to permanent positions within 2 years (2 each in the two years) to the ministry. Their main responsibility should be the following.

- Undertake studies on impact of environmental and other sectoral policies on biodiversity conservation. Although some of these studies could be undertaken in reaction to sporadic changes in policy, regular studies should be based on an annual program of research with defined output of an annual report with recommendations. The experts can divide their labor between green (agriculture, forestry etc) and brown (industry) issues that relate to biodiversity conservation.
- Undertake studies on removal of perverse incentives and provision of economic incentives for biodiversity conservation and provide recommendations for implementation.
- Further guidelines could be obtained from Emerton (2001) and the CBD documents.
- Identify appropriate economic instruments for biodiversity conservation. Under this programme, economic tools incentives or charges etc. for selected sectors of biodiversity should be introduced using appropriate policy interventions. These economic instruments can be implemented through relevant agencies such as Department of Wildlife Conservation and Forest Department.

4.3.2. Biodiversity valuation and use in national income accounts and project evaluation

Substantial progress has been made in the use of environmental valuation in the evaluation of projects on initiatives taken by the Central Environmental Authority. These initiatives should be further strengthened. The Ministry of Planning, which is responsible for approving projects based on economic rationale and the Central Environmental Authority, which is responsible for approving projects based on EIA should recruit at least 2 professionally qualified (M.Sc. in Environmental Economics/ Natural Resource Management) to permanent positions within 2 years (2 each in the two years). Their main responsibility should be the following.

- Compile all national and international studies on environmental valuation and maintain an environmental values data base that could be used in policy and project evaluation. This data base should be annually updated as any other national/ international data base.
- Undertake environmental valuation studies on an annual work programme. A paper prepared by Batagoda (1999) is annexed as Annex 3, which could provide guidance to develop a comprehensive environmental valuation program for Sri Lanka.
- Publish in an annual report or include in a suitable report on national statistics (such as the Central Bank statistical bulletin) valuations of the environment, such as the expected publishing of shadow prices used in project analysis.
- Estimate the contribution of biodiversity to GDP and include in the annual national reports such as central bank report.
- Assist through advice and guidance teams undertaking EIA studies on environmental valuations.

4.4. Financing Biodiversity Conservation

The Biodiversity Secretariat and the Environmental Economics Unit has taken substantial and credible initiatives to proactively seek for finances for biodiversity conservation through GEF, Bio prospecting initiatives, Bio Carbon Fund of World Bank and CDM initiatives under Kyoto Protocol. These initiatives should be formalized and strengthened. Again the constraint is the lack of human resources. Hence it is recommended that a qualified (M.Sc. in Environmental Economic or Economic) environmental economist is hired to undertake this specific responsibility. His/her responsibility should be as follows.

- Lobby for a biodiversity conservation financing policy based on objective/scientific reasoning. The biodiversity financing policy should ensure that the specification of government's intention on how to orderly:

- i Acquire finances and
 - ii Allocate finances at an appropriate level, form and time for biodiversity conservation.
- Ensure with the cooperation of the Secretary to the Ministry of Environment and Natural Resources that the environmental policy on financing biodiversity conservation is realized in the annual budgets.
 - The environmental/ biodiversity financing policy should give directions to formulate a specific strategy on who, how much and how could payments be made for benefits provided to society as a result of environmental/ biodiversity conservation and who should, how much and how should expenditures be made on environmental conservation. This would be proposed in the annual budgetary proposals provided by the MENR.

In order to achieve above, the Environmental Economics Unit of the Ministry of Environment with collaboration of the Department of National Planning should undertake a comprehensive study on how to acquire finances and allocate finances for biodiversity conservation as a rolling plan. This could be similar to the Public Investment Plan prepared by the Department of National Planning. Budgetary allocations should be rationalized on such a plan. See Kotagama (2002) paper on Financing Environmental Conservation: A Case Study in Sri Lanka for a basic framework.

The Biodiversity Secretariat and the Environmental Economics Unit (with potential collaboration of the IUCN/ Sri Lanka) should as it is involved in proactively propose mechanisms to acquire foreign finances for biodiversity conservation. Some such sources are GEF, CDM, RUPES, Bioprospecting, Ecotourism (taxes, cess). Excellent comprehensive guidance could be obtained from IUCN (2001) on Mobilizing Funding for Biodiversity Conservation.

The Biodiversity secretariat and the environmental economics unit in collaboration with the University of Colombo, Sri Lanka should develop and implement a Bio-prospecting programme with strong institutional support. It is proposed to establish an Ethnobotanical Study and Bio-prospecting Center at the Pharmaceutical Development Unit of the Faculty of Medicine of the University of Colombo. The Faculty of Medicine of the University of Colombo has already started a drug development programme. This programme can be supported by establishing a bioprospecting and ethnobotanical study center. Experience of other developing countries such as Costa Rica in developing bio-prospecting programmes can be used in this exercise.

4.5. Cross Cutting Issues

The Biodiversity Secretariat and the Environmental Economics unit should pursue to apply and monitor the application of environmental economics in biodiversity conservation in Sri Lanka in cross cutting areas/disciplines as expected by the biodiversity convention. A guide/check list that would be helpful is provided in Emerton (2001) and as table 1 and 2 in this report.

4.6. Presenting the BCAP in Development and Economic Terms

Finally it is recommended to adopt the recommendation by Emerton (2001) given in Box 11, in presenting the addendum to BCAP to the relevant decision makers and implementers.

Box 11

"NBSAPs are usually written with conservation and scientific audiences in mind. An important step in ensuring NBSAP goals actions enter into the agendas of macroeconomic and sectoral decision makers, and in setting in place the supportive economic measures to implement them, is to provide information about how the NBSAP is of relevance and importance to development and economic goals."

Emerton (2001) Pg. 51

5. ACTION PLAN MATRIX : APPLICATION OF ENVIRONMENTAL ECONOMICS IN BIODIVERSITY CONSERVATION

Objective	Activity/Time	Sub activities	Finances	Institutions
1. Improving national awareness on the use of economics in biodiversity conservation	1.Introduce environmental economics to school economics curriculum at GCE (A.L) (2yrs)	Curriculum development Text book/ support material preparation Teacher training Institutional arrangements	National budgetary funds or GEF	MENR (Biodiversity Secretariat and Environmental Economics Unit) and Ministry of Education
	2. Strengthen EIA training introducing a module on environmental economics (5yrs)	Continuation of the 10 day EIA annual training programme Module development of extended benefit cost analysis for EIA	National budgetary funds to the CEA	CEA and the University of Peradeniya and IUCN.
	3. Create awareness on the link between economics and conservation to general public and politicians etc (5Yrs)	TV and Radio programmes, Workshops, seminars, popular articles	National budgetary allocations or GEF	Biodiversity secretariat and Environmental Economics Unit
2. Improving capacity on economic valuation of biodiversity	1. Support research in environmental valuation n (5years)	Sponsor M.Phil/ PhD studies in Sri Lankan Universities, 2 students per year	Projects/ GEF/ national budget	Biodiversity Secretariat and Universities
	2.Support post graduate training of officers	Sponsor postgraduate studies, 3 officers per year.	Projects	Biodiversity secretariat and Universities

Objective	Activity/Time	Sub activities	Finances	Institutions
3. Strengthening analysis on policy and economic incentives for biodiversity conservation	1. Recruit 4 officers trained in environmental economics in 2 years	Undertake the relevant studies on an annual work programme	National budget	MENR
	2. Identify appropriate economic instruments for biodiversity conservation	Propose economic tools incentives or charges etc. for selected sectors as policy documents and implement		
	3. Pilot project for the application of economic instruments in biodiversity conservation using local community group to convert biodiversity values into real money	Identify suitable biodiversity site Establish community Trust Fund or similar mechanism Translate direct, indirect and non-use value of the selected biodiversity site into real money Develop a self financing management strategy by local people	GEF, National budget	Biodiversity secretariat Environmental Economics unit
4. Including biodiversity values into national income accounts	2. Recruit 2 officers trained in environmental economics and assign to appropriate institution (NPD)	Develop and maintain environmental valuation data base Undertake environmental valuation studies as an annual work programme Estimate the contribution of biodiversity to GDP	National budget	NPD and Environmental Economics Unit of MENR

Objective	Activity/Time	Sub activities	Finances	Institutions
		Gradually strengthen the institutional capacity of data collection for annual revision of environmental values		
		Guide EIA studies		
5. Financing biodiversity conservation	1. Recruit an officer trained in environmental economics and/or public finance	Propose means of enhancing appropriation of biodiversity values	National Budget	MENR
		Propose possibilities of allocation for biodiversity conservation Assist in preparation of request on budgetary allocations for biodiversity conservation. Proactively prepare programmes to receive international fiancés from GEF, CDM.		
6. Cross cutting issues	2. Develop and implement a bio-prospecting programme with strong institutional support	Establish a Ethno- botanical Study and Bio-prospecting Center at the Pharmaceuticals Development Unit of the Faculty of Medicine at the University of Colombo	GEF or other donors	University of Colombo Biodiversity secretariat Environmental Economic Unit
		Biodiversity secretariat to study and monitor the application of economics as a cross cutting issue guided by the CBD	Regular activity	MENR/ Biodiversity secretariat

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Terms of Reference for the Study

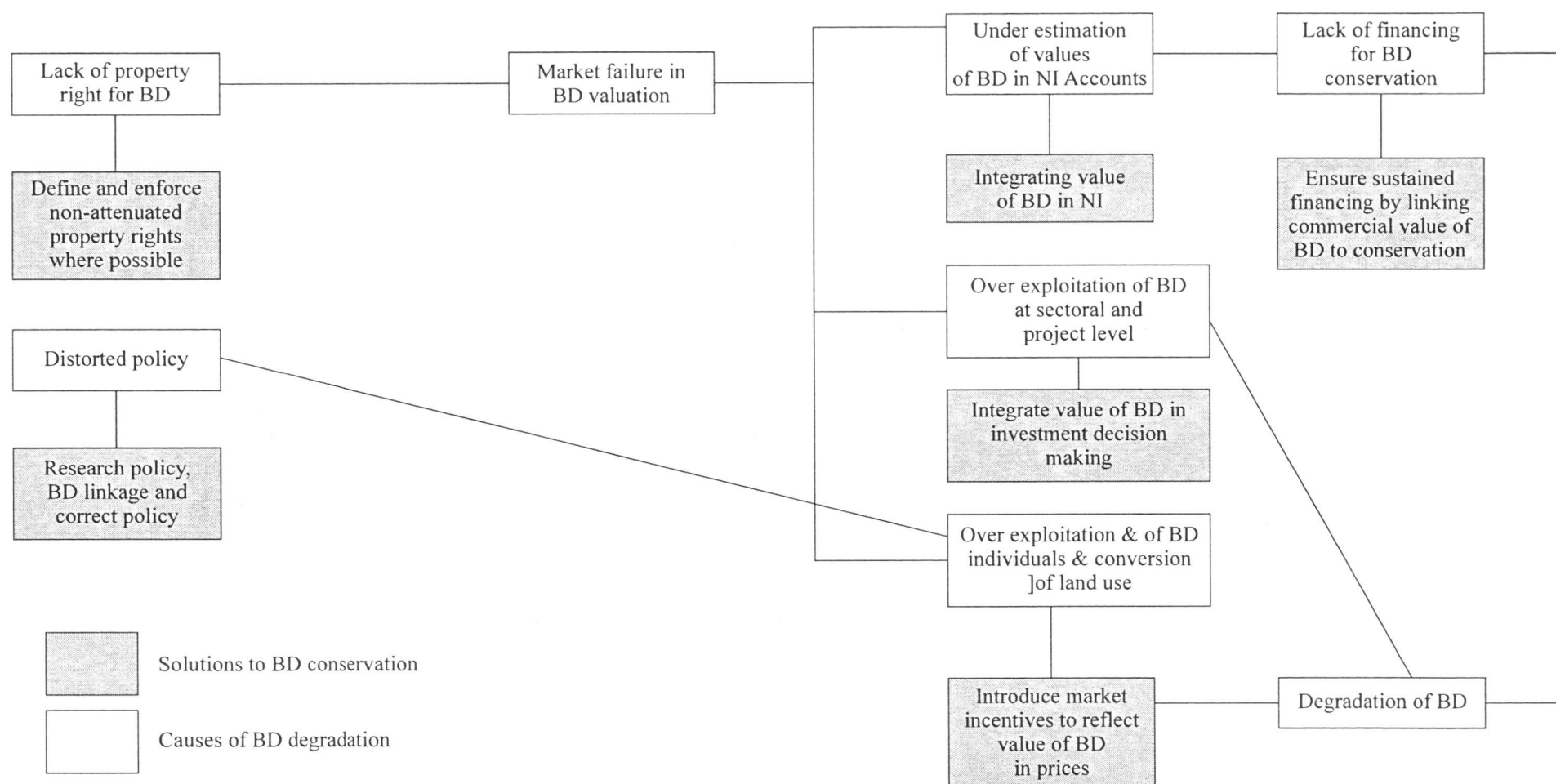
Ministry of Environment and Natural Resources
Biodiversity Secretariat
Protected Area Management and Wildlife Conservation Project
Component 'C' - Sub Component 1 - Review of BAP

Preparation of Addendum to the BCAP

- 1 Review the present status of the given thematic area considering the out comes of the gap analysis of BCAP and SBCAP.
- 2 Identify the important missing areas of and areas, which should be improved in, present BCAP related to given theme area.
- 3 Prepare a outline of review process and identify the structure of addendum specific to given thematic area
- 4 Collect and compile systematically available information. All statements must be based on substantial reference materials. Provide clear technical definitions to ensure avoid narrow conceptual definitions
- 5 Prepare concept/position papers on the important sections under given thematic area.
- 6 Design and finalize a baseline (information) on given thematic area including a comprehensive bibliography of all relevant documents and hand over those information to the Biodiversity Secretariat
- 7 Coordinate as much as possible with other Task Forces to avoid duplication and clear priority setting.
- 8 Identify clear recommendations and proposed modalities for the implementation and operationalizing the recommended action with respect to the given thematic area
- 9 Set priorities for identified recommended actions with future scenario vision for the given thematic area. This in term for the agreed National Biodiversity Policy for Sri Lanka
- 10 Establish the clear relationship between prioritize recommended actions and ecosystem approach
- 11 Prepare the Report on a addendum of given thematic area for BAP and finalize with all stake holders
- 12 Submit the above report with all relevant material to the Biodiversity Secretariat.

Annex :2 A schematic illustration of the Recommendation provided to BCAP Preparation in 1996
Causal chain of Explanation

Economic Causes for Biodiversity Degradation and Economic Solution for Biodiversity Conservation



Pricing the Island

**A Study on valuation of Ecosystems in order to incorporate Environmental
Values into Policy Decision Making**

**Establishment of Environment
Resource Value Bank**

Ministry of Forestry and Environment

1999 April

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1. Introduction

Sustainable development is the pathway, which is accepted worldwide in developed as well as in developing country. In this environmental resource (natural asset) also considered along with other factors of production such as labor, land and capital. Pricing the resources and amenities facilitate the decision making to incorporate the environmental concerns in economic development activities. Sri Lanka is an Island and well rich in biodiversity, forest, coastal, marine, water and mineral resources. Pricing the environmental resources is not complex procedure because most of the environmental impacts are localized. Few attempts already done to value the natural resources and these data are dispersed in different institutions in Sri Lanka. Main objective of the Ministry of Forestry and Environment is to achieve sustainable development by directing the policy makers and developers toward positively. Study of the pricing island is useful to generate an updateable matrix called environmental value bank.

1.1 Importance of valuing Natural resources

Environmental resources are not significantly considered or not considered in development project and policy causes irreversible damages to environment, lead to unsustainable development. Valuing of environmental resources and environmental stock assessment are important to evaluate development projects and policies. Environment resource valuation facilitates the developers, funding agency, donor countries and policy makers to design the project with minimal environmental cost and to formulate the policies with minimal environmental impact.

Current estimates of Net national product (NNP) are biased because depreciation of environmental resources is not deducted from Gross National Product (GNP). State another way, NNP estimates are biased because a biased set of prices is in use. Prices imputed to environmental resources on site are usually zero. This amounts regarding the depreciation of environmental capital as zero but these resources are scarce goods. Environmental value provides the data of depreciation of environment resources for NNP and GNP estimates.

1.2 Major Eco-systems in Sri Lanka

Sri Lanka is topographically the island, has a wide range of topography with three peneplain and climate variation mainly rainfall and this contributes to the variation in eco-system. Southwest part of the country receives rain throughout most of the year, while the rest of the country experiences a dry period of several months duration. Attitude also influences the climate through its effect on the temperature. On the basis of these variations, the island has been divided into six-climatic zone.

Originating in the center of the island and radiating to the coast are 103 rivers. Many of them give rise to basin estuaries at the coast, before discharging into the Indian Ocean. Low lying areas on either side of rivers in the coastal belt are subjected to frequent flooding water discharge resulting in the formation of many wetlands along the coastline. There is a wide range of ecosystem diversity in the island. The major ecosystems are given below with known examples.

- Forest:
- Tropical Wet Evergreen Forest (lowland rain forests)
 - Tropical Semi Evergreen Forests (Kurunegala District)
 - Tropical dry mixed evergreen forests (Hambantota, Puttalam)
 - Tropical thorn Forest (North west and south east sector of Sri Lanka)
 - Riverine forest
 - Tropical Lower Montane Forest
 - Tropical Montane Forest

Grassland	- Wet Montane Grasslands (wet Patans) - Dry Montane Grasslands (dry Patan) - Damana And Talawa Grasslands - Wet Villu Grasslands
Coastal and marine	- Mangroves (Vanathavillu in Puttlam) - Salt marshes - sand dunes and beach (Kalpitiya, Hambantota) - Mud flats - Sea grass beds - Lagoons (Puttlam) - Estuaries - Riverine estuaries (Ma Oya river basin) - Coastal estuaries (Bentota) - Coral reefs (Great bars) - Coastal seas
Inland Wetlands	- Flood plains (flood plain national park) - Swamp forests (Waturana) - Streams and rivers - Ponds - Villus - Inland fresh water marshes (Bellanwila-Aidiya marsh) - Lakes (Kandy, Gregory) - Reservoirs (Polgolla)

1.3 Environmental Valuation techniques

The methodology of environmental valuation has evolved tremendously over the past two decades. As such economic valuation of resources have been attempted in Sri Lanka using several valuation methods which are being refined to include Sri Lanka rural norms of appreciation of commodities. Value of natural resources is the level of appreciation originated from society and is subjective to time. Environmental resources have direct and indirect consumptive values and functional values consist of sink and life supportive value. Natural resources provide multiple direct, indirect and functional uses. Value of direct and indirect consumptive uses is not fully reflected in market prices. Valuation of ecological function is done by formation of artificial market because market is not available.

The methodologies of environmental valuation will be separated grossly into three classes such as actual market, surrogate market and contingent market based methods.

Actual market methods use market prices of affected sectors in the economy to assess the value of environmental change. Surrogate market methods estimate environmental values by assessing the contribution of the resources to the value of other goods in the economy. Contingent market based method attempts to create hypothetical market for environmental goods and services.

The most prominent techniques of environmental valuation methods are listed below.

1. Actual market based methods
 - 1) Changing in productivity method
 - 2) Loss of earning method

- 3) Averted defensive (preventive) expenditure method
 - 4) Replacement cost method
 - 5) Dose-response valuation method
2. Surrogate markets based methods
 - 1) Travel cost method
 - 2) Property value/hedonic method
 - 3) Wage differential method
 - 4) Substitute/proxy method
 3. Contingent market based method
 - 1) Contingent valuation method
 - 2) Artificial market method

2. Objectives

General objective of the study is to value the major eco-systems in order to identify and prioritize the environmental assets and pollution. Specific objectives of the study are to:

- a) Compile the completed environmental values from various experts
- b) Identify the gaps of data needed to further research
- c) Identify studies to be undertaken
- d) Conduct the specific valuation studies
- e) Compile all data to the format of environmental value bank
- f) Make awareness among the decision makers and other users to use this data for their purpose; and
- g) Update the environmental value annually

3. Methodology:

Major eco-systems in Sri Lanka and eco-system functions, identified from secondary data sources are utilized to formulate the format of environmental value matrix. Environmental values from past and future studies will be arranged in this format to compare the ecosystem functions of major ecosystems with others.

3.1 List of Major ecosystems to be valued

Major ecosystems with ecological functions are identified from literature surveys for the environmental valuation study. Half of the studies are identified for the year 1999 and another half for year 2000.

The studies identified for the year 1999 are following:

- a) Valuing recreational value of rain forest biodiversity
- b) Costing health effect of air pollution
- c) Costing the transport policy
- d) Costing energy policy-costing alternative energy use
- e) Valuing the biopiracy and bio trade

The studies identified for the year 2000 are following;

- a) Valuing coastal and marine ecosystems
- b) Valuing dry forest and savanna ecosystem
- c) Valuing mountain ecosystem

- d) Costing green house gas emission
- e) Costing health effect of environmental degradation
- f) Valuing of intellectual property right law and policy

3.2 Organization of the Study

Workshop on environmental economics will be utilized to gather and compile the past environmental valuation studies from various experts. Their data will be used to fill the box in environmental value bank. Finally the gaps will be identified for the future environmental valuation studies. These studies will be assigned to team of agencies or institution with accepted terms of reference (TOR) including the time frame. All these data will be utilized to complete the environmental value bank.

3.3. Format of environmental value bank

Format of environmental value bank prepared from the source of natural resources of Sri Lanka, conditions and trends (1991) SOBA environmental publication (vol: v/No. 3/ November 1994) and National Atlas of Sri Lanka, Survey department (1998)(table 2).

4. Outcome of the study

Outcome of the study is the preparation of environmental value bank which will be useful to :

- A) rank the ecosystems for conservation vs development purpose
- B) findout the lose of economic value of ecosystems by multiplying the total ecosystem value with the extent of total extent of destroyed ecosystem annually
- C) formulate policy decision on the basis of comparing the total economic value with the treatment cost or conservation cost should be imposed to conserve the ecosystems and
- D) provide the basic data to Environment Impact Assessment (EIA) and Initial Environmental examination (IEE) study to minimize the cost and time delay.

Table 1: Format of Environmental Value Bank

Table 1: Format of Environmental Value Bank

Major Ecosystems in Sri Lanka Ecosystem function	Forest							Grasslands				Coastal & Marine								Inland Wetlands			
	Tropical wet evergreen forest	Tropical wet evergreen forest	Tropical dry mixed evergreen forest	Tropical thorn forest	Reverins forest	Tropical lower Montana forest	Wet montane grass land (Wet Patana)	Dry montane grass land (dry patan)	Damana and Talawa grass land	Wet Villu grass land	Mangroves	Salt mashes	Sand dunes and beaches	Mud flats	Sea grass beds	Lagoons and estuaries	Coral Reefs	Coastal Seas	Flood plains	Flood plains		Streams and rivers	Ponds
Gas regulation																							
Climate regulation																							
Disturbance regulation																							
Water regulation																							
Water supply																							
Erosion control; and sediment retention																							
Soil formation																							
Nutrient recycling																							
Waste treatment																							
Pollination																							
Biological control																							
Refugia																							
Food production																							
Raw materials																							
Genetic resources																							
Recreation																							
Culture																							
Total value of ecosystem																							

Economic measures in Estonia A Biodiversity Action Plan

Estonia's NBSAP contains an action plan for Biodiversity Action Plan for Biodiversity Conservation up to the year 2005, which contains series of objectives and actions required to conserve biodiversity in major sectors. In each of these sectors a detailed set of supportive economic measures are specified and costed including:

For landscape aspects in planning and land management: implementation of land tax benefits with regulation/change in land use practice

For agriculture

- Payment of mowing compensation in accordance with management plans
- Payment of grazing compensation in accordance with management plans
- Subsidies for purchasing of undemanding farm animals to increase grazing pressure in semi-natural communities
- Facilitating of marketing products related to semi-natural communities(meat, milk, wool, handicrafts, juniper, souvenirs)
- Subsidy system for simulation of producers of breeds and varieties characteristic of Estonia
- Creation of market niches for high fat milk of Estonian rural cattle and for sheep farming products
- Subsidies during 2 year period of transition to organic agriculture and during further practice
- Creation of favorable credit opportunities for organic agriculture
- Application of economic measures such as subsidies, tax deductions for limitation of agricultural non point pollution
- Support to agricultural producers for purchasing of equipment suitable for sustainable exploitation of water bodies.

For Forestry

- Compensations for economic restrictions and obligations following from protection of forest biodiversity
- Tax deductions on the use of practices for the protection of biodiversity of forests
- Introduction of national wood standard taking biodiversity protection into account

For hunting

- Differentiation of hunting permits based on size of large predator populations
- Economic incentives to stimulate the hunting of raccoons and American mink

For fisheries

- Changing of fishing license fee system reallocation of part of fees for biodiversity protection
- Subsidies and compensation to encourage the use of sustainable fishing methods

For industry

- Update the rate of compensation for damage caused by pollution
- Implementation of environmentally friendly industry labeling system

- Direct incentives (grants, tax concessions, special borrowing terms etc) for environmentally friendly industry
- Revision of rates of natural resource use taxes

For transport

- Compensation for environmental damage caused by transport infrastructure
- Compensation of road tax for heavy trucks and trailers
- Inclusion of environmental damage in fuel excise tax

For tourism

- Preferential loans and financial support for eco-tourism projects

For nature conservation

- Prevention of assessment of and compensation for economic damages caused by protected species
- Compensation mechanism for damages to habitats caused by protected species

(From Government of Estonia)