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Working Group 16 Report

Ethics and Biodiversity

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ACRONYMS

ASEAN:	Association of Southeast Asian Nations
CBD:	Convention on Biodiversity
CCPWCNH:	Convention Concerning the Protection of the World Cultural and Natural Heritage
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
ECCAP:	Ethics and Climate Change in Asia and the Pacific (Project)
FAO:	Food and Agriculture Organization of the United Nations
HYV:	High Yield Varieties
IPCC:	Intergovernmental Panel on Climate Change
IUCN:	International Union for Conservation of Nature
MRC:	Mekong River Commission
NBSP:	National Biodiversity Strategy and Plan
NGO:	Non-Governmental Organization
TSBR:	Tonlé Sap Biosphere Reserve
UNDP:	United Nations Development Programme
UNEP:	United Nations Environmental Programme

PREFACE

This report was written during the International Year of Biodiversity (2010) and the International Year of Forests (2011). The report stems from the work of Working Group 16 established by the Regional Unit in Social and Human Sciences in Asia and the Pacific (RUSHSAP) at UNESCO Bangkok under the Ethics and Climate Change in Asia and the Pacific (ECCAP) project. The project has the aim to encourage science and value-based discussions on environmental ethics to produce substantive cross-cultural and multidisciplinary outputs that will be relevant for long-term policy making. As we witness the degradation of ecosystems we need to reflect upon our values and policy that may reduce the rate at which biodiversity is being diminished by human activities across the planet.

The aim of the ECCAP project is not to formulate universal economic or political plans of how to deal with these issues. Rather, the working groups of the project aim to increase awareness and discussion of the complex ethical dilemmas related to energy and the environment, and to identify scientific data, and available ethical frameworks of values and principles for policy options that have proven useful in facing the challenges in certain communities and countries. The projects are ongoing, and the details of this report that extends the Asia-Pacific Perspectives on Bioethics series, can be found in the Executive Summary. The report was developed by working groups, whose members participate as individuals in the highest standards of intellectual vigour and integrity, integrating engineers, philosophers, policy makers, experts, youth, and persons of many different cultural backgrounds and experiences. The reports are subject to ongoing open peer review, and the principal authors are listed.

There is ongoing discussion of numerous reports on the yahoo group, unesco_eet@yahoogroups.com, that are in various stages of drafting. For all reports, drafts and outlines of others, and specific requests for further case studies and analyses, please examine the working group webpages which list the members, and the overall website, <http://www.unescobkk.org/rushsap/energyethics>. The report writers thank all members of the ECCAP project, and in particular WG16, and Mr. Amarbayasgalan Dorjderem and Ms. Mardi Grundy for comments. Feedback and comments are invited to Dr. Darryl Macer, Regional Advisor in Social and Human Sciences in Asia and the Pacific, Regional Unit in Social and Human Sciences in Asia and the Pacific (RUSHSAP) at UNESCO Bangkok, or email rushsap.bgk@unesco.org



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Executive Summary

The Convention on Biological Diversity emerged out of a universal consensus that biodiversity is of immense value to humankind. Although the report adopted the definition of the Convention on Biological Diversity, it reviews the concept of biodiversity as applied to genes, microbes, ecosystems and the planet as a whole. There are a number of accepted scientific measurements to allow recording of biodiversity, although all show that it is being reduced at rates that are unprecedented, due to anthropogenic activity.

A variety of ethical approaches to human relationships to biodiversity are described in the report, but despite the range of ideas that they include, most would argue that human beings should modify their behaviour to slow the rate of biodiversity loss. Even an anthropocentric argument would also show the high value of biodiversity for current and future human generations, as exceeding the short-term gains that are the cause of most biodiversity loss. There is an extensive description of many value systems and biodiversity. Traditional practices such as the use of sacred groves were based on holistic approaches to all of life. What lessons do such systems offer us today?

There is a major case study of the Tonlé Sap ecosystem in Cambodia, to explore how regulations are developed, and evolve in practice with the local and external users of a biodiversity sanctuary. Some ethical lessons are drawn from this study which may be useful for policy options for not only that habitat, but also for others.

A review of international law and biodiversity is presented with attention on some of the ethical aspects. There is discussion of ecotourism policy, and labeling laws, that may be used to protect biodiversity. There are a number of policy issues for future preservation of biodiversity that suggest governments (local and national) may like to reconsider what is sustainability, what economic policy and time frames they adopt, and the role of environmental movements in implementation of policy. Although there are some good laws on paper at the international level, and at national level in some nations, these are not always implemented effectively as both the local communities and consumers globally need to act to protect biodiversity. Examination of the common goals to protect and value biodiversity over history and in the future may make the difference that is needed.

1. Biodiversity and its Definition

1.1 Genes, Species and Ecosystem

The first step of this discourse on ethics and biodiversity is to establish the criteria and definitions, as the ethical implications and responsibilities towards biodiversity change depending on the understanding of the word. The definition of biodiversity has changed over time, currently that of the Convention on Biodiversity (CBD) is widely used, “*the variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species and of ecosystems.*”¹ In addition to that concept of biodiversity, the Intergovernmental Panel on Climate Change (IPCC) specifies the parts within biodiversity as genes, species and ecosystem.² This definition and accompanying specifications have evolved from the original coinage of the term and its roots in conservation biology, in the sense that biodiversity includes more than just species numbers (Maclaurin and Sterelny, 2008).

Many conceptual variances may be found, one example is that an ecosystem can be interpreted as a component necessitating diversity itself, rather than only the system housing diversity. That idea is exemplified through the concept that biodiversity is composed of three primary components (Neem, et al., 2008), composition, structure and function, and each arrangement of the three parts within an ecosystem could render the ecosystem as unique. Such a discrepancy of interpretation is an example of why biodiversity cannot be thought of ‘in any one way’ (Lovejoy, 1995). Furthermore, to think of biodiversity defined through any one aspect is incomplete, perhaps the closest would be recognizing the complexity of life as the core principle and defining characteristic. Another useful definition, “the richness and variety of ecological communities”, uses language that hints of the intangible qualities of the complexity of biodiversity, yet fails to provide the needed clarity, which is representative of the definition difficulty as a whole. An additional difficulty in defining biodiversity occurs as one soon realizes that the wider the definition of biodiversity the more difficult the quantification, yet the simpler definitions lack the descriptive power needed to adequately define the wanted connotations.

Defining and quantifying biodiversity are just one step as we go into the topic of this report, the ethics of biodiversity. It is only after we understand biodiversity that we can analyze our relationship with it and duties towards it. This chapter will attempt to consider how we define biodiversity, its components, and provide an introduction to the following chapters which further analyze values attributed to it and our responsibilities towards it.

Since 2010, the International Year of Biodiversity, the world’s attention has shifted from the challenge of understanding climate change to focus on the challenge of understanding the world’s inhabitants and the pressured biosphere. We live in a precarious point in time after the International Year of Biodiversity was celebrated.³ The year 2011 is the International Year of Forests. The focus on the issue of protecting biodiversity remains critical. All actors at all levels, from local to national to international, need to continue to analyze the situation and decide how best to proceed to achieve the mutually agreed and beneficial goal of protecting our shared genetic heritage.

The threats facing biodiversity are many, anthropogenic causes of climate change are one factor in a myriad of activities that adversely affect biodiversity. The Convention on Biological Diversity (CBD) signed in 1992 showed that wide-ranging policy on species protection in the international forum is a viable course of action. With the current international discourse focusing on combating the effects of global climate change, there is an opportunity to engage the participants regarding the linkage of climate change to habitat loss and the adverse effects it has on numerous species. The hopeful outcome of such discourse would be to positively affect or even reverse, through policy, the man-made or anthropogenic causes of climate change while raising awareness of the role biodiversity plays in our interconnected and shared world.

1 For a full description see CBD Article 2. (<http://www.cbd.int>)

2 See <http://www.ipcc.ch>

3 See <http://biodiversity-l.iisd.org/news/cbd-closes-international-year-of-biodiversity>

The difficulties in achieving this lofty but admirable goal are numerous, as before policies can be implemented and appropriate actions decided upon, dialogue and discourse must take place. The foundation of discourse is in the philosophical and ethical viewpoints that are expressed, and it is in this regard that establishing a universal understanding of the ethical implications of biodiversity is paramount. No matter, however difficult it is to find the needed solutions, ethical consensus on the seriousness of the rapid rate of species disappearance at a rate not seen since the last great extinction nearly two-hundred and fifty million years ago is that we need to act to slow this. We have duties to future generations as stated in the 1997 Declaration on the Responsibilities of the Present Generation to the Future Generation.

Biodiversity is composed of a myriad of components in dynamic relationships. However, the overall beneficence of biodiversity is not a point of contention any longer as the beneficence is a question not of is it good, rather how good. Regardless of the definition used, the more relationships and the more dynamic the relationships, the healthier the system. As the evidence has shown that a wider range of genes, species within an ecosystem improves the ecosystem's functioning, and alternately declining biodiversity affects ecosystem functioning, and finally that biodiversity provides insulation from declines and improves reliability in ecosystem functioning.⁴ These issues of value and function of ecosystems are discussed in the appropriate sections it is important to maintain such an understanding while considering the ethical and policy implications of the following sections.

1.2 Components of Biodiversity

Life in some form has existed for about 3 and a half billion years on Earth. What we find in the natural environment has at some point evolved from a predecessor, resulting in the diversity of life forms we find today, estimated between 10-100 million varieties, with 1.5 million already identified (Wilson, 1988). The way in which we divide life has implications on how we view and value the natural world and ourselves. We understand ourselves as *homo sapiens* and define ourselves with that in mind, despite the ambiguity surrounding the microtaxonomy classification system. Ethical values develop, partly due to the way we learn and think of life and its manifestations. Therefore the classification of life is a contentious issue that must be understood thoroughly before the ethical implications of a diversity of life can be analyzed. Counts of species numbers which incorporate alternative definitions can return differences as high as 150 per cent (Hey, 2001). Ethically, all definitions of species consider each species unique. Components listed by the IPCC, genes species and ecosystems, are not a perfect division of biodiversity. The lines between each part are not clearly drawn. The accepted norms of classification of life used in fields of ecological thought are widely understood but not without points of debate. This section will analyze what biodiversity may be comprised of.

1.2.1 Genetic Diversity

As one delves into the components of biodiversity the complexity of systems and myriads of parts quickly become apparent. Because of the complexity and the difficulty in separating any one part for analysis or as an argument in reductionist theory, there tend to be debates over where lines can be drawn. This is the case with even such a scientific aspect and component of biodiversity as genetic composition. There are debates within the appropriate fields as to what constitutes the genetic component of diversity, and where the gene pool lines should be drawn to define individuals and species. Such considerations add to the already convoluted debate on what constitutes biodiversity. It also adds to the ethical concerns, from an anthropocentric perspective, it forces more consideration to the uniqueness of individuals by describing the lack of consistency amongst a population or community or species. From an ecocentric view it may suggest potential holistic ethical aspects.

4 That biodiversity improves functioning is shown by Mcgrady-Steed et al. (1997). That declining biodiversity adversely affects ecosystem function is shown by Naeem et al. (1994). Biodiversity provides insulation from declines and improves reliability (Naeem and Li, 1997).

Genes, in modern biological terms, are defined as sections of DNA. A genome is an organism's complement of DNA which contains the information for form production. Genes dictate the inherent properties of a species along with their environment through protein production. However, the form of any gene may vary at the allelic level and at the protein level. Another question regarding the genetic component of biodiversity that must be considered is the issue of genotype and phenotype. DNA or genotype holds the information and the phenotype is the varied representative form of the genotype⁵. Some of the ethical questions surrounding this issue are, how do we choose individuals that are representative of a species? Where do we draw the lines of identification between individuals and species?

1.2.2 Microbial Diversity

If the debate on what constitutes biodiversity is muddled by the definition of genes, it is rendered additionally unclear by the consideration of microbial diversity. This component causes the debate to be brought to new plains of consideration, for if the concern is of preserving or conserving microbial ecosystems we must consider factors which greatly alter the common notion. Firstly, microbial diversity can occur in places not usually thought of as life bearing or worthy of diversity protection, for example oil wells or human bodies. Secondly, that if microbial diversity is given the same consideration as other components such as species, the valuation becomes infinitesimally more difficult from a prioritization aspect, while it may be easier from a holistic perspective. This difficulty occurs as people rarely value or have affinity for microbes despite that fact they are a necessity of survival for all species and play invaluable roles in the healthy functioning of every living being. For that reason perhaps microbes are the perfect microcosm example of why all life must be valued. The ethical considerations pertaining to microbial diversity are especially unique.

1.2.3 Ecosystem Diversity

Before the concept of ecosystem became accepted, modern biology was found in laboratories, and the reactions were judged out of the context of the environment. After the coinage of the term in 1935, a move to recognize that the concept conveyed by the word ecosystem, "*is the inclusion of the physical-chemical environment as a fundamental part of the ecological unit*" (Robbins, 2007). The size of an ecosystem is variable, depending on the interactions in question, from microbial ecosystems to the earth as a whole. The complexity of ecosystems can be enormous as it is constituted by the sum of its organisms, environment and its processes between and within all its parts (Cragg, 1968). Ecosystems in the study of ecology are generally viewed through the processes of energy transfer and the dynamics of such interactions (Chapin III et al., 2002). This report however, tries to expand on such analysis to incorporate factors that are not necessarily energy focused and are specifically relevant to biodiversity, such as the different values of each component within the ecosystem. In addition to the traditional concept of ecosystem used in ecology, macro-ecological views of ecosystems will be used to understand the diversity and rarity of whole systems and to clarify the dynamics of climate change and ecosystems in relation to ethical concepts.

1.2.3.1 Holistic and Dynamic Views of Ecosystems

It is not only species or genetics that deserve consideration in respect to biodiversity, it is appropriate to include the entire ecosystem as something worthy of a unique and valuable status with protection from loss of diversity. The ethical implications are equally prevalent yet different when considering ecosystems compared to considering species. Systems as a whole are perhaps more delicate than species, as slight variations reverberated through interconnected relationships to alter the whole. This can affect ethical responsibilities and differentiate those towards ecosystem than towards species, for example zoos can protect against species loss, but ecosystems cannot be replicated.

When considering ecosystem diversity, it is important to understand the uniqueness of each equilibrium (or non-equilibrium) amongst the range of possibilities. To conceptualize the range of diverse balances

5 For a debate over a phenotype is refer to R. Dawkins, 1999, *Extended Phenotype*.

and interdependent relationships amongst species possible within an ecosystem, consider these factors of dynamics; each species and accompanying genetics possess functional traits that represent tolerances, responses and impacts to and on its surrounding environment (Garnier, 2002), species relate to one another through their traits (Naeem, 1998), those relationships may have homologous origins and significance (Ackerly, 2004), and the web of interactions may compose of parasitic, predatory, competitive or facilitative relationships that vary in intensity (Thébaud, 2006). Furthermore, the density and mass of biodiversity is dependent on factors such as a species' growth rate, body size, metabolism and life history (Brown, 2004), resource availability (Tilman, 1982) stoichiometry (Elser, 2002), interactions within the food chain (McCann, 2005), and spatial factors (Loreau, 2003). And finally biogeographic processes are responsible for the genetic populations of an ecosystem (Lomolino, 2004). And in addition to the special factors, the temporal issue of which species develop first also affects the biodiversity of an ecosystem (Larsen, 2005).

Fluctuations in any of these variables of dynamics result in differing states of biodiversity and thusly reflect the diversity of ecosystems as a whole. By understanding the complexity of factors involved, the uniqueness of each ecosystem can be more easily found and an associated value of the uniqueness attached combined with the ethical responsibilities to that value. Threatened urgency

1.2.3.2 Special Ecosystems and Hotspots

While the definition of biodiversity and whether certain ecosystems are diverse is in question, what is not in question is that there are other more easily recognizable ecosystems that are 'special'. These ecosystems are considered special in the sense that they are rare, and rare in the sense that they are either unique in composition or rare in occurrence. The ethical implications of what constitutes a 'special' ecosystem are of particular interest as it directly relates to attitudes towards 'normal' ecosystems. Once it is clear what constitutes the 'special' designation and whether or not there are differing ethical responsibilities, we can better understand the relationship with 'normal' ecosystems. The ethical question of whether an ecosystem or even a species is more 'valuable' because it is rare is addressed in the following chapters.⁶

Examples of 'special' ecosystems grow in numbers as one appreciates the delicacy of balance found within normal ecosystems and the myriad of variables that make each ecosystem unique. Ecosystems that are commonly referred to as 'special' may include caves, tidal pools, estuaries, ice-locked lakes, wetlands, rainforests and old-growth forests. In addition microbial ecosystems can be found in many locations usually considered inhospitable, such as near nuclear waste and oil-wells and therefore uniquely rare. Add to this list the variability of the definitions of ecosystem and one can gain a sense of how hard it is to define a 'special' ecosystem, although many biologists would claim that every ecosystem is special.

1.2.3.3 Human made Ecosystems

Of unique consideration are the special ecosystems that are not threatened by human activity but rather dependent on them. This reversal is of specific interest to ethical thought in that role reversal provides insight into the nature of the dynamics of responsibility. For example it raises questions such as, are there different ethical implications such as stronger or weaker responsibility towards conservation when we are the "creator" of the ecosystem? This issue is also interesting because some of the human made ecosystems include polluted sites, which have negative effects upon some species although they may increase the diversity of certain types of organism that use the pollution as an energy source.

1.3 Dangers to Biodiversity

The 'hot' topic of international discourse in the 21st century has been global climate change and its accompanying effects. There is little argument against the idea that we are currently witnessing one of the greatest die-offs of species in known history. The current debate is not on whether it is taking place but rather on how much greater the extinction rates are than the background rate, with estimates usually ranging from less than 100 times to 1000 times greater, with some estimates as high as 10,000

⁶ For further discussion, see sections 3.1.2 and 3.1.4 on the intrinsic and instrumental values of biodiversity.

times higher (WHO, 2005). What we can infer clearly from this is that biodiversity is under threat more than at any other time during human history. As this is the greatest extinction event that humans have ever borne witness to or have played a role within, there are unique ethical issues concerning our role in relationship to the wellbeing of other species that have never been faced by the human race. Because of this we must understand the threats to and causes of biodiversity loss, in order to better choose our course of action or non-action. Some causes are anthropogenic with direct ethical implications and other causes are not a result of human activity, however the ethical implications of those must also be considered.

Of the many factors that can affect an ecosystem's biodiversity the biggest cause for a decline in biodiversity and the most pertinent to ethical consideration is habitat destruction.⁷ While the correlation between habitat loss and loss of diversity may seem clear, the causes of habitat loss are perhaps less clear. Fragmentation due to the protection of only certain hotspots is another aspect of biodiversity degradation that is just beginning to enter consideration. Using definitions borrowed from the Millennium Ecosystem Assessment framework, there are direct and indirect drivers of change to an ecosystem.⁸ Anthropogenic causes have both short-term impacts such as habitat destruction, and long-term such as climate change.⁹ The anthropogenic causes are, perhaps, the most important to ethics as they directly express our relationship with biodiversity. The five direct drivers of biodiversity loss as stipulated by the CBD are climate change, introduced species, nutrient loading, land use change, and overexploitation (Diversity, 2006).

It is predicted that by 2032 more than 70% of the land surface globally will have been damaged or disturbed by the human population (UNEP, 2002). Habitat loss has been identified as a major threat to 85% of all species described in the IUCN's red list (WWF, 2011). This report gives a few examples, but readers are referred to other publications for specifics. Ethically we can agree that the destruction of life is counter to the principle of non-maleficence. The wildlife trade is one example of how satisfying the appreciation of some persons for diverse species usually harms the ecosystems from where they are taken. Unlike many other industries, there is no burden of proof on wildlife traders to establish that their proposed market is sustainable for nature, safe for the public, or safe for the living organism, itself (Toland et al., 2012).

1.4 Measuring Biodiversity

The issue of measuring biodiversity is of tremendous importance when considering pragmatic factors such as conservation of biodiversity and formulating policy on biodiversity. There have been numerous methods of measuring biodiversity used in the field of ecology since its inception but the inherent difficulties of quantifying biodiversity have yet to be completely removed. The difficulties in measuring biodiversity fall into various categories from definitive to practical. Conceptually, the difficulty lay in the deep interconnected nature of biodiversity and its ecosystem, as neither exists independently of the other and thus defining the roles and functions biodiversity plays through quantitative methods is abstract or strange.¹⁰ That is not the only difficulty as the defining characteristics of the dynamics of biodiversity are not easily quantifiable¹¹. Combined with the practical difficulty of collecting the required field data due to a short supply of time, money and experts needed for proper sampling, few surveys can tally all species (Magurran, 2005). These difficulties have been laid out repeatedly using varied language in the field of ecology and can be emphasized through the non-agreement of a definition for biodiversity and summarized by the feelings towards the CBD's definition in 'What is biodiversity?', *"Such a definition is of little use to conservation biologists trying to develop and evaluate methodologies for biodiversity measurement..."* (Maclaurin and Sterelny, 2008).

7 See section 1.2.3 on Ecosystem diversity for a description of factors. That habitat destruction is the biggest cause of biodiversity loss is described by Reaka-Kudla et al. (1996).

8 Direct drivers unequivocally influence ecosystem processes (Millennium Ecosystem Assessment framework language).

9 Based on the IPCC report on Climate Change and Biodiversity (Technical Paper V).

10 Strange in the sense that measuring something by itself is fundamentally abstract. Neem et al. (2008) show that neither is independent of each other.

11 For more elaboration on the dynamics, see section 1.1 on Genes, Species and Ecosystem.

Despite these difficulties there are methods to overcome the ambiguity of concepts and issues of quantification. From the original root of the term 'biodiversity' in conservation biology and with it the total species concept of measurement has grown a more mature field of quantification.

Measuring diversity requires a definition of diversity. Even a simple definition of diversity, the one used in conservation, focuses on the total number of species or total biomass and requires less than simple quantification tools. The total species or species richness¹² approach must factor the commonness or rarity of a species, endemic populations, and the distribution models needed to measure accurately the variety. This ability is exceptionally important before a total number can be figured and the methods used to achieve such a figure have been many. One method, plotting, exists in a variety of forms namely the rank/abundance plot or dominance/diversity curve, or the variation using percentage the Whitaker plot, the k-dominance plot and its variant the Abundance/Biomass Comparison. In addition to plotting there exist statistical methods of measuring the abundance of species, such as the Log series, the negative binomial and the Zipf-Mandlebrot model. These approaches are considered deterministic and are contrasted by stochastic models. The main conceptual difference between the two approaches is that deterministic models assume an equal distribution within species, and stochastic models take into account variance.

Contrasting statistical models are the biological or theoretical models categorized as stochastic approaches. Biological models tend to focus on niches within a system. Since 1957 the predominant model used has been the broken stick model devised by HR MacArthur, it is still used for null hypothesis today. Newer models contributed by Tokeshi, such as the dominance pre-emption, random fraction, power fraction, MacArthur fraction, dominance decay, random assortment, composite and Hughes' dynamic model, differentiate between fundamental and realized niches to give a more accurate description. In addition to these exist a plethora of other models, two celebrated methods are Caswell's neutral model and Hubbel's neutral theory of biodiversity and biogeography. While niche apportionment models, such as these, take into account the variances of distribution of species, problems arise when converting to empirical data and gaining accurate sampling. However, methods exist for achieving reliable data as long as the variances are not too great between attempts at replicating samplings.

On the abundance issue of rarity of species, definitions are thrust to the forefront. To determine rarity there are two branches of definitions, relative and absolute. Relative rarity can take into account the abundance of other species with factors such as endemism, population size, and habitat specialization in addition to the scale of the survey, all of which might affect the perceived rarity of a species. An example of a relative definition would be, "*Rarity is merely the current status of an extant organism which, by any combination of biological or physical factors, is restricted either in numbers or area to a level that is demonstrably less than the majority of other organisms of comparable taxonomic entities*", (Kunine and Gaston, 1997). Absolute definitions are a predetermined standard by which to measure rarity. One example of an absolute definition is that of the singleton, in which the criteria are that a single individual constitutes rare. Rarity remains a concept that is debatable, and any usage of the term in this report will be qualified by a definition.

The next aspect in measuring species richness is simple in theory, but is not without discrepancies. Several concepts of 'species' are used when contemplating species richness, such as the biological species concept, phylogenetic species concept, and the cohesion concept. Each concept with its own boundaries as to what constitutes a species can either inflate or deflate the total number. After a concept has been decided there are two methods of expressing the richness of species, the numerical species richness or species density which is the number of species in a given area. The other difficulty in finding the desired totals is issues of sampling due to methodology, extensive discussion on the difficulties and solution to overcome them can be found but will not be laid out here. However, methods that are used to compensate for the inability to perform intensive sampling are important to consider. Surrogacy exists in several forms, cross-taxon measurement (where richness of one species is correlated to the richness of another), within-taxon (where generic or familial richness is used to infer species richness), and environmental (where certain environmental perimeters are assumed to contain certain levels of species richness). Due to the imperfections within surrogacy it is not to be considered as an accurate tool on large scale estimations, but rather as tool for case-by-case studies.

12 The total number of a given taxon in an assemblage.

Diversity indexes fall into two categories species richness (already discussed) index and heterogeneity indexes which combines species richness with evenness measures. This section will look at methods that are categorized as heterogeneity indexes. Heterogeneity diversity indexes fall into two categories, parametric or nonparametric. Of the parametric variety of indexes widely used are the log series, log normal, and the Q series. Of the nonparametric are the Shannon index, the Brillouin index, Simpson's index, the Berger-Parker Index, McIntosh measure of diversity, and finally the taxonomy index Clark and Warwick's taxonomic distinctiveness which has been characterized as highly promising.

Other contrasting measurement concepts include that of functional diversity in which the functionality of a certain trait, specifically those connected to ecosystem function, are measured. Such a method has intuitive value as a diversity index and practical value related to modeling results of species extinctions. Another conceptual model that is similar to the species richness models that focus on total numbers, is the body size method which focuses on a correlation between the body size of samples and the abundance of the species.

With the availability of such a wide variety of methods and measures, one might think that biodiversity would be well on its way to being indexed. However the variance of methods makes cross-analysis difficult, methods are not always conducive to empirical data collection, and the methods themselves can only account for some and not all factors considered in the broader definitions of bio-diversity used for policy making. The difficulties in ranking biodiversity remain for now, but that does not need to limit what can be done to prevent biodiversity loss and policies on biodiversity. Based on the Precautionary Principle the widest definition of biodiversity should be adopted along with a myriad of tools to measure it.

2. Ethics and Biodiversity

“What is crucial to recognize is that the human capacity for empathy and identification is not static; the very process of recognizing rights in those higher vertebrates with whom we already empathize could well pave the way for still further extensions as we move upward along the spiral of moral evolution. It is not only the human liberation movements... that advances in waves of increased consciousness.” (Tribe, 1973).

Our understanding of ethics and biodiversity is still in its infancy, yet it is advancing. As this report is partly a result of the concerns of many stakeholders of the issue, it is a manifestation of will to improve the dynamics between humans and the myriad of species that combine to create the biosphere, which will ultimately benefit both humans and non-humans alike.

2.1 Ethical Approaches to the Environment

This chapter will introduce multiple ethical approaches and world views taken to biodiversity and nature. Through focusing on theory and the conceptual framework of ethics and biodiversity, it may hopefully provide support when considering the examples contained in later sections. This chapter will take into account philosophical contemplations, as well as offer some descriptive analysis of the approaches contained within. Common critiques, and ethical dilemmas associated with approaches to biodiversity are also taken into account to better understand the challenges of forming accepted theory for environmental ethics. This report will approach the ethical issues of biodiversity from primarily a descriptive angle, through analysis, case studies and real-world policy, while offering several prescriptive elements. It will also introduce the ways in which ethics and biodiversity are interconnected and how the implications of decision manifest themselves based on the categorical differences between the approaches that are discussed.

This section will serve as a summarization of existing thought and an introduction to a categorical system of approach based on four value orienting approaches. This thought can aid as a stepping stone for attaining a new ethical paradigm between humans and all other forms of life, or simply as a tool for understanding our current approaches. The basis for such an attempt is rooted in the biodiversity loss crisis that is occurring (Diversity, 2010). And the necessity gains strength with the perceived lack of success in achieving the 2010 targets. This direction of thought will also attempt to correct the apparent focus on biodiversity as only, *“ecosystem services and how it contributes to human well-being”* (Dempsey and CBD Alliance, 2010). One aim of this report is reinforcing paradigms, whether ideological or action-based, in accordance with the ideals of the CBD, which encompass the complexity of human ethical consideration, and those of all stakeholders of biodiversity. This may result in a sustainable future, which is an agreed goal of all member states of the United Nations (Rai et al., 2010). The methodology of achieving such a shift, in this report at least, will be to focus on value. By conceptualizing value as the center of approaches, value as a dynamic component within relationships, and shifting the value away from the connotation of economics, to a broader, deeper and richer understanding of what it may mean in a variety of contexts and to a variety of stakeholders.

The direction of consideration regarding ethics and biodiversity in this report will include approaches, and address the core questions of environmental ethics, that of ‘Why should we conserve Biodiversity?’, ‘what is the source of the value of biodiversity, human, intrinsic or both?’, ‘what is the essence or ‘category’ of the value as it exists?’, and the most difficult question of ‘how should we act after the value is established?’ These questions tend to have widely varying answers depending on the sources, such as conservation biologists or companies which depend on exploiting natural resources. Because of the apparent difference of views, a better understanding is needed to find a middle path for policymaking.

The complexity of the ethical aspects of biodiversity is due in part to the multifaceted conceptual nature of biodiversity, and secondly due to the varying thought on the value of and the rights of life for non-human beings. When these two considerations are given due weight, it becomes clear that there exists the possibility for many contentious issues and areas of debate. Examples of imperatives and principles can be found in some of the classical sources of ethical thought, such as Plato, Aristotle and Kant, and world views as sources dating back thousands of years. Balanced with the reasoning of more modern

thinkers and concepts found in broader worldviews, there exists a plethora of thought on the matter. Seemingly this thought has been overlooked consistently in favour of economic imperatives in policy directives. This thought has been condensed into four categories of approaches to nature. To avoid the potential divisive effects of such classification, keep in mind that a useful goal is of finding mutual or congruent ethical thought, specifically in principle or imperative form, but not necessarily limited to principalism. Acting from a categorically pure approach is not a necessity and has been noted for its impracticality in politics and policy.¹³

Understanding the categorical approach or view used as a basis for ethics is important in conceptualizing biodiversity and its accompanying factors and its relation to aspects of biodiversity and determinants of such a concept. Such an understanding begins with definitive issues and progresses to include the deeper complexities of the idea. This occurs as certain concepts associated with biodiversity, such as indices, measures and qualities; change related to the values contained within an approach for example, anthropocentrism. Concepts and highlighted qualities that appear in anthropocentric approaches are, rare species, endangered species, charismatic species, cuteness, familiar species, and locally imported species.¹⁴ These exemplify the human-centered consideration of concepts associated with anthropocentric views. However, other approaches note differing qualities, indices and measures, which ultimately change the perception of what constitutes biodiversity and how it should be approached in policymaking.

This idea can be taken further, towards the broader definitive issues of biodiversity. For example, when alternative structural conceptions of biodiversity are considered more factors, beyond indices and measures, become affected by the approach taken towards it. Anthropocentric views may contend that certain structural conceptions are appropriate and a biocentric or a cosmocentric view may lead to alternative components being included or excluded. However, the assumption that one approach may necessarily be at absolute odds with other approaches, or that approaches are dichotomously opposed to one another, should be avoided. It can be noted that the views of Plato in regards to life on Earth, contain elements of all the following approaches, and cannot be limited to any one category; whereas the views of many thinkers such as Aristotle and Kant have been generalized and are now seen in the light of a single approach. This is unfortunate and perhaps an oversimplification, as very few of the theories, theorists, or even the approaches within which the theories are contained are absolutely opposed to one another and most contain traces or aspects that go beyond a pure theory.

The philosophical goal of looking for ideal theories and universal truths does not always provide the best considerations for policymaking, which is dialectically opposed to ideal theory through its nature of being a pragmatic practice. This has been noted by UNESCO and COMEST during the 2010 meetings and in the report *Towards an Ethical Framework for Climate Change Policies*, “First, the challenge of universalism, from the perspective of an international organization such as UNESCO, is not to reconcile fundamental philosophical, cultural and religious differences but on the contrary, taking those differences as they are, to explore the possibility of practical consensus, both in those areas where background views actually intersect and in those areas where common conclusions can be drawn from contrasting premises.”¹⁵

It may be that when so-called differing approaches offer similar answers, the need for distilling the ideal theory to which each belongs to can be ignored. This is the case in many pragmatic ventures, and has found to be the case as environmental views have moved away from the extreme views of any one theory or universal principles. When considering the following approaches, it may be beneficial to try and mitigate the extremes of each view, for example the complete domination of nature appropriated by traditional anthropocentrism and the complete removal of humans’ participation found in some forms of biocentrism, ecocentrism or cosmocentrism.¹⁶ Each approach offers a view that may hold beneficial aspects and others that are less so, by including the analysis of each, the hope is that of finding the most appropriate options when all known factors are considered.

13 Categorically pure motivations are impractical (Sapontzis, 1995). ‘The Nature of the Value of Nature’ can be found at: <http://ejap.louisiana.edu/EJAP/1995.spring/sapontzis.1995.spring.html>

14 These differentiations can be found in Christie et al. (2006).

15 UNESCO Headquarters, Extraordinary Session, 28-30 June 2010 (Ref: SHS/EST/COMEST2010/pub-20).

16 The two extremes are detrimental to environmental considerations (Evans, 2005).

2.2 Anthropocentrism

Anthropocentrism, the approach that denotes human centeredness in relation to nature and biodiversity, is often the starting point when considering environmental ethics. This may be in part due to the canonization of western thinking on the issue, in part due to the influence of Abrahamic theological schools of thought,¹⁷ and in part because we are human. Anthropocentric ethics and its moral considerations have been found in the work of some of the most prominent thinkers in Western cultures. An example of this is found in the ideas of Aristotle, who contends a strong yet shallow version of anthropocentrism, as his views contend for a purely instrumentalist view of animals, essentially that their existence is for the benefit of humankind.¹⁸ This view is echoed in many classical thinkers of western origin. Proponents of anthropocentric thought use varying arguments to deny the intrinsic value of nature and biodiversity, from philosophical debates that lead to unknowable answers, to logical circles that deny such value through definition, to theological interpretations of human superiority.

As it has become abundantly clear that anthropocentric environmental ethics have resulted in the instrumental use of biodiversity, and consequently the possibly unethical appropriation of natural habitat and other degrading factors resulting in the crisis we are now facing, we must consider alternative approaches. Beginning with Immanuel Kant, who gives more consideration to that idea that treatment of animals should be moral, if only for its effects on the morality of the human individual, this maintains the instrumentality of animals (Kant, 1963). This softening of the traditionally strong anthropocentric view is an evolution towards a broader consideration of value of other beings and can be seen as a bridge to biocentric oriented approaches. Philosophically, this view can be seen as dichotomous as it does not implicitly state that animals have intrinsic value, yet implies it is morally wrong to treat them as if they don't, for the effects it has on human morality. This is perhaps overlooked in the generalization of Kant's view being anthropocentric, as man is the ultimate end and animals are simply considered a means to it (Kant, 1963). If this is extended to our current situation, human value still reigns supreme and our actions towards biodiversity are measured by the effects they have on humanity.

To adapt to evolving views anthropocentric ideals can be seen as moving towards what is called enlightened anthropocentrism. Enlightened or prudential anthropocentrism, that which sees the beneficial treatment of the natural world as likewise benefiting humans.¹⁹ This idea evolved in part due to the environmental movement and as a reaction to biocentric and egalitarian views. However, it can be seen as having its roots further back, and can be seen as congruent with Kant's ethics. The common example of prudential anthropocentrism is of the difference it makes between sports hunting and hunting for food, the latter of which is acceptable and the former not morally acceptable (Sakar, 2005). This form of anthropocentrism can be argued to contain elements of both biocentric and ecocentric consideration, as it connotes certain moral criteria regarding acceptability in the 'order of things' which can be satisfied. That the natural world is worthy of moral consideration, if only in relational to human, can be seen as the divergent point where circles of morality grow beyond the most basic form of anthropocentrism. The idea of hunting for food being acceptable can be seen as congruent with Plato's view of harmonious order of living things, which connotes value in all life, a biocentric view, and ecocentric as the system contains value.²⁰

To find solutions to the challenges of our times, such as policymaking for climate change and biodiversity loss, pragmatic commonality is preferable to nothing if ideal universals cannot be achieved. In the hope of finding workable solutions, prudential and enlightened anthropocentrism contains thought that provides sound arguments and is cohesive with ends pursued by conservationists (Krebs, 1999).²¹

17 Rai et al. (2010) notes that this hegemonic thinking has become the basis of knowledge either through default or intention.

18 The idea of a 'stronger' anthropocentrism in Aristotelian ethics can be found at: <http://plato.stanford.edu/entries/ethics-environmental>

19 Concept of prudential anthropocentrism put forth at: <http://plato.stanford.edu/entries/ethics-environmental>

20 That congruency is subject to the interpretation of Plato's definition of harmonious.

21 A definitively enlightened anthropocentric approach uses sound arguments. This is shown through seven points (Krebs, 1999).

Enlightened anthropocentrism, that which finds moral consideration of animals yet places them secondary to those of humans, does not reduce nature's instrumental value, rather it attributes what has been called 'a eudaemonic intrinsic value to nature' (Krebs, 1999). Such approaches can be seen as bridging the extremities of the absolute views. Enlightened anthropocentrism has also led to broader philosophical considerations, which question the absoluteness of the anthropocentric claims in 'strong' anthropocentrism. This can be shown in the growth of the field of environmental ethics through new areas of consideration such as aesthetics and eco-phenomenology.

Eco-phenomenology is perhaps an extension of anthropocentric thinking, yet takes the necessary step of recognizing itself as such to gain a foothold in objectivity. Heidegger's critiques of values have been considered subjectivist yet his distinction of differing answers found between meditative and calculative thought "provide resources for deeper ecological thought" (Brown and Toadvine, 2003). This area of thought asks questions and contains ideas which push the boundaries of 'what is human centeredness?' an important question to ask if making ethical choices from an anthropocentric point of view. The last note for making the case for an anthropocentric approach is that, we cannot deny the human element in determining value, yet we can redefine that value at will, and retain our human centeredness. It is very much within our grasp to redefine an anthropocentric value system in a way which ethically values biodiversity.

Commonly, there are two types of criticism that can be found regarding the anthropocentric approach towards environmental ethics. Two ethical arguments that make the case that a human centered approach is lacking, the first which contends that moral consideration should be extended to other forms of life, and the second which makes a direct argument against human centered thinking (Evans, 2005). The more general and widely resonating criticisms of anthropocentric approaches, contend that the decline in the health of the natural environment, from destruction of habitats to pollution to climate change and accompanying loss of biodiversity is a result of such approaches, and imply that had other approaches been taken the current situation would not need to be faced. Should these criticisms form the basis of an argument for taking an alternative approach, be it biocentric, ecocentric or cosmocentric? This is the question of this chapter.

2.3 Biocentrism

Biocentric ideals can be found in ancient world views but became recently the focus of attention during the environmental movements since the 1960s. Biocentrism contends the inherent worth of all members of the biosphere, some strains giving priority for species with certain functionality, and some strains of biocentrism approach it in an egalitarian manner. The resurgence of biocentrism is linked to the desire to balance the anthropocentric ideals which some see as being the cause of the current environmental crisis.

Biocentric approaches, gained prominence in the 20th century due to contributions from pioneers such as Albert Schweitzer, who put forth the principle of 'Reverence for Life'. *"Reverence for life means to be in grasp of the infinite, inexplicably, forward-urging will in-which all Being is grounded"* (Cicovacki, 2009). This has been echoed through similar broad imperatives such as 'Respect for Nature' or 'Love of Life' (Macer, 1998).²² Biocentrism, which in a broad sense encompasses approaches and ethical theories which ask for moral consideration of all life, differs from enlightened anthropocentrism through its presumption of an intrinsic or inherent value within all beings. This presumption is the most contentious factor to some and fodder for the critics of such a theory, yet is the key factor for proponents of such an approach. That nature is worthy of moral consideration with relevant obligations and duties to be appropriated on our behalf, is not without a precedent as more tempered human societies have struck balances with a diversity of species due in part to a respect or reverence for an unquantifiable value that the natural environment was perceived to have.

22 Paul Taylor's (1981) essay was titled 'Respect for Nature'. The "Love of Life" was introduced by Macer (1998).

2.4 Biocentric Egalitarianism

Biocentric Egalitarianism, which emerged into popular discourses from Paul Taylor despite being present in world views for thousands of years, ascribes an inherent value to all living beings in a similar manner to other biocentric theories. It distinguishes itself through the idea that all living beings are worthy of the same respect that is given to humans. Furthermore in his essay 'The Ethics of Respect for Nature', Taylor puts forth the idea that in regards to the all members of earth's biotic community, 'We are morally bound to protect or promote their good for their sake'. Taylor goes on to provide ways in which this respect for nature can manifest itself in our morally bound relationship, these duties may include a respect for the integrity of natural ecosystems, to preserve endangered species, and avoid environmental pollution, all with the goal of allowing wild species to maintain a healthy existence in a natural state (Taylor, 1981).

Such an example of prerogative provides a useful example and a clear manner in which we can further our moral actions regarding other beings. Taylor further articulates how the 'good' of other species de-necessitates the debates on sentience and rational arguments against the ability for other species to feel pain. This is similar to the inherent 'goodness' found in many approaches from Jainism to Plato and others. The second concept Taylor puts forth which overlays other arguments of this chapter, involves his concept of extending 'inherent worth' to all living beings, using the principles of moral consideration and intrinsic value. He further argues that duties owed to other beings stem from this 'inherent worth' (Taylor, 1981). Again such a presumption is the key factor in considering biocentric theories and can be found in a wide range of world views and approaches.

It has also been noted that certain conundrums of a seemingly philosophical origin arise when contemplating ethics within the framework of biocentrism.²³ These meta-ethical dilemmas can stem from our inherent lack of ability to perceive the potential ethical concerns of other life forms. For example, virtues cannot be imposed in egalitarian theories without clear problems of anthropomorphizing, and some would argue that they have no place in environmental ethics.²⁴ This serves as an example of the difficulties of finding ethical principles and imperatives that extend beyond the first level, such as 'respect for nature' and 'reverence for life', which ultimately are interpreted by human considerations when extended into 'life quality' and deeper contemplations of the ethics of other living beings. That meta-ethical concerns such as those that extend beyond such principles of biocentrism, can hinder the process of achieving conservation policy due to the inherent lack of conclusive thought on the issue is noted in environmental philosophical texts, (Sakar, 2005).

Perhaps adding to the criticisms of biocentrism and its ethical theories is the ambiguity attributed towards one of the key pioneers in the field, those directed towards Albert Schweitzer. "His writing presents the reader with many formidable ambiguities, if not apparent contradictions: his ethics are presented both as rational and yet mystical, and as universal and subjective", (Barsam, 2008). Such criticism, when applied to Schweitzer, refers to the interdisciplinary aspects of his philosophical and theological thought applied to ethics, however these contradictions seemingly encompass the debates of environmental ethics as a whole. These aforementioned contradictions of universal versus relative, and rational versus mysticism summarize the extremes of philosophical viewpoints, seemingly dichotomous positions, and creates the division points found within the philosophical arguments of ethical environments.

Additionally, one can safely speculate that because of criticisms of early proponents of biocentrism, such as Schweitzer, that later arguments and justification of biocentric theories were developed to fit into the academic mould in a more congruent manner. Yet, because the base for many biocentric theories, is that of an intrinsic value residing within life beyond humans, that can only be 'proved' with its presupposition, which does not satisfy the rationale of a logical approach. Therein lay the possibility for a contentious debate between those who can extend the value and those who cannot, those who can presuppose intrinsic value and those who cannot.

23 This has been noted specifically in regards to normative ethical theories when broadened to non-human realms (Sakar, 2005).

24 This has been an argument for anthropocentric policy, as seen in William Baxter's 'Case for Optimal Pollution' in which he says that nature is morally neutral and not worthy of consideration ethically (Elliot, 1999).

2.5 Ecocentrism

“The higher affirmation of life can only arise when affirmation of life tries to understand itself in affirmation of the world.”²⁵

Ecocentric approaches, those which ‘take a point of view that recognizes the ecosphere, rather than the biosphere, as central in importance, and attempts to redress the imbalance created by anthropocentrism.’²⁶ That such a view connotes an opposition to biocentric or anthropocentric views is an unnecessary limitation on consideration. Ecocentric approaches can be useful in bridging the gap between individual, population and habitat, or concepts of self and environment. While both anthropocentric and biocentric approaches represent the value of the beings within the life bearing matrix, the ecocentric approach represents the value of the matrix in sustaining the beings. That the primary threat to biodiversity loss is habitat destruction, or in other words destruction of the equilibrium of the matrix resulting in both decimation of individual and species numbers, suggest that an ecocentric approach is a valid and worthy approach from which to synthesis policy choices.

The holism of such an ecocentric approach proves to be both a beneficial and complicating factor. The holistic aspects of ecocentrism arise from the anti-reductionist tendencies of incorporating all parts of the system, individuals, species and ecosystem into the consideration of value. Ethical choices stemming from the consideration of such a value, seemingly appropriate, are the most complicated due to the myriad of dynamics yet likewise providing the depth of consideration from which the strongest imperatives can be appropriated. The prominent proponents of ecocentric theories are those such as Aldo Leopold and his famous ‘land ethic’, Arne Naess and ‘Deep Ecology’ and many holistic world views.

Ecocentrism on the surface may appear to be the most inherently sensible approach to take when considering biodiversity. An ideal approach could focus on the value of the life-bearing matrix of our ecosphere, and the maintenance of it. However, at this time the pragmatics of such an approach is far from ideal, as the level of knowledge necessary to act in response to the needs of maintaining the matrix is far from adequate. The possibility for unforeseen consequences of tampering on a large scale is high, and the slightest potential for negative or catastrophic effects must be considered. Ethically, such attempts to manipulate the functioning of the ecosphere, are the hardest to justify as the potential effects may reverberate not only spatially around the world but temporally far into the future. The dangers of such actions have been recognized and recommendations for moratoriums on geo-engineering have been sent for consideration (ETC Group, 2010).

2.6 Deep Ecology

To categorize the theory of Deep Ecology among other ecocentric approaches is, perhaps, a gross oversimplification of the ideas contained within it. While the movement known as deep ecology does attribute a worth, synonymous with intrinsic or inherent value, towards the natural life bearing matrix and in this case the quality of biodiversity, it goes well beyond that basic assumption of ecocentrism.²⁷ In making the distinction of a ‘Deep Ecology’ from a shallow one, a comprehensive list of core principles were crafted to ensure the vital components of such an approach to nature were understood, which

25 Albert Schweitzer replying to Nietzsche’s philosophy of affirmation of life (Evans, 2005).

26 Definition found at <http://www.encyclopedia.com/doc/1O999-ecocentrism.html>

27 That the Deep Ecological movement holds the notion of such a synonymous value is found in the analysis by Yu (2004).

make it a powerful tool in practical action due to the suggestion for a holistic real-world approach.²⁸ From these core principles certain imperatives can be distilled, that of preservation of un-spoilt wilderness and restoration of degraded wilderness are an example (Guha, 1989).

In the early stages of Deep Ecology's development the distinction was made between its philosophy and its existence as a movement, and likewise its recognition as a movement provides the basis for many real-world imperatives that otherwise may lack from a purely philosophical consideration.²⁹ Such imperatives have been compared to those found in a 'shallow' or anthropocentric approach and provide an alternative, seemingly sustainable methodology which born out of the environmental crisis of the 1970's seems equally applicable in the current situation.

Some proponents of 'social ecology' criticize deep ecology for not linking the threats to the environment to authoritative style of governance.³⁰ While others criticize the inherent trans-disciplinarian position it takes in attempting to move past the 'shallow' and anthropocentric environmental movements it aims to supersede, as well as the over simplification of political, social and cultural differences caused by taking the view of earth and its life proposed in deep ecology (Wyck, 1997). The latter two are examples of opposition present which is representative of a certain segment of academia which is critical of the meta-ethical, all-encompassing grandeur of such theories. However, the one criticism that is echoed among more seemingly unbiased views and that is also made of other biocentric theories is, that humans' place within the approach is not clear.

2.7 Cosmocentrism

Cosmocentrism is an approach which denotes a value system centered in the cosmos as a whole. This approach can manifest in many forms, depending on the culture from which it arises and their particular view of what constitutes the cosmos. Examples of such approaches may contain aspects which place environmental issues on earth against the scale of the known and unknown aspects of reality, against space and time and cycles which may include aspects that extend beyond our ability to consider. Theory on cosmocentric approaches can include parameters and scope which vary as widely as the stars are numerous. Descriptive examples of such approaches can be found in traditional societies such as the Kyrgyz. For further examples please see chapter 3 of this report. The obvious difficulty in considering such an approach is the ideological scale which must be considered, and the seemingly overwhelming effect it has on human value.

2.8 Traditional Environmental Ethics

In this report alternatives to traditional environmental ethical approaches are discussed, exemplified by sections on world views which incorporate approaches to nature that are not explicitly labelled as environmental ethics, as well as the alternative value orienting categories of anthropocentrism,

28 1. The well-being and flourishing of human and nonhuman life on earth have value in themselves (synonyms: intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes. 2. The richness and diversity of life forms contribute to the realization of these values and also are of value in themselves. 3. Humans have no right to reduce this richness and diversity except to satisfy vital needs. 4. The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of nonhuman life requires such a decrease. 5. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening. 6. Policies must therefore be changed. These policies affect basic economic, technological, and ideological structures. The resulting situation will be very different from the present situation. 7. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent value) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great. 8. Those who subscribe to the foregoing points have a direct or indirect obligation to try to implement the necessary changes.

29 That Deep Ecology is a movement and more than a philosophy (Naess, 1988).

30 Michael E. Zimmerman in an interview (Atkisson, 1989).

biocentrism, ecocentrism, and cosmocentrism.³¹ Traditional environmental ethics use categories, when understood contextually, can be more divisive than is desired for this report, which attempts to bring about synergistic understanding of global environmental ethics. While traditional ethical theoretical categorization extends from long studied philosophy, it is a very specific way of thinking that is not implicitly exhaustive or inclusive. Environmental ethical categorization, although relatively new in the West, has grown to the point where scholars analyzing other world views attempt to fit the ethics of other ancient philosophies into those of western ethical thought, with only limited success. This report attempts to allow the dynamics of humans and biodiversity to be understood through each approach objectively, and not subjected to categorization that is contextually inappropriate.

2.8.1 Normative Principles

“The goal is rather to determine what constitutes the morally respectful use and appropriation of the natural world and of the beings of inherent worth with which we share that world.”³²

The argument for action may appear in a form similar to this; ‘There is reason to have worries about the environment and we should act on our worries in the short or long term.’³³ And it is summarized by this statement from the CBD: *“The Action taken over the next decade or two, and the direction charted under the Convention on Biological Diversity, will determine whether the relatively stable environmental conditions on which human civilization has depended for the past 10,000 years will continue beyond this century. If we fail to use this opportunity, many ecosystems on the planet will move into, new unprecedented states in which the capacity to provide for the needs of the present and future generations is highly uncertain”* (Diversity, 2010).

Because of such thinking the need for normative principles is created. The difficulty in producing normative principles often falls on the problematic assumptions necessary for logic associated with action and the environment. Often these assumptions involve the difficulty of judging the available empirical data and scientific models and the right course of action (Sakar, 2005). The differing theories included within the umbrella of ‘normative ethics’ lead to different decision regarding the broad question of ‘right’ course of action. Adding to the difficulty is the myriad of world views and ethical approaches which challenge the definition of ‘right’ course of action.

Due to the crisis that is now facing biodiversity as a result of climate change and other pressures such as loss of habitat, there is an imperative to act out of concern for the loss in value of those species. The nature of that value may vary depending on what approach is considered, none the less biodiversity carries value in all the categories. The one concept that may be universal if only in a pragmatic context is the worthiness of protecting life, which is the primary assumption to base normative action in this case. The almost universal scientific conclusion that human life correlates to the health of the biosphere, defined as synonymous with biodiversity, provides trans-species ethical support on which to base goals and principles. It also provides a common ground on which ideological synergy between world views can be based.

2.8.2 Deontological and Teleological Ethics

Necessitating the debate between deontological or teleological justification, in this context, is the difference that they may offer in policy option, if they offer the same advice however, the ethical debate can be avoided. In this report several examples exist for both cases. There is a strong basis for both types of justification, and in this case the distinction will be made only if it is substantively pertinent to understanding the option or approach.

31 See sections 3.2.3 to 3.2.12 on theological approaches to nature.

32 From the preface of Evans, 2005, *The Respect for Nature*.

33 For an example of this premises soundness and validity, see Sakar (2005).

2.9 Moral Agency

Moral agency may be seen as a being unnecessarily inexorable from the debate on reason and rationality, of which Kant ended in the dichotomy of *a priori* and *a posteriori*. This debate also takes on the dichotomy of rational and irrational of which there are no absolute answers. It is with this in mind that the discussion of the moral agency of non-human species takes place.

Moral agency is commonly understood as having an interest in the outcomes of moral decisions (Macer, 1998). It is widely argued that in order to have an interest in the result of action, the being should be sentient, able to experience pleasure and pain. A more stricter concept of a moral agent is a being that can make moral choices, because they possess the ability to make a moral judgment. A requisite for judgment is rationality, and it is the differing concept of rationality on which most contentions of moral agency are based. A largely western and anthropocentric approach to rationality is that of human superiority due to the use of logical equations or ability to perceive and use empirical evidence and some might still contend for pure reason. It is this assumption that reason is only attainable by human faculties that human superiority is founded upon. However, if this assumption is put to the test one soon finds that it is not as certain as it is often portrayed.

There are several aspects of moral judgment based on logic which are questioned in a cross cultural approach. Firstly it implies the denial of non-logic based rationality such as intuition or ideas found in many other world views discussed in this report. Secondly, the understanding of scientific or logical rationality as being inherently neutral in relation to moral judgment, favours humans when they are posed against other living organisms. In most arguments that promote the value of other animals as sentient beings (Singer, 1975) they compare attributes to elements that are found in *Homo sapiens*, rather than on virtues such as the ability to love across species boundaries (a type of self-less love as a contrast to actions of love that promote the same species (Macer, 1998).

These concerns can be resolved in at least three ways, one agreeing that rationality is not limited to logic, and thus is inclusive of other forms, possibly intuitive, non-dualistic or esoteric. Secondly by agreeing that moral judgment itself is not dependent on rationality. The third and more subjective aspect is the contention that moral agency is not definitively linked to moral judgment, and thus agency can exist independent of judgment as within a non-dualistic understanding. Depending on the views taken we may prioritise certain sentient endangered species more highly than ecosystems and other organisms, and at some stage evacuate Great Apes³⁴ out of habitats that are impossible to protect, for example. Conservationist and animal rights advocates agree however, that the first choice is to maintain the natural ecosystem if at all possible.

This is a contentious aspect of ethics and biodiversity yet important as it may be a key to resolving the re-definition of the dynamic between humans and non-human species. The strong anthropocentric approach may not grant moral agency to other species and therefore human superiority creates a dynamic that is largely parasitic, to borrow a biological term. Prudential anthropocentrism likewise does not grant moral agency to other species but suggests that moral agency of humans should prohibit the unrequited parasitism by humans upon other species. Biocentric theories may or may not suggest agency, rather some theories ignore this debate in favour of considering intrinsic rights of other species, and biocentric egalitarian theories grant moral agency to other species. Ecocentric and cosmocentric theories stances vary regarding intrinsic rights and moral agency, however few if any of these theories grant humans the exclusive moral agency that strong anthropocentrism does.

34 The term Great Apes commonly includes chimpanzees, gorillas, orangutans, and human beings. See <http://www.greatapeproject.org>

2.10 Prioritization: Place and Species

"All animals are equal, but some animals are more equal than others" (Orwell, 1954)

Prioritization is perhaps the core issue of ethics and biodiversity. Prioritization of our responsibilities, of our duties and prioritization of the value we place on all the beings effected by our actions. Unfortunately, this can no longer be a theoretical exercise left to philosophers and academics, as the point has passed where inaction weighs as heavily as action. Prioritization of species, of places, and of principles, these are the key aspects related to ethics of biodiversity.

The ethics of prioritization are the most difficult to contemplate, justify and even more so to communicate.

The need for new understanding of prioritization stems from the strong anthropogenic approach based actions which led to direct drivers of climate change, degradation of biodiversity and correlated loss of life and diversity in the biosphere, suggests that our intellect needs some refocusing, and intellectual ethics based on the illusion of 'objective reason' may not be the best tool for prioritization of species. Like the topic of the previous section moral agency, prioritization is closely linked to the dichotomies of reason and without that absolute base that rhetoric often suggests it is retained. Prioritization is a derivative of judgment and as such succumbs to the same basic flaws, of neutrality of objective reason, and uncertainty with regard to the nature of reason. Science can provide relatively objective data for classification and analytical analysis of species functions within ecosystems, yet it cannot provide the moral or ethical judgment of which other species become subjected to as a result of human activity and development.

Cases of human prioritization in the best of times has not given us the best of precedents, without sensationalizing, much of the world is without adequate commodities of survival while more than enough for their well-being is held in the hands of the few. That is a matter of prioritization, not unlike the question of species prioritization. The value of maintaining the resulting global socio-economic system, as it is found now, prioritizes profits and economic growth over the value of potential effects on the climate (Mcmullen, 2009). Prioritization in ethics and biodiversity manifest in differing ways such as land usage policy, that which balances the needs between instrumental aspects such as development and other humanly concerns with the needs of other species and ecological integrity. It can manifest in a ways such as animal testing, in which the needs of humans are judged as more important than those of the subjected species. It is also extremely important when judging the criteria for aspects of ecological integrity and suitable habitats, as ultimately the imperatives vary by species and by approach taken.

Biodiversity necessitates the most ethical considerations of any other field. The order of the prioritization of species occurs differently depending on the approach taken. Even anthropocentric approaches have begun to recognize the intrinsic value of those species that possess sentience, such as higher vertebrates. For the most part however, instrumental value is attributed based on the supply benefits a species provides in relation to human demands. If a biocentric approach can be understood the ethical dynamics would consist of a new variety of ethics, which balance values across species along traits which are mutual. One option of a biocentric founded path is looking at sustainable symbiosis as a potential area of value and ethical understanding.

Ecocentric approaches would denote prioritization based on the value of a species towards the functioning of the ecosphere as a whole, in such a scheme humans as it stands may rank rather low. However such statement can be qualified with the positive potential we carry in relation to ecosystem functioning, and the potential to rank higher as we better understand and follow the life bearing matrix. Human intelligence may allow us to act in ways that broadly support the ecosystem and its functioning if we so desired to.

Cosmocentric approaches to prioritization, as is the case with many of the considerations taken from this category, are various and many. It is not practical to consider all the possible value schemes, rather only the descriptive accounts of such an approach.

2.11 Ethical Issues of Extinction

Why should we be concerned with the loss of a species? How does extinction as a result of human activity change our ethical understanding? Ethics of extinction is an ominous topic and it may elicit feelings associated with catastrophe or inescapable demise depending on one's temperament and view of evolution. From an environmentalist standpoint, the extinction of a species may be invoked to highlight what are considered ethical failures on the part of humans and are often accompanied by demands for change. There have been great extinction events in the past, as seen 250 million years ago at the end of the Palaeozoic era where nearly 90 per cent of all organisms and 99 per cent of animals went extinct, and 65 million years ago nearly two thirds of species and 80 per cent of individuals disappeared (Courty, 1999). Although these occurred, they were caused by natural occurrences, such as an asteroid impact.

However, the ethical issue is about human responsibility and a common ethic across cultures to protect species. One example is that of the Yangtze River dolphin, which died off under the gaze of environmentalists and as a result of apathy. Some have accused those involved of political games and general lack of resilience in protecting a threatened species. The lack of clear data as the species diminished has been cited as an excuse towards the preventable conclusion and as a result the precautionary principle applied to biology has gained credence (Turvey, 2009). Summarized by feelings towards pro-active protection such as: *"Do not wait until you have all the facts before you act—you will never have all you would like. Action is what brings change, and saves endangered animals, not word"* (Merton, 1992).

Such attitudes may resonate with compassionate individuals, yet our ethos is not universal as to what the human responsibility is towards non-human species. Qualifying this statement is the theme of this report, which is the necessity of biodiversity to the wellbeing of humans and non-humans alike. That ethos suggests that preventing anthropogenic extinction drivers is the least we can do normatively, and ethically our awareness must grow as a result of the increased effect we have on other species.

It is clear is that anthropogenic effects have altered extinction rates, but may not be the only factor during this Holocene period as summarized by Russell et al. (1998), *"Holocene mammal and bird extinctions occurred at a significantly elevated rate, but taxa containing disproportionately few species are both disproportionately threatened with extinction today."* The denotations of that statement lead objective thinkers to desire more information, emphatically stated, *"We need more work on the relationship between feature diversity and phylogenetic diversity. We also need more work on the use and non-use values of each"* (Mooers, 2009).

Remembering that after each of the previous mass extinction events life on earth rebounded, adds to the ethical obscurity of the ethics of extinction. Objectively, we can say that the human species will not remain to the end of this event (unless they physically destroy the entire planet) but life in some form will continue to evolve. In the short term, over a few hundred years for example, we may find that humans survive but our actions cause the extinction of many species. According to the moral principle of avoiding harm, the less species that human action causes to become extinct, the less moral harm, and this is a basis for conservation efforts.

2.12 Stakeholders

Biodiversity encompasses not only the human element, but the entirety of the biosphere, and possibly the ecosphere and even life found anywhere in our cosmos. For this reason the most all-encompassing and perhaps most complex understanding of stakeholders and moral agents is required (Macer, 1998). Attempts to save one ecosystem may affect another, and efforts to protect one endangered species may compromise another. In order to protect biodiversity an ecocentric approach will be generally most useful, which may justify the removal or killing of introduced animals to an ecosystem in order to protect the original ecosystem that existed prior to the introduction of the so-called "pest" species. A biocentric approach would protect sentient animals over plants, and may also place some pests higher than animals with less sentience.

Emphasizing the importance of a broad range of stakeholders and is the Convention of Biological Diversity (CBD) National Biodiversity Strategy and Action Plans training module, which suggest all levels of stakeholders should be include in an across-the-board active way to ensure success. It is stated that: *“No small group of official or expert ‘biodiversity planners’ will ever have the understanding, experience and knowledge to be able to successfully identify all the policy issues that will arise in such a broad exercise, still less to identify a set of policy proposals that will effectively address the issues. Such a restricted exercise would inevitably be a theoretical, top-down approach to policy development which, without the input of real life experience from local stakeholders, will prove ineffective when implementation is attempted.”*³⁵

Thus there are a variety of stakeholders of biodiversity including humans, plants, wildlife and other non-human living organisms. In human market behaviour the consumers and producers affect the decline in biodiversity.³⁶

Consumers: Environmental-conscious and ethically-conscious consumers can benefit from their purchasing choices if labelling laws are standard and consistent. All consumers regardless of their environmental consciousness will also benefit from standardized labelling laws as they will not be so easily misled or duped into purchasing a product that they would not normally choose.

Producers: Those who are environmentally or ethically conscious in their production will be able to benefit from standardized labelling as consumers will be able to trust their products that has been marketed as environmentally friendly. Farmers will also be able to benefit from biodiversity as this means that their crop or stock will be more genetically diverse and therefore has a better chance of resistance against diseases.

Other species: Plants, wildlife and other non-human living organism will benefit greatly from biodiversity conservation as some depend on specific ecosystems. Not only will conservation prolong their lives but it will also ensure that their species will continue. Moreover, the indigenous peoples’ way of life, knowledge and cultural traditions that stem from biodiversity will be preserved. If biodiversity resources are sustainably used and protected, future generations will also be able to enjoy benefits that a biologically diverse world will provide.

2.13 Obstacles

Understanding the obstacles to environmental ethics is the first step towards overcoming them. Ideological obstacles often transcend the perceived cultural barriers of differing approaches and are remarkably similar. The 2009 Conference of United Nations Vesak Day equated the obsession of humankind with technology and material gains as the reason for a degraded natural environment (UNDV, 2009). While from Aldo Leopold’s classic *The Land Ethic* are listed obstacles to an ethic with nature, specifically mentioned are the separation of citizens from nature through gadgetry and both physical and mental distance which has resulted in humans to have ‘outgrown’ nature (Leopold, 1969). Each of these views carry similarities which can be considered despite being made half a century apart, and stemming from strains of thought, Buddhism and Ecology, that may be considered as culturally relative.

Leopold also points to the attitude of the farmer, which views nature as an adversary to be tamed, this effect of agricultural society is directly linked to the discussion on the ethics of instrumentalization. Another of Leopold’s ideas proposed as the misperception of the common citizen that scientists thoroughly understand nature in all its complexity (and hence biodiversity), and the scientist’s clear understanding that he does not (Leopold, 1968). This may play an important role when public opinion is crafted on matters of ethics in relation to biodiversity and climate change.

Another category of obstacle is that which exist in awareness and misconceptions which stem from contentions of philosophy and ethics. The ethics of biodiversity incorporate aspects which extend into theoretical aspects of our meta-ethical understanding, into areas such as philosophy of mind for non-

35 From the CBD NBSAP training module (<http://www.cbd.int/doc/training/nbsap/b5-train-stakeholder-nbsap-en.pdf>).

36 Other implications are discussed in chapter 5 on Law, Governance and Biodiversity.

human 'species'. These areas of conceptualization relate to species prioritization and moral agency of non-human 'species' and are presented within different moral and ethical theories in very different ways.

More challenges that are both philosophical and practical in nature are those which contend that intransigent positions exist as a result of dichotomous understanding of some the core conceptual aspects of ethical theory, such as subjective versus objective, empirical versus intuitive rational, universal versus contextual, linear versus non-linear, ends versus means, natural versus unnatural, and self versus environment. When considered intransigently these dichotomies can be understood as 'parallax' gaps, which can be extremely detrimental to discourse, and should therefore be thoroughly understood.

Another type of obstacle is that of a pragmatic nature, found in the issues surrounding feasibility and policy. Such obstacles are to be discussed in the section on policy.

2.14 Ethical Options for the Future

A renewed understanding of the ethical implications of biodiversity may culminate in a redefined approach to how we view and interact with the biosphere. The need for a shift in our ethical relationships with all life is evident, prescriptive options for how to make this shift occur in an appropriate and satisfactory manner is the challenge which is to be explored within this section.

Since 2010, meetings subsisting of considerable debate on the issues of climate change, initially exploring the potential for a UNESCO instrument on the ethics of climate change, sparked discussions which explore the core ethical and philosophical underpinnings of human activity and understanding in relation to the biosphere. During the last 4 years there have been apparent failures at the geopolitical level to build a consensus for universal approaches to the direction of environmental action and accompanying ethics at major meetings and conferences. This has led to a growing opportunity for concepts which may be regarded as a part of a new ethical paradigm to be put forth.

Expanding on the potential philosophical shift is the current work of COMEST. This work aims at identifying and addressing the most fundamental challenges of ethical, philosophical and conceptual dilemmas. In addition to these idealistic barriers the work of COMEST needs to be founded with consideration for the pragmatic implications of policy. The relevance of such work to the ethics of biodiversity cannot be understated. The broad consideration for a myriad of world views and ethical approaches to biodiversity contained within this report carries the same pitfalls as those considered by COMEST's recent interim report, such as synthesizing seemingly contradictory views towards the goal of pragmatic consensus. The suggestions within a interim report, presented at UNESCO's 'ECCAP: Energy Ethics After Fukushima' conference, Bangkok 2011, provides guidelines that may very well allow for a successful paradigmatic shift in ethical understanding and approach to international environmental policy and that which carries additional philosophical policy implications (Ibana, 2011). The shift begins with the recognition of the unattainability and potential setbacks of prioritizing a definitive universal set of values as an ultimate imperative in relation to ethical environmental policy and action. The process can be further summarized by the move away from universal principlism, towards a focus on mutual, contextual goals guided by concepts of 'ethics of collective action' and a 'co-benefits paradigm'.

COMEST (2010) identified points on spectrums that dialectically mapped represent seemingly un-synthesizable points or parallax gaps. These are well debated, divisive and contentious issues which hindered the creation of a normative instrument on the ethics of climate change (COMEST, 2010). This includes the debate on human rights versus biocentric views of non-hegemonic groups, the debate of 'development theory' versus 'replicating historical antecedents', the issue of the 'precautionary principle' versus 'the indeterminacy of potential harm' and issues surrounding 'polluter pays' versus 'legitimized pollution' debate. The inability to solve each of the respective issues with singular universally satisfactory syntheses represents the basis for considering another approach to international environmental policy.

Towards the goal of overcoming these dichotomies suggests known principles of 'Earth as the common heritage of humankind', and 'principles of participation, involvement of interested a parties'. Supplementing these principles, that are previously known through international conventions,

a further five possible principles were advocated. First, by the initial interim report a 'diversity of world views as an ethical priority', (COMEST, 2010). Secondly, recognize the interconnectedness of the global socio-ecosystem and the responsibility of humans. Thirdly, call for international solidarity beyond the conventional framework of development and aid which stems from Amartya Sen's theory of development as building human capabilities. Fourthly, the need for further articulation of the virtues of forbearance, frugality and enoughness in relation to systematic ethical analysis of consumption and production. And lastly, the need to think beyond the rights framework about ethical duties of guardianship or trusteeship with regard to non-human entities, emphasizing a need for institutionalization of an ethics of care.

The methodology within the post-interim report suggests that by accepting only limited consensus on certain issues, goal representing extrinsic factors will be allowed to manifest in diverse, contextually appropriate manners. Theoretically this allows for regions and countries to adapt policy which is determined not by universal ethical standards but by mutually agreed upon environmental goals or contextual imperatives. Such a process is not limited to only international level consensus building and can supplement national and local strategies.

Ideologically, evolving beyond dichotomous and divisive understanding is another strategy which taken in tandem with practical extrinsic actions, leads to a renewed emphasis on solidarity, cohesion and collective beneficence. This conceptual evolution produces an awareness of the monistic, dualistic, pluralistic and transcendent phenomena which form the structural components of understanding. Recognizing these variable forms, ideological intransigence which hinders syntheses or merely mutual recognition of a common reality, can be overcome under the direction of a co-beneficence imperative.

Returning to conditional manifestations, the new prescriptive measures grew from the meetings held in 2010 and include substantial philosophical implications that are articulated within five points. First is the shift away from the language of universality to the language of inclusion, this is paradigmatic in relation to the previous philosophy of absolutist principlism, and universal imperatives which represent monistic or universally transcendent phenomena. Second is the recognition of the need for a shift away from conventional instruments to more creative approaches to the ethics of climate change, the implications of this are developed through new syntheses. The third point focuses on the need to shift away from consensus, be it ethical or ideal, to focus on the undeniable realities of climate change, regardless of national interests in order to articulate an ethics of collective action, justified through scientific process. Furthermore it is iterated that politicians must respect simple notions of equity and fairness. Ethical positions should be developed in relation to concrete examples that express duties and responsibilities, in essence pragmatic positions which relate to 'real world' challenges, with emphasis on renewing focus on energy ethics and issues of climate exiles. The final substantial concept discussed is the 'co-benefit paradigm', which suggests that an appropriate ethical approach will allow all stakeholders to benefit in a multiplicity of ways. This is the most profound aspect as biodiversity both models such a concept, and is interdependent upon it. Humanity must find a way of evolving to develop the mutual benefits of our dynamics with all other life forms.

The role of values within these suggestions is not explicitly mentioned, yet conjoined with the theme of this report, which is to respect and review a plethora of cosmological views and respective values and ethics regarding biodiversity, grows a renewed emphasis on the importance of the subjective potential of value. Each of the aforementioned suggestions that arose from the COMEST expert meetings on climate change and summarized in the post-interim report, implicate defined and undefined values intended to balance simple economic value. Two of the summarizing points are inexorably affected and should be re-considered from a valuation standpoint. The first point which advocates a switch to a language of inclusivity, and not simple universalism, can likewise be applied to concepts of inclusive values. Such consideration places all respective values on a level plain, not implicitly as equal but as worthy of comparison, bounded by the concept of inclusiveness. The potential for contention increases with the challenging process of comparing values that are different in composition, for example intangible values with tangible values, such as the concept of the value of money, which is intangible, to the undeniable value of tangible, natural resources. Or equally challenging, comparing values that stem from varied cosmological views and have little bridging references, such as comparing dualistic cosmological views to non-dualistic cosmology or anthropocentric ethics to cosmocentric ethics. Using logical systems which are inclusive of monistic, dualistic, pluralistic and transcendent values in a non-hierarchical manner allows for the most beneficial opportunities to be recognized without prejudice.

The post-interim report's summary of the debates also provides a multitude of imperatives to guide the search for an answer to such possible contention, none more substantial than the 'co-benefit paradigm'. This places emphasis against zero sum solutions to practical issues. This inexorably implicates the subjective potential of value, as what constitutes a mutually beneficial outcome is undefined and to be determined by the representative parties, thus allowing for contextually applicable goals, while emphasizing the role of compromise and spirit of cooperation. Additionally by broadening the quantity of respected values the potential for recognizing mutually beneficial solutions increases accordingly.

COMEST's own reflections on the discourse for positive ethical action towards the environment were summarized by reiterating statements found in the millennium ecosystem assessment reports sections on climate change and biodiversity. Secondly, by noting the importance of transposing biodiversity to cultural diversity, while factoring the principle of solidarity through recognition of a complementarity of perspectives, the uniqueness of collective persons, and emphatically the transversality of unique individuals towards shared aspirations of human kind.

Reiterating the philosophical shift's process' relevancy to biodiversity is the apparent similarity with which a co-benefit paradigm mirrors the process of symbiotic mutualism, which is an integral aspect of the biological processes that comprise the basis of biodiversity. This is not simply the recognition of universal process or emergence, but additionally the transversality into ethical realms of such processes. A shift in symbiosis summarizes the dynamic process of interaction between species, which ultimately parallels the potential shift in the human non-human spectrum of ethical consideration and action towards mutualism or co-beneficence. This is a clear example of how biodiversity can affect our ethics and in return those adapted ethics can affect biodiversity, potentially leading to a spiralling dynamic resulting in increased health, integrity and ethical awareness of the biosphere.

3. Value of Biodiversity

"It is inconceivable to me that an ethical relation to land can exist without love, respect and a high regard for its value."³⁷

The first step in finding a mutually agreeable ethic with biodiversity is to understand value, and then the value of biodiversity. Value is at the center of many of the debates in environmental ethics and especially our relationship with biodiversity. Defining value is a core issue in any theory and also the point at which theories diverge from one another, the concept of value itself is malleable depending on the theories it is associated with and there is a necessity for careful use and understanding of the word "value" in this report and beyond. Value will be qualified in this section and the varying understandings of the word can subsequently be transported to the rest of the report based on the definitions found here.³⁸

In relation to biodiversity and environmental ethics, there are a limited types of values to be considered, and therefore an exhaustive discussion on the possible types of value can be avoided. Much of this report lists value associated with the four categories of anthropocentric, biocentric, ecocentric and cosmocentric theories. Along with the sub-categories found within each of these strains. The distinction made by such a categorical separation is often based on the theory determining value, or 'where does value come from' within the approach. Commonly the distinction between intrinsic or extrinsic value is the distinction used to differentiate such approaches.³⁹ Considering only these distinctions may lead oversimplification and comprises only half the issue when considering value. The other aspect to consider is the core issue regarding the definition of value itself, or 'what is value'. Value is a considerably different concept in different theories and using it interchangeably, without due regard for its variances, creates unnecessary complications and misunderstanding.

In the debate between instrumental and intrinsic value, the concept of value is actually quite different and the debate takes on needless burden because of the misunderstanding. Examples of value which can cloud the issues are those which don't carry moral significance in a literal understanding such as mathematical value, functional value, and descriptive values (ten Brink, 2009). Once those are removed we are left with a slightly more manageable selection of relevant values. Such distinctions are important in the discourse although excluded values may remain inexorable from philosophy and when finding ideal theories. When considering the subsequent points on value for policymaking it is notable that pure values are not always implicitly necessary in finding practical solutions. That multiple theories may lead to the same conclusion does not dilute, likewise does not add, to the strength of any one theory. The primary assumption that intrinsic value or inherent value is absolutely opposed to instrumental value must be questioned in the hopes of finding workable solutions in aiding the halt of biodiversity loss and relieving pressures on the biosphere and ecosphere (Evans, 2005).⁴⁰ Absolute and intransigent views on particular value systems can work against the common goals of protecting biodiversity.

Economic valuation of biodiversity through the use of exchange value and derivatives such as insurance value is a contentious issue as many contend that life is priceless, and as the integrity of the ecosphere is also dependent on the biosphere and biodiversity, economic valuation of biodiversity is fundamentally unethical.

37 Leopold (1968) made the distinction of the aforementioned value as broader than economical value and closer to the term in a philosophical sense.

38 While chapters 4 and 5 of this report are both based on examples of values, the context is specific to each idea. General understandings of value are discussed within this section.

39 Intrinsic value is used in the sense of opposing instrumental value, and non-specific to any of its varieties, rather synonymous with them.

40 See, <http://www.independent.co.uk/environment/climate-change/5000000000000-the-cost-each-year-of-vanishing-rainforest-2096367.html>

3.1 Categories of Value

The values of biodiversity can be seen as the integral components of an ethics of biodiversity. The discussed values can be inherent to different theories and system of categorization, yet they are to be understood as objectively as possible, so as to allow for synergistic understanding of such theories and categorization. The following values are those which are most commonly found throughout this report. As value can be understood as a contingent truth, subject to context, the number of values which may be border just inside an infinite limited only by the necessary categories and perspectives.

3.1.1 Inherent Value

'Inherent' value is an appropriate starting place when considering definitions of value, as it is the simplest if based on the criteria of objectivity alone. 'Inherent' value, in relation to biodiversity and nature is "independent of any awareness, interest or appreciation by a conscious being" (Duvall and Sessions, 1999). This value can be found in the category of ethical theories that are considered ecocentric, as it places value in all 'parts' of the natural world. Heidegger has been considered one of the first ecocentric theorists who implied inherent value as he stated that in the relation between man and nature that man must "let beings be", (Pepper, 1996).

3.1.2 Intrinsic Value

Intrinsic value in this report shall be used synonymously with 'non-instrumental' value to avoid the necessity of specifying the strain of intrinsic consideration unless otherwise stated. The exact meaning of intrinsic value is a contentious, and rather philosophical issue which may vary amongst cosmological orientations. Types of such a value differ in texts and have been noted for occasionally being used interchangeably to the detriment of their own cause (Sakar, 2005). The cause of justifying intrinsic value, some of which has been mentioned in the section on criticism of biocentrism and some arguments here, has faced difficulties of a particularly philosophical nature. However as all theories face critiques in some form, that intrinsic value attracts criticism in a philosophical sense should not be cause for overlooking the criticism of other values, based on descriptive realities (such as instrumentalism found in anthropocentric humanism).

3.1.3 Aesthetic Value

Aesthetic value is one of the most interpreted values considered. Aesthetic value has been considered objective and universal, as well as highly subjective. It has been linked to anthropocentric values to the environment. As it has been linked to romantic ecocentric approaches (Tomalin, 2009). Many environmentalists have invoked the 'beauty of biodiversity', perhaps most famously Aldo Leopold, *"a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise"* (Leopold, 1968). Aesthetic value has been given great consideration in ethical theory as it can be used as justification and support for commonality, depending on the potential of its universal or intrinsic qualities. It can be used as a measuring stick by which to judge what is fair, 'right' or correct as it is occasionally considered to correlate positively with other virtuous ideals. Understanding of aesthetics crosses from intrinsic to extrinsic, and as such can serve as a transcending factor on which to judge value, however it remains a highly subjective ideal in practical example.

3.1.4 Instrumental value

Instrumental value, that term which is commonly used to express value which is based in its worth as a mean rather than an end, can be considered a broad category which contains within itself a myriad of values all deemed instrumental. This is the primary value category in reports which considered human issues, and commonly economic value. That instrumental value is almost exclusively the focus of so many reports and policies may be due in part to the difficulties of working with alternate value

definitions such as intrinsic, which are almost immune to quantification. Although instrumental value is considered relatively opposed to intrinsic value, it is not necessarily synonymous with extrinsic value, as aspects related to human-wellbeing cross between imposed and subjective valuation. This debate is best summarized by issues surrounding transformative value.

3.1.5 Exchange value

Exchange value, can be seen as the market set value of a commodity. It contains not only the commodity value but additional perceived value. Such a 'demand value' is quite different than the previously mentioned, perhaps more abstract, types in that there are clear formulas for determining such a value, whereas the aforementioned values are of an indeterminate nature. Exchange value, that which is based on consumer demands, is used in the economic valuation of ecosystem services and other aspects of biodiversity and the biosphere. For example wetlands and the protection they provide are valued at the cost of replacing the service with dikes, ignoring the alternative roles that such a habitat plays in the ecosystem. This falls into the category of instrumental value, and is usually found in the anthropocentric approach to biodiversity. Such valuation of biodiversity, that which places a monetary value on services provided by and interactions within the biosphere, face criticism by those who claim any valuation of irreplaceable aspects is null and void, as those aspects are quintessentially 'priceless'. However, there has been a large movement towards understanding and expanding biodiversity's economic valuation over the past twenty years (ten Brink, 2009). And in 2010 a significant step was taken to value a biodiversity hotspot, as the Amazon has received an economic valuation of 5 trillion USD per year.⁴¹

3.1.6 Insurance Value

This derivative of demand value has been the focus of much attention recently which focuses on the stabilizing and mitigating effects biodiversity has on the function and negative functioning of economically valued ecosystem services. This is not a primary definition of value, which must be considered as base value on which to focus an environmental approach, but a side-effect of the approach which places exchange value on biodiversity. There exist many schemes for such valuation and the recent TEEB outlays some of the most current (ten Brink, 2009). The concept of the insurance value of biodiversity is interesting in that it places emphasis on the uncertainty of both the interplay of biodiversity with ecosystem functioning as well as the shifting understanding of economic values associated with biodiversity.

3.1.7 Transformative Value

The concept of a transformative value existing as a result of biodiversity differs from the other primary objective definitions mentioned, as it is a more complex and dynamic (by definition) type of value. It is not an objective value, rather an idea that a subject is transformed by some, almost phenomenological criteria. As transformative value is a process rather than a determinate state of value, the value of transformative value is non-static, and up to the subject to determine. This uniqueness gives transformative value a flexibility which can be applied to other valuation schemes. If combined with exchange value, as it often is transformative value is determined by the effects it has on a subjects demand. Such a value concept is almost dialectical in process and can be explained as the force pushing for synthesis. This potential for a dynamic changing effect, is routinely linked to economic valuation change, but can be extended to change of an interchangeable value. Aesthetic value is a commonly described instrumental value that fluxes based on the transformative value that biodiversity and or the environment has, a strong aesthetical transformative value has been described by cultural figures in almost all societies. If biodiversity is lost on a large scale, than the potential for transformation based on any values contained within it are also lost. Transformative value can be found in all approaches to nature, but the value that they transform varies depending on the approach, be it anthropocentric biocentric, ecocentric, or cosmocentric which is considered.

41 For a comprehensive analysis on ethical worldviews and nature, please see ECCAP project Working Group 2 report.

3.2 World Approaches to Value

In broadening the scope of consideration of ethics and biodiversity, one cannot ignore the natural resource which is the diversity of worldviews created through unique geographical, temporal and cultural dynamics with the environment. Such variation provides, much like biodiversity itself, examples of relationships which include insights that may aid in creating a sustainable future. This section will serve as an introduction to worldviews which entertain the idea of intrinsic value residing within biodiversity and nature. This will not be a comprehensive summary of views.⁴²

The approaches which contain an intrinsic value associated with biodiversity commonly fall into the biocentric, ecocentric and cosmocentric categories, and thusly this section will comprise primarily of such approaches. Due to the philosophical contentiousness of such a value, this will remain a descriptive and minimally analytical section so as to avoid drawing any lines between intrinsic value based in what may or may not be considered theological roots.⁴³ To simplify the understanding of intrinsic value it will be synonymous with non-instrumental value, unless specifically qualified.

Intrinsic value, with its definitive difficulties, is closely linked with almost all the approaches to nature beyond anthropocentrism. Biocentric approaches often recognize an inherent value to all forms of life, as can ecocentric approaches depending on the understanding of the systemic operations of the ecosphere. Cosmocentric approaches, the most all-encompassing of an infinite possibility of factors, commonly attribute value that is intrinsic in composition. Intrinsic value or terms which suggest synonymy with the definitions parameters have existed in many theological strains of thought, and in many creation stories, and as these strains are also a base for much of the world's moral and ethical understanding it is within them that we search for conceptions of the intrinsic value of biodiversity.

Eco-theology, depending on the strain, can fall into any of the four categories of value orienting approaches and follow both intrinsic and instrumental typologies of value. Because of the deep interlinked history between humans and the search for further understanding of oneself and environment, religion has attained an inexorable position in the growth of many concepts; intrinsic value and biodiversity is certainly no exception.

3.2.1 Indigenous Views

The term indigenous view connotes a myriad of peoples and approaches. When such a loaded term is discussed in relation to ethics and biodiversity, it is especially important to recognize the potential for additional perspectives that are not mentioned. However, certain themes and issues do appear more frequently and in general can be applied to the discourse appropriately. Issues within this discourse include the unique ethics found between indigenous peoples and the natural environment, the unique relationships between indigenous peoples and conceptions synonymous with intrinsic values of other species, and the unique methods by which the integrity of the natural environment is maintained by indigenous peoples. Often spirituality and intrinsic worth is discussed together, if this is true then the 25th article of the Declaration on the Rights of Indigenous Peoples contains potential connotations regarding the intrinsic value of the territories of the resources, and by extension biodiversity, there within.⁴⁴

One general, yet generally true statement is that: Different cultures and peoples perceive and appreciate biodiversity in different ways because of their distinct heritage and experience (Posey, 1999). In part, this is the motivation to produce this report, to recognize the different conceptions of ethics and biodiversity

42 Intrinsic value can become conceptually muddled with the values in deity worship or animalism, and likewise there are difficulties in contemplating the difference between intrinsic value and cosmocentrically imposed value.

43 UNDRIP, Article 25, states that 'Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.'

44 An example of a definition of harmony applicable to the interaction of living beings can be the third meaning found here; "a: 'pleasing or congruent arrangement of parts' b: 'correspondence, accord' c: 'internal calm : tranquility'", from <http://www.merriam-webster.com/dictionary/harmony>

amongst all the people of the Earth. The value of recognizing these views may lie in ethical aspects as well as instrumental aspects. Traditional ecological knowledge has shown to be extremely useful in providing insights to alternative conservation and preservation of biodiversity. This is exemplified by the strong fact that, approximately 80-85 per cent of the earth's remaining healthy ecosystems and global diversity priority areas are said to belong to Indigenous and local communities (GEF, 2007; Nursey-Bray and Hill, 2010; Cocks, 2006; Jones, 2000). Summarizing the importance of biodiversity and cultural diversity is the thought that, 'Biodiversity needs to be maintained because it provides humans with different ways of understanding and interacting with the world and ultimately offers different possibilities for human futures' (Cocks, 2006). Indigenous peoples play an integral role in shifting the balance towards a more harmonious and balanced relationship with biodiversity.

3.2.2 Totemic

The term 'totem' has grown from its original denotations and connotations to include world views that include indigene from around the globe as well as abstract meaning. Totemic views include the intrinsic aspects of a bond between animals, plants and human counterparts. More research and better understanding of the original coinage has allowed for new terms to be recognized as similar or synonymous, and may be adopted without forcing the term Totem to 'give up its roots'. That a preferred alternative to the term 'Totem' may be found in 'kinship' was suggested by a report published under the NSW Biodiversity Strategy (Jones, 2003). Part of the idea to change the term is the recognition that it is originally a term found in a Native American group in central North America, but is now applied to dynamics of indigenous peoples with nature around the world. The more modern understanding of the term also includes the connotation that totems are not merely representations as postulated by early anthropologists and sociologists, but rather expressions of 'real' dynamics between beings. It is this connotation that is pertinent to ethics and biodiversity. It is a relatively new development to look at totemic approaches as beneficial to biodiversity and ecological integrity, and as the inquiry grows it is becoming apparent that such approaches may benefit ecosystems and individual species. That a term like 'kinship' is suggested to replace 'totemic' may change the intrinsic connotations associated with the dynamism of the interrelationships implied in totemism.

Totemic approaches, in addition to exemplifying deep intrinsic value, may also provide useful conservational ideals. While individual totemism alludes to further inquiry of ethical aspects, group totemism can be a valuable tool for regional ecosystem management. A group may recognize more than a hundred species bound in totemic relationships and have mechanism to protect them. It may also be used to direct sentiment towards certain geographical areas and therefore become a tool of conservation and preservation. The ethical influence of totemism on biodiversity may be exemplified in the potential for such deep interconnected dynamics existing between human species and another species. The uniqueness of such a species to species bond suggests ideals of a meta-ethical nature that must inexorably be considered along with the ethics of biodiversity.

3.2.3 Hinduism

Vedic philosophy is known in the West as Hinduism, may be perceived as placing intrinsic value within all objects of the universe, as God resides within them all. Within the Upanishads, biodiversity and the ethical dynamics between humans and natural world become an integral part of worshipping God, as God entered each object after creating the universe to maintain the interrelationships between them (Palmer, 2003). If spirits are considered intrinsic property, then all plants and animals have such value, as they have spirits. All life is considered important, and there are no inferior species within Hinduism, although certain species are held in higher regard. Principles such as simple living have been influential on Hindu society towards the goal of minimal consumption partly due to the ethical concerns stemming from recognition of the effects on individuals, society and the natural environment. Principles of compassion and respect are integral to the ethical dynamics between humans and other beings. Within the Hindu view the interdependent relationship between all beings has been compared to links in a chain and should any link fail to make the necessary contribution the chain breaks. Because humans are considered the most intelligent of the animals on earth it has been postulated that the contribution should be the most, however when one searches for such a contribution it appears as if it is indeed missing (Palmer, 2003, p. 93). In recent environmental discourse Hindu activists have taken

strong stances against GMOs as well as chemical fertilizers as agents of disrupting the natural balance. For Hindus inner peace and the spiritual path are the ultimate purpose of life, and the exploitation or domination of the natural world is merely a distraction from such a path.

3.2.4 Buddhism

One of the key elements when considering Buddha's relation to ethics and biodiversity is how he shifted the consideration of nature away from that of fearful, exploitative concepts based in the Brahmanic pan-naturalistic approach towards a cosmocentric approach based on empathy and consideration for all sentient beings (Bilimoria, 2001). This is not to say that only sentient beings deserve ethical consideration or as moral agents in Buddhist thought. The themes regarding nature found through research of scriptures suggests ideas of a possibly unifying spiritual elevation of all beings in a sacred universe, rather than a singular ontological approach similar to common environmental ethics. Buddhism brings with it pleas for recognition of the mutual interdependency of nature, which is the cornerstone of ethics and biodiversity as it is. This is contemporarily expressed by the Dalai Lama and his plea for compassion for the environment and ethics of universal responsibility (Bilimoria, 2001). Likewise the well-known Vietnamese monk Thich Nhat Hanh, has discerned ingredients necessary for a sustainable environment for humans and other beings, such as wisdom-concentration. The following passage alludes to dynamics between humans and the earth,

*"I entrust myself to earth,
Earth entrusts herself to me.
I entrust myself to Buddha,
Buddha entrusts herself to me." (Hanh, 2003).*

Examples of how Buddhist thought has influenced approaches and interactions with the natural environment can be found in Tibet and Sri Lanka where Buddhism was adopted and fostered many years ago. Preservation of nature and moral respect of beings in Tibet has been enforced by Lamas while in Sri Lanka Buddhist environmentalists are active in modern day efforts to salvage the natural beauty of a country ravaged by difficulties.

There is one note that may be pointed at as a contradictory aspect of including Indian Buddhism in the chapter of 'Intrinsic Value' since strains of such beliefs do not extend to ideas of intrinsic properties, as they are a side effect of dualistic thinking. The choice to include it is based more on the non-instrumental aspect of Buddhist environmental ethics, and as such fits within the definitions included in the introduction of this chapter.

3.2.5 Jainism

Jainism grew as an alternative to Hindu-Brahmanism from Indian roots and provides another outlook containing principles which are conducive to ideas of inherent worth of all beings, which can be rationalized as moral agency and definitively non-instrumental in nature. This again is not absolutely synonymous with intrinsic value, but falls within the parameters set out at the introduction of this chapter. Notable in Jainic rationality is the inherent sentience and pleasurable disposition of all beings, these ideas are very similar to Plato's concepts as he suggest rational is attributed to all beings from the form of good.

Relevancy to the ethics of biodiversity is extrapolated from the idea of sentience being attributed to all beings, from the developed forms in human beings to the relatively embryonic forms in animals and in plants. In contemporary ethical studies as well as in general understanding Jainism has been paced at a forefront in approaches with empathetic tendencies towards the natural world and as a model for ecocentric ideals, while maintaining the goal of transcendence of the self.

Ethical principles can be found within the Jainist approach which are conducive to modern ethical understanding, particularly emphasized are the ideals of non-injury or non-harm. However these have been understood as both prudential and non-prudential in importance, which change their relation to modern ethical thoughts in the interpretation and placement of such ideals. Regardless of such a distinction the principles are noted as sympathetic to the world's ecology.

3.2.6 Confucianism

Confucian philosophy tends to be thought of as a purely humanistic ethos, however such thinking is false. Within its teachings are broad inclusive ethics which suggest harmony and ethical order between humans, earth and heaven. Biodiversity, although not explicitly mentioned within Confucian texts, is alluded to through the conception of nature. Nature understood as an inclusive system of which humans and all other beings form an organic whole subsisting from interdependent relationships. It is the misconstruing of these relations which lead to an impoverished natural world which subsequently lowers human's material quality of life and socio-cultural quality of life (Tianchen, 2003).

The aspect of intrinsic value within such understanding is suggest by the term tian, when applied to Confucian ethics defines the term with denotations of it being synonymous with nature, but also of the universe's moral order. Other meanings may include denotations of heaven, sky and fate. It is because of all of these meanings, but especially the former, that, intrinsic value may be conceptualized as existing within the parts of nature, and by extension within biodiversity. Neo-Confucianism has suggested stronger ethical bonds between beings, stemming from humans unity with heaven and potential for duties to it. This is suggested in a passage which relates to the ethical dynamics between humans and other beings in relation to heaven by Zhang Zai:

"Heaven is my father and Earth is my mother, and even such a small creature as I finds an intimate place in their midst. Therefore that which extends throughout the universe I regard as my body and that which directs the universe I consider as my nature. All people are my brothers and sisters, and all things are my companions" (Zai, 1960).

Regarding an anthropocentric approach to human nature dynamics, Confucian ethics does not grant human dominion over nature, but neither does it suggest that human development must be sacrificed to ensure pristine natural conditions. It recognizes that human will assuredly interferes with natural will, and that a principle of equilibrium should be adopted in policy.

3.2.7 Taoism

Taoist philosophy may not have originally contained explicit environmental ethos, but discussion now exists on how Taoist thought lends itself to such issues. Can a Taoist perspective create a new environmental ethical theory? That is a question that must overcome the original difficulties of including environmental ethics within Taoist philosophy. Studies conducted since the 1980s have suggested that Taoist philosophy may allow for such a development, while acknowledging that Taoist scripture does not include precepts or principles that explicitly suggest so (Chan, 2009). However, certain debates exist which challenge such an idea. Firstly, that originally Taoist thought may have left out environmental ethics consciously, possibly due to the fact that any such thought may be misappropriated and falsified to support practice that in fact is against prescriptive applications. However such an approach leaves little room for pragmatic efforts to develop a better understanding of ethics and biodiversity, and as so must be dissolved or synthesized.

The renewed efforts to seek an environmental ethic derived from Taoist thought have in a large part focused on using the principle of sustainability. By extending the imperative of the cultivation of virtue, to include virtues of environmental ethics based on the dynamics between humans the earth and naturalness exemplified by the Tao, a statement for a virtue of strong definition of sustainability can be made, based on:

*"Man models himself on the Earth;
The earth models itself on Heaven;
Heaven models itself on the Tao;
And the Tao models itself on naturalness"* (Dim Cheuk Lau, 1989).

Such phrasing should not be misunderstood as a hierarchal blueprint but rather that Tao represents that which is natural and inherent to all. Some analysis has seen human's role as that of a humble student of nature which is there to teach us and not to be dominated. Rather to teach us to seek the understanding of the naturalness of the Tao, in addition to natural laws and scientific facts. Extending such a thought

to biodiversity suggests that an additional danger of diminishing biodiversity is that of losing the opportunity to develop the virtue of understanding the Tao's inherent naturalness.

The aspects of biodiversity which suggest intrinsic or inherent value, in addition to the intrinsic aspects of the Tao, are that of the human nature dynamic being compared to that of a student teacher relationship and the accompanying respect to be shown by the student to the teacher. Such a metaphor alludes to the thought that biodiversity as representative of nature deserves respect.

An argument that the Taoist virtue of non-action may be interpreted as extending to an environmental ethic of non-interference similar to preservation or strong conservation theory may also be made. Such ideals are an extension to find compatibility with common strains of environmental ethical theories. The Tao may be seen as promoting cosmic harmony (Kohn, 2009) and the dynamic between humans and nature, and by extension biodiversity, is to exemplify such harmony.

3.2.8 Shinto

Shinto is compatible with common conception of intrinsic value within biodiversity. Shinto recognizes that spirit and spirituality exist within all animal, plants and even moving water such as rivers and waterfalls. It is the inherent divine aspect of the natural world and the tradition's focus on nature which exemplifies the importance of what could be conceived as biodiversity. Some scholars of Shinto have suggested that balanced "*uchi*" or inner aspect of being brings about natural order in the outer aspect "*soto*", and that without such balance the natural order will be mismanaged and lead to the destruction of humankind (Yahya, 2010). Shinto philosophy teaches that nature is something to be respected and that it is worthy of admiration, furthermore that it is right to be gentle with nature and gentle to the earth. Such suggestions have been actively pursued at the 80,000 Shinto shrines across Japan, which have pledged to sustainably manage their sacred forests and purchase timber from only sustainable sources. Shinto shrines also suggest notions of 'common' heritage, as they do not belong to anyone but to everybody (Torigoe, 2008). As with many of the other long established world views, a human biodiversity dynamic of harmony and balanced is suggest by Shintoism.

3.2.9 Judaism

On the surface Judaism appears to represent a strong anthropocentric approach to the human-nature, and by extension biodiversity, dynamic. Supporting such a claim are Judaism's ideals that humans were created superior to all other beings on earth, and that natural resources may be justifiably appropriated for human use under the philosophy of stewardship. Four further points reflect a strong anthropocentric and human dominion, "Protecting the environment is not the highest imperative, human life is more important than non-human life, nature is to be used and enjoyed as well as preserved, and nature can threaten humans, just as humans can threaten nature" (Yahya, 2010). Qualifying such statements however is the idea that it should be protected as well. Protected while putting forth the view that a proper balance between the protection of the environment and protection of humanity be maintained, a balance that ensures an unequal relationship between humans and nature due to human superiority and limited ownership of the Earth (Palmer, 2003). Partly explaining the Judaist view is the passage below:

"When God created Adam, he created all the trees of the garden of Eden and said to him: "See my works, how lovely they are, how fine they are. All I have created, I have created for you. Take care not to corrupt and destroy my universe, for if you destroy it, no one shall come after you to put it right." (Ecclesiastes Rabbah 7).

The Jewish story of Noah's ark contains many possible connotative allusions to both biodiversity and conservation. The parables of this tale revolve around not only God's desire to save a plethora of animals but also the fact that human wickedness, aggravated through carelessness an environmental catastrophe which affected all of earths inhabitants. The flood story is also adopted in Christianity and Islam, and seen in a number of other traditions of the world also.

3.2.10 Platonism

Plato's approach is considered philosophical rather than theological, however his view influenced the works of St. Augustine, and the works of Thomas Aquinas can be considered fundamentally Platonism. Thus his views are pertinent to modern Christianity, all be it to some strains more than others. Plato's thought regarding the empirical world is usually overlooked, aside from his notion that motion and change are continuous, however it can be rationalized that his views provide guidance in the realm of environmental ethics and that he himself was a proponent for biodiversity. This occurs as Plato presupposed harmonious motion and change, powered by the Form of Good, combined with the thought that in our universe maximal diversity is the ultimate value (Pietarinen, 2004). In conjunction with the view that as humans have a superior rationality (which can be mistaken for an anthropocentric view), so do all life forms have some degree of rationality. From these strong points, of harmonious order, maximal diversity and an intrinsic value based on the rationality of all beings, we can say that Plato was a proponent of biodiversity as the manifestation of the Form of Good and natural to our reality. When extended to policy choices however, it becomes more difficult to extrapolate principles beyond harmony and diversity, as the definition of a term such as 'harmonious' becomes highly debatable when applied to the complex interactions found between living beings.⁴⁵

Another notable point regarding Plato and biodiversity is the distinction he makes between the individual and population of a species, as he notes that the souls of individuals vary, and as such the inherent rational and intrinsic value of the individual varies and is no less important than that of the intrinsic value of a species (Pietarinen, 2004). This contention rests on the equating of rationality with intrinsic value, if such a view cannot be adopted than the less contentious position is that life contains rationality. It may be unfair to place Plato's views within any of the categories as it contains a degree and combination of all the mentioned approaches. Yet he stands alone as one of the most notable thinkers to put forth arguments for the intrinsic value of all life and biodiversity as a systematic effect of natural law. Plato himself expressed that all life contains degrees of rationality and goodness, which can be interpreted as intrinsic value. The normative ideals present in Plato's views are that of harmonious order and maximized diversity, offer an ideal of which to aspire.

3.2.11 Christianity

Another prominent Abrahamic view is that of Christianity which has been a foundation of western moral conceptualization. The popularity of this approach over the past two thousand years has played a large role in the development of ethical thought. However, in relatively recent times the anthropocentric views supported by it have come under increasing scrutiny as being unsustainable. By extension the anthropocentric and dominion aspects of Christian ecology have come under increased scrutiny. Debates exist on whether anthropocentrism remains justified in our time, it seems however that some of these are in a large part academic. As it may not be anthropocentrism itself which is pragmatically in question but rather what is done using anthropocentrism and dominion as justification.

Aspects of commonly referenced Christian scholar Thomas Aquinas, suggests that the debates pertaining to rationality and irrationality (therefore extending to the debates on dominion and stewardship) ignore the love that is a part of every beings relationship with the creator as expressed through the *duplex ordo*—of each beings empirical natural operation and divine goodness (Jenkins, 2008). Intrinsic value is inherent to God's creation as is the end of all things is an expression of extrinsic goodness. A summation of thought applying to biodiversity can be found in Aquinas' work here:

*"For God brought things into being in order to communicate the divine goodness to creatures and thus be represented by them. And because God's goodness could not be adequately represented by any single creature, God produced many and diverse creatures, that what one lacked in representing divine goodness might be supplied in another. For goodness, which exists in God simply and uniformly, exists in creatures multiply and distributively. Thus the whole universe together participates the divine goodness more perfectly."*⁴⁶

45 ST 1.47.1 Willis Jenkins' translation.

46 In Thai, "ชาติมนุษย์พิพาทชาติซาบ กุหลาบกนามทั้งสองทาง เบงระมายุ่สุน่กาง กลีบบานเพราะเหล่าดาวเรือง"

The Bible argues that each creation, as it is loved by God, should be loved by humans (Obrien, 2010). A re-evaluation of Christian environmental ethics offers examples which may extend towards new enlightened anthropocentric approach towards the human-biodiversity dynamic. The Jewish story of Noah's Ark is widely used in Christian teaching to promote biodiversity conservation also. St. Francis of Assisi (1181-1226 A.D.) is the patron saint of animals and the environment, and promoted a cosmocentric view of life and the universe, that is counter to the view of human dominion of nature.⁴⁷

3.2.12 Islam

It has been summarized that the Islamic view advocates 'a wider role for ethics at personal, social and environmental levels' (Ahmad, 2009). It is a broad ethical approach that is interpreted through the Qu'ran, which speaks of an approach which denotes a cosmological ecological balance composed of coherence and unity with connotations of a unique balance and harmony. Categorizing such views through classical philosophical interpretations of environmental ethics may offer hindrances that would not exist if such ethos were taken separately. Rather than look for classical notions of environmental ethics, the Islamic approach to biodiversity is one of an extension of personal holistic ethics. A holistic harmonic paradigm which places imperative a unification of all stakeholders in the environment while acknowledging a variety of social existence bonded through common ground. While such understanding is focused on the human ethics, it entails a cosmological balance from which ethics can be distilled. Biodiversity as a concept is not explicitly alluded to, most likely because the ideals of the Qu'ran precede the coinage of the term, but within the scripture the word and concept of earth is found 485 times, and water nearly 300. The dynamics of human-nature found in Islam is one of ethical balance, very similar to our common understanding of biodiversity.

3.3 Biodiversity in World Culture

Quantifying values which are esoteric or intuitive in quality is a challenge which is usually solved through using appropriate indicators. However, such concepts may be understood as highly subjective due to the inability to produce empirical evidence directly supporting the claims. Perhaps an appropriate method to judge the intrinsic aspects of biodiversity is through the inspirational value and effect it has on human creativity. Examples of biodiversity in literature, music and art in culture can be debated as having both instrumental and non-instrumental value. Inspirational aspects of biodiversity cross from aesthetic value to transformative value which may be deemed as instrumental, while the qualities of biodiversity which catalyze the inspiration may be thought of as intrinsic. Qualities which may be ascribed to biodiversity through interpretation of the creative output dedicated to it range from reverence to respect to love. This section serves as a bridge between abstract concepts of intuitively ascribed values and the following section on instrumental value, as culture surmises practical example of the intangible qualities of biodiversity and human well-being.

3.3.1 Biodiversity in World Literature

*"Therefore am I still
A lover of the meadows and the woods
And mountains; and of all that we behold
From this green earth; of all the mighty world
Of eye and ear, both what they half create,
And what perceive; well pleased to recognise
In nature and the language of the sense
The anchor of my purest thoughts, the nurse,
The guide, the guardian of my heart, and soul
Of all my moral being." (William Wordsworth, 1798)*

47 http://en.wikipedia.org/wiki/Francis_of_Assisi

Examples of the perceived worth of biodiversity and the natural world can be found in the works of literature produced by all cultures. From South-East Asia examples from Thailand, which is rich in species of flowers and plants, have been produced by poets admiring their beauty and describing various ways of using them. Adding to the diversity of plant life in Thailand are introduced species which were accepted into the culture such as Jasmine and Marigolds, the latter which was presented by the French to King Narai Maharaj. This acceptance was exemplified in the Niratthanthongdang, *The journey to ThanThongdang* which is a set of poems written by Prince Thammathibet that includes, “*Appearing beautiful Jasmine, on both sides there are roses, African Marigolds are blooming with Mexican Marigolds*”⁴⁸

In Thailand, there are various ways of poetic composition, a very well known one is called “Nirat”⁴⁹ Mostly Nirat are associated with a way of expressing the poet’s feeling of his beloved and/or when the poet is traveling or taking on a journey from place to places. Also in the sets of poems of the Journey to Thanthongdang, as the Prince travelled he described the living organisms he saw, with some poems including a numbers of wild animals such as leopard, Eld’s deer, mountain goat, python, fishing cat.⁵⁰

Another set of poems, the chronological Thai version of the Ramayana compiled by King Rama I, describes a diversity of flowers, Hibiscus, Butterfly pea, Monkey apple, Screw pine, Night Blooming Jasmine, and others in a poetic sense.⁵¹ Further themes related to biodiversity found in Thai literature include descriptions of the variety of poultry and poems describing the medicinal benefits of herbs.

Haiku is a Japanese poem composed in particular structure, and some describe and emphasise seasons and nature (McGee, 2009).

For instance, a famous piece of Matsuo Basho (Miyamori, 2002) is:

*“The Ancient pond
Frog jumps in
Sound of water”*⁵²

*A work of Ransetsu (Barnhill, 2004) is:
“Yellow and White Chrysanthemum;
Would that there were no other names”*⁵³

Western literature also includes a number of works that reveal both the knowledge of biodiversity and exalt its wonder. A clear example is one of the prestigious works by Ernest Hemingway, *The Old Man and the Sea*, as it has mentions various kinds of animals, tunas, sharks, sardines, dolphins, plankton.

The forms of animals in Arabic literature is often ascribe in fictions, poetry and folktales this can be found as Spanish poets compiled Arabic poems known as *Sherut-Tabia* or Poetry of Nature. In those pieces, frequently mentioned are the beauty of animals’ parts especially camels and horses.⁵⁴ Biodiversity had a great influence on poetry and literature during the time that such works were produced. Spain was considered as “Garden of the world” (Yahya, 2010).

3.3.2 Biodiversity in World Music

Music can impart a level of feeling beyond what we can write. Cultures that have a strong reverence for nature often produce music that imparts such feelings for biodiversity and the beauty and importance of the diversity of life within the natural world. Some of these can be used to help promote children’s awareness of biodiversity.⁵⁵

48 In Thai, “ชาติบุษบิพุทธชาติชาบ กุหลาบกนทงทั้งสองทาง เบงระมอดยี่สุน่กาง กลีบบานเพราเหล้าดาวเรือง”

49 <http://www1.mod.go.th/heritage/nation/nirat/nirat.htm>

50 <http://www1.mod.go.th/heritage/nation/nirat/tantong/tantong1.htm>

51 In Thai, “...ข้อตะแบกชาติบุษบิพุทธรา การะเกดกรณิการันมสวรรค์ มะลูลี มะลิลา แสงลงพัน อัญชันแอบช้อชบาบาน...”
รามเกียรติ์ : พระบาทสมเด็จพะพุทธยอดฟ้าจุฬาโลก ร.๑

52 In romanised Japanese: furuie ya/kawazu tobikomu/mizu no oto.

53 In romanised Japanese: Kigiku shiragiku Sonokoha no na wa Nakumo gana.

54 Camels were mentioned 160 times and horses 120 times.

55 For example, Chris McKhool , an educator and musician with an environmental concern and a focus on children as listeners can be found at his website <http://www.fiddlefire.com>

In Australia, music is an inexorable part of the way life experienced by aboriginal people. Aboriginal songs are used as a way to express knowledge, transcend generational gaps and impart their history to younger generations. Songs in various different dialects are composed with an essence of worshipping nature. They believed that every being has their own silent song. They orient themselves in a cosmology that includes dreamtime as a period of elevated consciousness as an integral aspect of knowledge. It is understood as connection to the time of creation which formed the natural world and all creatures. It is thought that everything wishes to be heard and sung as an expression of experience.

During the 1970s, Aboriginal music was used as a channel of expression for political concerns and social aspects of the Aborigines, including environmental protection. An Aboriginal band called “Blek Bala Mujik” also known as Black people’s music performed dances and traditional music; one of their famous songs is ‘Walking Together’ from which these lyrics regarding aborigine cosmology come from: *“A long time ago, the ancestors walked the earth. Creating the world we know. They made the trees, the plants and the animals. And Life was given to the land. This was the time of the dreaming. A very powerful and spiritual time. Today we live in a dream. This is our culture and traditions.”*

The most well-known instrument to be associated with Australian aborigine is the didgeridoo, originally made from termite hollowed bamboo or eucalyptus limbs. Such an instrument is said to have meditative and healing effects. The sound of the didgeridoo can be supplemented by rhythmic hand or body clapping foot, stomping and a variety of other traditional rhythm inducing instruments. Aboriginal ceremonies may honour nature.

Another aspect of music and biodiversity is the potential of using it as a tool to reach youth. As an environmental education device it can be extremely effective, not unlike how indigineous groups may use music to transmit oral histories, music can impart knowledge of biodiversity.⁵⁶

3.3.3 Biodiversity in World Art

Defining art is subject both to interpretation and the ever changing perception found within different periods of different cultures. Art may be understood through an objective aesthetic value or a subjective aesthetic value, and as with some post-modern art maybe no aesthetic value at all. Summarizing world art and nature is nearly impossible to do without constant qualification, due to the amount of different views contained and as the possibilities of conceptualization become exponential as exemplified by the endless philosophical debates on the topic of creation. In the Western world *“the evolution of aesthetic appreciation of nature has been intertwined with both the objectification of nature achieved by science and the subjectification of it rendered by art.”* (Carlson, 2000). In Europe Immanuel Kant provided significant thoughts on the topic, which consisted of balancing subjective and objective aspects of aesthetic appreciation. In the second half of the twentieth century a flood of philosophical works were released (Budd, 2002). The art, and discussions of it, has included novel views of art and nature which have extended into objective realms such as mathematics where concepts such as fractals and symmetry demonstrated in nature may give unique understanding of aesthetic value in relation to art. The idea of symmetry in patterns being a common aspect of both the design of nature and of human created art can be useful for synergistic understanding. It also adds a unique view of cultures such as Islam which purposely avoid using nature directly as inspiration, yet follow symmetrical patterns in art such as ornamental tiles in mosques (Field, 2009). Symmetry within biodiversity can be metaphorically understood as the balance of relationships which define it.

In the larger part of the world, a myriad of thought pervades the subject, and universal themes are limited to the inspiration that nature provides. Some views of post traditional art, contend that another universal theme, found even in selfless traditions such as Zuni Indians, Ch’an Monks, Hindus Chinese and Christian, is the unique individual egocentric artists who peak when fully attuned to nature and forgets tradition imposed cares, desires and moral imperatives (Scharfstein, 2009). Nature and biodiversity can be found in the defining imagery that is found within a number of world views such as the ‘Rainbow Snake’ by Australian aboriginals, the bamboo and rocks as portraits within Chinese art, the totems found in North America and countless others.

⁵⁶ One example of using termite mounds as models for sustainable buildings can be found here <http://www.biomimicryinstitute.org/case-studies/case-studies/architecture.html>

In contemporary times art has been used as a tool of raising awareness of biodiversity and also for investigating attitudes towards it. Architecture and biodiversity is another interesting area of practical art, themes of biomimicry have become more common as ideas of nature as a model for sustainability are being applied to development.⁵⁷

3.3.4 Biodiversity found in Ancient Cultures

Nature was ever present in the lives of almost all of the ancient cultures in the known history of humanity. The living diversity found in the environment around us has inspired almost everything we see today from science and technology to social science and economic theories. The importance of biodiversity has been ingrained in the human mindset and lifestyle since the ancient Mesopotamians (Sumarians, Babylonians, Israelites, Assyrians, and Persians) who looked at nature and different segments of ecology as their deities or the mediums for deities, and who in developing astrology, ascribed nature's beauty in the celestial planes. Indian and Chinese cultures evolved their life value systems and even their financial systems based upon their observations of biodiversity around them, from the animist Bedouins to largely anthropocentric Greeks and Romans, from Muslims who were used to not idolizing nature but at least respecting it, to Latin American pre-Colombian cultures revering each and every aspect of the ecology comparatively in its most objective sense, although as a sign of respect to a creation of the gods.

The ancient people, with all of their technological backwardness, understood that conservation of biodiversity was necessary to meet human needs, such as those for clean, consistent water flows; protection from floods and storms; and a stable climate. From Peru in the Central Andes the Wari Culture comes the tale of a father who told his son 1500 years ago stories of how our nature was the God who created us, who grows with us and how we need it to survive for our sake; this fable was imprinted on the millions of pottery pieces found by archaeologists today. Pre-Colombian people believed the Gods run this world impartially connecting the dots between numerous ecological cycles around us; again ceramic evidence exemplifies these ideas. Nature was their God. To survive, they needed it to prosper.

In southern Peru, near Puno, in Lake Titicaca, there are about 40 islands that didn't change much while their Incan and pre-Incan counterparts arose and fell. Some of them lived on what are named 'The Floating Islands of Uros';⁵⁸ building their homes on the totora reeds, completely disconnected from today's technologies and commercialism, except some tourism. They talk about the ecology of their lake with pride. They have struggled against numerous governments, from Incan to Spanish rule to recent Peruvian governments, adamant on protecting their 'mother' (the lake was called Mamacocha until very recently) from misuse.

Modern Archeology has pointed us to the fact that artists of coastal societies in Latin American cultures sometimes associated anthropomorphized birds with war and ritual activities. In Moche ceramic art (1-800 A.D.), raptors were portrayed as warriors handling shields, maces, and owls carried defeated warriors to the world of the dead, as they would carry their catch to the nest. Owls occasionally personify shamans or folk healers, whose power of curing supernatural illness is strengthened by the acute vision of the nocturnal birds. Ceramics point us to so many other aspects of ecological involvement in the lives of these people (Jackson, 2008).⁵⁹

For the Chimu culture (900-1470 AD), birds may be linked with prestige and abundance, appear in naturalistic form on ceramics and undergo various degrees of geometries on textiles and architectural drawings. In the urban capital of Chan Chan, the inner walls of palaces were decorated with adobe carvings representing different species of fish and sea birds, in which pelicans were dominant. Pelicans, which were thought to have the ability to dive into the watery world of the ancestors, were also decorated

57 The problems of indigenous Uru and Aymara people are discussed briefly on: http://www.wearewater.org/en/ancestral-culture-to-save-titicaca_5512

58 Margaret Ann Jackson (2008) discusses the Moche ceramic evidences in detail in her work, "Moche art and visual culture in ancient Peru".

59 Moore and Mackey, 2008, discuss the Chimu Empire. This practice of putting spondylus shell with the mummies was found with a lot pre-Colombian cultures because of the commonality of El Nino effect.

on objects such as fine vessels and wooden lithics. Sea birds, the emblems of fertility, were venerated in Chimu religion, where life revolved around the ocean. Spondylus shells were a sign of fertility and the power of kings. A lot of these spondylus shells were found on the excavated mummies of females in this region, decorating the dead with a philosophical continuum (Moore and Mackey, 2008)⁶⁰

In Nazca (100-700 AD) art, plants often sprout from the mouth of trophy heads, showing the strong connection between death and land's fertility for people living in a desiccated landscape. In Nazca religion, they highly valued plants, animals, and birds as participants in the regeneration of life. Many of the Nazca geoglyphs take the shape of birds in flight. New interpretations suggest that the location and orientation of geoglyphs are connected with geological faults and channels of underground water, which were exploited by Nazca agriculturalists. The connection between all the living beings is evident from this fact. These geoglyphs were also painted on ceramics and precious gold ornaments (Kusuta, 2004).

At Chavin de Huantar, the ceremonial temple of the Chavin civilisation (1000-500 B.C.), in the monuments and engraved stone slabs, architecture is decorated by complex creatures that include body parts of wild, carnivorous animals like snakes, felines, eagles, and vultures. The Estela Raimondi is adorned with the claws, fangs and hooked beaks of these animals. These remind us of reliefs found across South and South-Eastern Asia. A lot of these practices and philosophies are still present in the day to day lives of these people.

This respect and care for biodiversity is evident from other examples around the world. *"In ancient India, in general, Hindus have always believed that animals and people have rebirths. In other words, a human can be reincarnated as an animal, or vice versa. This means that all life forms are to be respected."*⁶¹ So, Hindus have always been polytheistic animists. For example, Ganesha has the head of an elephant and the body of a human. The example of cows having 32,000 gods in them shows their reverence towards nature.

It's not just the ancient people. Culture has drawn upon from nature and its diversity in all walks. In Belize, spirituality of the Garifuna people embodies this fact. In Gautamala, people are working hard towards protecting their worldviews, rights and belief systems into the communal land tilting in the national protected area system. Kaya forests in Kenya, sacred groves in India, taboo areas in Fiji as well as Venezuela, Brazil and Madagascar are some of the other locations where nature is very closely linked with the local cultures.⁶²

The markers are there for the historians, archaeologists and anthropologists to see all over the world. Every day they unearth new evidence, and dig ultimately, 'new', 'unknown' ideas that used to drive our ancestors to lead environmentally sensitive lives. A revival of these ideas today may help us to be more in touch with everything natural, and provide insights allowing us to re-evaluate the challenges we face.

3.3.5 Sacred Groves and Community Conservation of Biodiversity in North East India

Expressions of ecocentric culture, religion and lifestyle have been manifested in many indigenous societies throughout the world, for example in the aboriginal communities (First Nations) of Canada and the USA, among tribal communities in India, in Buddhist and Shinto traditions, and in certain practices and beliefs of many eastern religions like the Hinduism. These worldviews envision humans as "partners" or "participants" in nature rather than as master or even steward. This section will give some examples of the mechanisms used for biodiversity protection by the tribes living in the northeastern region of India.

Northeast India is one of the four biodiversity hotspots shared by India, the other being the Himalayas, the Western Ghats and Sri Lanka, and a small part of Sundaland. The northeastern region represents the

60 Information about involvement of other religions and regions can also be found here: <http://www.libraryindex.com/pages/2148/History-Human-Animal-Interaction-ancient-cultures-religions.html>

61 UNESCO Communications and Information Sector is working towards helping these people preserve their cultures in every sense of the word. <http://www.conservation.org/learn/culture/pages/overview.aspx>

62 See <http://www.precautionaryprinciple.eu>

meeting ground of the Indian, the Indo-Malayan and the Indo-Chinese biogeographic regions. Being an area of high rainfall, it supports lush green and diverse vegetation with many endemic species of orchids, rhododendrons, ferns, bamboos, canes, mosses, lichens and a variety of other species. The forests of Northeast India are home to a myriad of animal species including mammals, colourful birds, reptiles, amphibians, fish, insects and other invertebrates. Such biological diversity is almost equally matched by the cultural diversity of the region which is comprised of a multitude of tribal groups whom inhabit the plains and hills of this verdant frontier. Since time immemorial, these groups have lived in close harmony with the hills, forests and sparkling streams. Their life is intricately woven with nature, and this is reflected in their highly naturalistic worldview that embodies a host of beliefs and practices that serve as cultural tools of conservation. These beliefs and practices range from the maintenance of sacred groves to the worship of sacred streams and mountains, taboos on killing of particular animals or groups of animals in different seasons, or during certain life stages and the like.

3.3.5.1 Ecocentric Preservation Ethics: Sacred Groves

Perhaps the most significant of all conservation practices by the tribal groups in Northeast India is the preservation and maintenance of sizeable patches of forests as 'sacred groves'. All forms of vegetation in these sacred groves including trees, shrubs, climbers, orchids, ferns and herbs are accorded total protection. Even the removal of dead wood is taboo. Often these groves are under the protection of a presiding deity, and any violators of the rules of the grove are believed to incur the wrath of this deity. The most well-known of these groves are found in the picturesque hill state of Meghalaya. The sacred groves of Meghalaya are of three categories, namely, *Law Lyngdoh*, *Law Niam* and *Law Kyntang*. Of these, the *Law Lyngdohs* are under the control of a priest (*Lyngdoh*). In places where the traditional religion (*Niam trai*) holds sway, the groves are called *Law Niam*, and when these are under the control of a village headman, these are called *Law Kyntang*.

The sacred groves of Meghalaya serve as a rich repository of the original climax flora of the state that has been greatly disturbed and destroyed due to various anthropogenic activities. They are in fact the last refuges of the forest flora and its associated fauna. Many plants no longer found in the disturbed forests of the state are still encountered in the sacred groves. Seventy nine such groves have been recorded so far in the state of Meghalaya, varying in size from 1 to 550 hectares. Unfortunately, anthropocentric values manifested as greed have failed to respect the sanctity of these groves at present, and only a handful can now be considered as totally undisturbed. These groves still cover a total area of about 10,000 hectares.

Many sacred groves of Meghalaya are located in strategic places in the catchments of major rivers and streams and play a vital role in recharging these ecosystems. For instance, the numerous streams and streamlets flowing through the city of Shillong mostly originate from the *Lum Shyllong* sacred grove along the Laitkor ridge. This sacred grove is also the abode of *U Blei Shyllong*, the presiding God of the Shillong hills. Another important sacred grove is located on the slopes flanking the Myntdu River near Jowai, the district headquarters of Jaintia Hills district. The vegetative mass of the groves retains water and soaks it up like a sponge during wet periods. Water thus stored is then released slowly in times of drought. Furthermore, transpiration from the vegetation increases atmospheric humidity, thereby producing a more favourable temperature-moisture regime for many organisms including animals. The most well-known and perhaps the richest among the sacred groves of Meghalaya in floral diversity are the *Mawphlang* sacred grove near Mawphlang, a small township about 40 km from Shillong, and the *Mawlongsyiem* sacred grove near Cherrapunjee that houses the Mawsmi Cave, a popular tourist spot. The dense forests of both these groves still hold the boundless gifts of nature that have been subject to mindless plunder elsewhere. At least 50 endangered and rare species of plants have been recorded in the sacred groves of Meghalaya by the biologists (Dutta, 1986; Syngai, 1999).

The sacred groves are intricately linked with the traditional culture of the Khasi and Jaintia people. Many rites and rituals of the traditional religion are practiced inside or beside the sacred groves. Even among other tribes, particular species are required for a specific ritual. For instance, the Dimasa tribe that inhabits the North Cachar Hills and Cachar districts of Assam, requires specific varieties of bamboo to perform many rituals in sacred groves called *Madaico*. They also maintain a separate banana plant in their homestead garden and the leaves, flowers and fruits of that plant are used only for performing rituals whenever required.

Besides Khasi and Jaintia Hills, the Garo Hills also has many sacred groves, although their size is much smaller than those found in the former areas. They often consist of small clusters of trees protected by the local community. Similar groves, mostly associated with various deities are also found in Manipur and parts of Assam. It is estimated that Assam has around 40 sacred groves while Manipur has around 365. Tree species like *Phoebe hainsiana* (vulnerable), *Rhus hookeri* (endangered) and *Flacourtia cataphracta* (endangered) have been found to be well-represented in two sacred groves of Manipur valley. The last mentioned species is also found in some sacred groves of Cachar district, Assam. The sacred groves are also of great importance from the point of view of forestry as ecologically valuable species like *Albizia lebbek* and *Ficus glomerata* found in many sacred groves of Assam and Manipur are known to conserve high amount of nitrogen, phosphorus, magnesium and calcium in their leaves.

It may be contended as being obvious that the conservation of sacred groves is essential for maintaining the local or regional biodiversity, the comprehensive health of a landscape, and for preserving the socio-cultural integrity of local communities. It is fair to suggest that the groves provide far greater benefits than their small size would otherwise indicate.

3.3.5.2 Adaptability of Ecocentric Preservation Ethics

An interesting example of traditional conservation by the communities is provided by the small sacred groves in the tea garden areas of Assam. These groves are called 'thans', which are associated with various presiding deities, including Lord Shiva in the form of *Dih Baba*, *Bhakat Baba*, *Mahadev* and others. Many *thans* offer total protection to plants and animals found therein. Any visitor to the than has to open his or her shoes before entering, and are advised not to harbour evil thoughts in their minds while inside the than. The tea garden labour community that protects and maintains these thans originally came from Central and South India. In their original homeland, they used to maintain sacred groves called *Jaherthans*. While these hapless labourers were lured to work in the tea gardens, they carried with them the time-honoured tradition of a harmonious existence with nature even in the face of untold miseries, starvation, torture and back-breaking labour, and nurtured their naturalistic, ecocentric identity by erecting *thans* in their new homeland.

3.3.5.3 Congruency of Ecocentric and Anthropocentric Value Ethics: Safety and Supply Forests

Besides the sacred groves, safety and supply forests comprise another important mechanism for conservation of valuable environmental resources. In Mizoram, the land use system at the village level is divided into two distinct categories: 'supply forests' from which only regulated harvest of biomass is permitted, and the 'sacred safety forests' from which removal of biomass is strictly prohibited. In many northeastern states like Manipur and Mizoram the once extensive network of sacred groves was largely destroyed in the 1950s as a result of the development of transport network and a lucrative market for timber coupled with conversion to Christianity, and accompanying anthropocentric value ethics, especially in Mizoram. In those areas where shifting cultivation prevailed, some of the sacred groves encircling the settlements served as firebreaks during the slash and burn operations. In several villages inhabited by the Gangte tribals in the Churachandpur district of Manipur, the traditional practice of conservation of forests has been revived by the community. As the community has since embraced Christianity, the groves no longer serve a religious function, but are used as 'forest reserves', and serve as an example of ecocentric preservation values without an aspect of spiritual necessity. However, their original name "Gamkhal" persists till today.

Similarly in Mizoram, the Mizo tribes have a system of keeping safety reserves around the habitation to prevent intrusion of fire during burning for shifting cultivation. Several other tribes and sub-tribes such as Dimasa, Pnar, Hmar, Changsen, Vaiphei, Debbarman, Hrankhawl, Zeme, and Meiteis in Assam, Mizoram, Nagaland and Manipur maintain such community reserve or supply forests, where extraction on a sustainable basis is allowed with the permission of the headman (chief) and community elders. Thus in spite of sacred groves having lost their religious significance in many areas, the village headman with the concurrence of the village council has protected patches of forests wherefrom a limited extraction of timber is permitted. All the families in the village share the extracted timber. However, removal of dead biomass from these reserve forests is still strictly prohibited. This helps in maintaining soil fertility through nutrients released from it. Therefore, this practice has a conservatory role. Further, the very old

trees are usually cut down so that regeneration in these gaps helps in maintaining the stability of these forests. After removal of the older trees, revegetation using seeds from the forest is done by the villagers.

3.3.5.4 Conservation-oriented lifestyles and beliefs

A conservationist philosophy is often the essence of the lifestyle and beliefs of many indigenous Northeast Indian societies. For instance, the Nagas believe that destruction of forests in close proximity to villages will bring a loss of prosperity and disease outbreak. There is also a widespread taboo on hunting during the mating season of animals. Hunters belonging to several communities in Cachar, Assam, do not kill deer during March-May, when pregnant females are present in the herd. Most of these hunters also observe a taboo on killing the leader of deer herd or a sounder of wild boar, as it is believed to be bestowed with supernatural powers, and hence killing it is considered a sin. Again, although many people eat herons and egrets, hunting is banned during the nesting season, and their nests, which are common sights on the bamboo groves of most villages, are never disturbed.

Table 1: Conservation-oriented taboos in tribes and other ethnic groups of Northeastern India

Animal(s) Protected Through Taboo	Tribe/Ethnic Group	State in N.E. India
Deer, wild boar, and other animals in mating season; pregnant females and young animals; leader of a group of deer/wild boar.	Various tea garden communities, Hrankhawl, Hmar and Debbarman tribes	Assam, Tripura, Mizoram
Elephant, Tiger, Monkey, Owl, Vulture, House Crow, Raven	Various tea garden communities	Assam
Elephant, Song birds, certain snakes	Hrankhawl	Assam, Tripura
Monkey, Otter	Pnar	Assam, Meghalaya
Elephant, Eagle, Parrot, Hill Mayna	Dimasa	Assam
Hoolock Gibbon, Tiger, Python, Wild Goat, Bulbul (bird), Frog	Rongmai naga	Assam, Manipur
Tortoise, Snail, <i>Channa morulius</i> (fish), Small eel, Some catfishes, Snakes, reed	Ningthouja clan of Meitei	Manipur, Assam
Egg and meat of all animals, some catfishes, small eel, <i>Channa morulius</i> , Snail, simul cotton seed, snake	Khuman clan of Meitei	Manipur, Assam
Field rat	Khabanganba clan	Manipur, Assam
Sparrow, buffalo	Moirang clan	Manipur, Assam
Parrot, Owl, Elephant, Monkey, Jackal	Muslim trapper	Assam
Sparrow, Jackal, Crow, Eagle, Vulture	Muslim nomad	Assam
Monkey, Elephant, Songbirds	Muslim nomad	Assam
All poisonous and non-poisonous snakes	Worshippers of Goddess 'Manasa'	Assam
Herons, Egrets, and Cormorants in heronries during mating/nesting season	Most communities in valley areas	Assam
White goat	Angom clan of Meitei	Manipur, Assam

Source: Gupta and Guha (2002)

The killing of certain animals is taboo among certain groups. For instance, several ethnic groups in Cachar, Assam, who practice hunting, do not kill the crow, the owl, the vulture, the elephant and certain snakes, while a group of Muslim trappers do not trap or kill the parrot, the owl, the monkey and the jackal. Members of the Ramo tribe in Arunachal Pradesh do not eat or kill tigers, because they consider tigers as their brother, while the Tagins (another tribe in the same state) eat tigers. In the Meitei tribe of Manipur, the different clans have a number of totems forbidden from touching or eating. For example, the taboo-objects of the Ningthouja clan are reed and tortoise, of the Khuman clan the snake and the

simul cotton seed, of the Moirang clan a buffalo, and of the Angom clan a white goat. Again, within a clan, certain lineages may have specific taboos. For instance, pumpkin (*Cucurbita moschata*) is a taboo for all the members of the Salam lineage. Such lifestyle-based taboos of various ethnic groups in parts of Northeastern India are provided in Table 1 (Gupta and Guha, 2002).

Further examples of practical conservation ideals found within tribal groups include the Pnar or Jaintia tribe of Meghalaya and Assam grow betel vines through a system they call *Pan-Jhum*. As the betel climbers require trees for support, the *pan-jhum* systems conserve the trees and are consequently rich in biodiversity. Another case is the Naga's practice of jhum cultivation in association with alder (*alnus nepalensis*) trees. These trees can fix atmospheric nitrogen into the soil and are therefore, useful in maintaining soil fertility in the jhum fields.

3.3.5.5 Anthropocentric vs. Ecocentric Conservation: Intrinsic Values

Recognition of intrinsic or inherent value in both living and non-living non-humans is also a characteristic feature of indigenous or "tribal" religious and spiritual belief systems throughout India. It has often been suggested that ecosystem considering people such as tribes maintain sacred groves and exhibit other mechanisms of protection of nature mainly because they tend to be prudent in their resource use. Consequently, they sacrifice some of their immediate benefits to ensure greater benefits to accrue at a later date. Such behaviours are, therefore, believed to signify the society's recognition of the "bequest value" of the elements of biodiversity or nature as a whole (Gadgil and Guha, 1992; Gadgil, 1995).

In the language of normative ethics, therefore, the actors displaying such prudence assign only instrumental value to non-humans, and consequently, are governed by the principles of direct or indirect reciprocity. However, people worshipping nature in sacred groves or through tree or animal worship, cannot be said to assign only extrinsic value to the objects they revere, and therefore, there is something more in this relationship than mere expectation of some reward at a later date (Gupta, 2006). Kellert (1996) has suggested that altruistic acts towards non-humans in many indigenous cultures are often motivated by "sentiments of affinity" and not calculated empiricism. Deb and Malhotra (2001) have shown that the tribals of West Bengal, India, hold as sacred a tree (*Adina cordifolia*) and a shrub (*Euphorbia neriifolia*), which have no direct use values. Similarly, the sparrow, the jackal, the tiger, various species of songbirds, and various species of snakes are held sacred in many indigenous cultures of Assam, Manipur and Tripura (Gupta and Guha, 2002). Such sentiments and beliefs could perhaps be explained by the concept of 'biophilia', a term originally proposed by Fromm (1973) as love for all living beings. It has been subsequently defined as "the innately emotional affiliation of human beings to other living organisms" (Kellert and Wilson, 1993). Many cultures, exemplified by the Meiteis of Manipur and Assam, North East India, go beyond biophilia to 'ecophilia' or 'cosmophilia' through the practice of 'Chingoiron'—the worship of hills—and 'Nungoiron'—the worship of rocks (Singh *et al.*, 2003). In Korean shamanism, deities could exist, besides other places, in the trees, the ground, the rocks, the spring, the river, and the sea (Rhi, 1993).

3.3.5.6 Community Conservation Today

Recognizing the role of communities in offering protection to biodiversity in India, the Indian Wildlife Protection Act, 1972, was suitably amended in 2002 to allow the creation of community protected areas, some of which also serve as valuable corridors that provide link between protected areas like national parks and wildlife sanctuaries. These community protected areas come in two categories, viz., "Community Reserves" and "Conservation Reserves". Four of the former and eighteen of the latter are known to exist, with another seven being proposed.⁶³

3.4. Instrumental Value of Biodiversity

This section is focused on clearly establishing the instrumental value that biodiversity has, and the ethical considerations that are formed because of that value. The utilitarian benefits of ecosystems are well documented, however regarding biodiversity, there is room to establish value that is perhaps not already considered. This section looks at the ecosphere as a whole, biodiversity's role in ecosystem services, the roles and value of biodiversity in science, the economic aspects of biodiversity, and the

63 Protected Area Update, Vol XIV, No. 6, December 2008 [<http://www.indianjungles.com/pa76.htm#cr>]

necessity of maintaining biodiversity. Recognizing the role biodiversity plays in ecosystems is paramount in establishing the link to the instrumental value of biodiversity and will be the aim of this chapter.

The ethical considerations that follow the instrumental value of biodiversity are the most straightforward and easily identifiable of those discussed in this report. The ethical questions that arise when the instrumental value is analyzed are the most pertinent to policy. As with any utilitarian theory, the question of delayed gratification is at the forefront, in this case the concerns are not for our own best interest but those of our children and children's children. What we do now regarding biodiversity, and consequently ecosystem services, will directly impact what remains of them for our descendants. The question is of what responsibility we have to future generations, as well as our own. One of the clearest and most established principles that takes into consideration the ethical responsibilities towards future generations is the precautionary principle.⁶⁴

In continuing with the theme of this report, value and its perception are at the forefront of this chapter. And continuing again with the theme of shifting value consideration beyond basic economic demand value towards at least other human centered values, such as the necessary, transformative and aesthetic values that biodiversity carries with it.

3.4.1 Biodiversity and Human Wellbeing

"We must recognize the right of future generations to inherit, as we have, a planet thriving with life, and that continues to afford opportunities to reap the economic, cultural and spiritual benefits of nature." (Diversity, Global Biodiversity Outlook 2, 2006).

While the considerations for how biodiversity affects human wellbeing are many, those of a utilitarian or instrumental value revolve in a large part around ecosystem services. These services are the basis on which every economy depends (Alcom, 2003). This indirectly and directly affects the livelihoods of many of every population. In addition to the economic considerations ecosystems provide spiritual, educational and recreational, among other non-material benefits to people. Moreover though, humans cannot dispense with ecosystem services and live healthily (WHO, 2005), and if biodiversity plays a role in the functioning of these services, it is not due to the state that human wellbeing is largely dependent on biodiversity.

The profile of biodiversity's role in ecosystem functioning has been raised over the last decade, and has attracted considerably more research than the previous period. Establishing with quantitative evidence the importance biodiversity plays in the reliable and sustainable functioning of the services that humans rely on has been made easier during the past decade. These advances in measurement are invaluable in valuing biodiversity, and better understanding its part in the complex processes that make up ecosystems and ecosystem services.

The life supporting functions of ecosystem services include air and water purification, mitigation of droughts and floods, generation and preservation of soils, pollination of crops and natural vegetation, dispersal of seeds, cycling and movement of nutrients, protection of coastal shores, protection from UV rays, partial stabilization of the climate and the moderation of weather extremes and their impacts (Ehrlich et al., 1981). This is in addition to the economic factors of ecosystem goods which indirectly affects people. The economic factors are discussed in the relevant section later in this chapter.⁶⁵

The role of biodiversity in ecosystem functioning and ecosystem services is apparent, but difficult to quantify. The increased efforts towards researching such links have produced results that show in some cases differing states of biodiversity, considered as species richness and evenness and accompanying variance of species traits, does alter ecosystem functioning. Here is an overview of the ways in which alterations of biodiversity affect ecosystem functioning; firstly these effects are more prominent in low species density ecosystems, which itself hints at the stabilizing effects of a species rich ecosystem.

64 See Section 3.4.3.

65 For a more complete overview of the analysis of data, see Chapin III et al. (2004).

However the correlation is not absolute in all ecosystems or relationships. In ecosystems with species that have strong effects, usually through mediating energy or material flux or altering abiotic conditions, species richness plays a smaller part in ecosystem processes.⁶⁶ Many other factors and relationships can be found in the data, some tend to suggest biodiversity playing a part, others less so or are inconclusive and there remains a need for further research into the question.

However, both ethically and theoretically the most important argument to consider in the debate is that since we rarely know, empirically, which species play which roles in maintaining the functioning of the ecosystem, protecting biodiversity is important as we don't know which species can be removed before critical damage occurs to the processes. Ethically, it should be noted that humans have by far the strongest effect on ecosystems, and consequently human activities influence the relative abundance of species more frequently than the absence or presence of a species. How much we can alter these systems before they fail remains unclear and ethically, how should we act not knowing that answer?

3.4.2 Biodiversity's Scientific Value

Biodiversity is not only the source of replicable processes but is a source of inspiration to human beings. The relationship between humans and the environment, whether framed as energy flow, information exchange or in moral terms acts as the most influential aspect of our awareness of our place in the universe. As our understanding now includes science as a pillar, analyzing the dynamics between biodiversity and its contributions to humans is a telling description of how interconnected we are. Bio-mimicry is the source of inspiration in science, as also is humankind's desire to adapt to, and sometimes overcome, our environment.

3.4.2.1 Biomedicine, Research and Biomimicry

Animals, plants and microbes and the biochemical reactions found in nature, directly and indirectly support human health and understanding. Plants and microbes are a critical part of modern medicine, which can trace its roots to them and to the current medical advances made through learning of cellular process of other species. Biodiversity is inexorably important to medicine both in developed and underdeveloped areas of the world, as Traditional plant and animal derived medicines remain the primary sources of healthcare for some 80 per cent of the world's population (Farnsworth, 1985). 57 per cent of the 150 most prescribed drugs have their origins in biodiversity (Grifo, 1997).

Only some of the vast reservoir that is biodiversity's genetic resources has been researched, only 5000 plants have undergone the scientific process to identify potential chemical biochemical benefits, while over 20,000 plants are used in natural medicine around the world (Leveque, 2003). Thusly preserving biodiversity is supported by the argument of it acting as a potential depository of human benefitting substances yet to be fully understood.

Bio-mimicry, or mimicking natural biological structure, is another aspect of biodiversity which from an anthropocentric point of view may provide us with greatly beneficial innovations. Bio-mimicry relies on naturally designed and adapted order which often provides highly sustainable solutions to problems of innovation. The link between biodiversity and agriculture is similar to that of biodiversity and medicine, there is a massive depository of potential information that has yet to fully incorporated, and should biodiversity decline, so will our opportunity to learn.⁶⁷ Ethically, the precautionary principle is applicable with genetic resources, as we consider the potential harm done to future generations by present actions such as allowing genetic resources to become diminished, and with it their chance to learn and harness its potential.⁶⁸

66 Projects such as those found at <http://www.asknature.org/> provide examples of bio-mimicry.

67 See: <http://unesdoc.unesco.org/images/0013/001395/139578e.pdf>

68 See <http://www.cbd.int/decision/cop/?id=11037>

3.4.2.2 Genes and Biotechnology

Genetic material that is considered a genetic resource is the material that may have value instrumentally, often economically. Biodiversity contains the widest amount of potential resources. All species from microbes to humans share a core of about 500 genes which are universal to all living things and mediates such basic functions as DNA replication, the production of proteins from RNA, metabolism, electron transport, and the synthesis of the compound ATP, the energy currency for all life on this planet (Chivian, 2003). With such a universal condition, the potential for extrapolating genetic information which may have beneficial uses to humans from any species is created. Such a condition also adds to the argument for preserving biodiversity from an anthropocentric point of view, as a correlation between biodiversity and potential genetic resources.

The dynamic between humans and biodiversity has been one of co-evolution, as each affects the other. In the human controlled arena, breeding has entered a phase moving towards practices which limits genetic diversity, such as standardised breeds, varieties, lines and even clones (Leveque, 2003). One principle which is synonymous with biodiversity is that of maximum long-term genetic diversity. However, there exists an ever complicated balance between protecting endangered breeds against improving the dominant breeds and variations. Management of genetic diversity is gaining new levels of importance as a result of the reality of declining diversity and potential for further declines.

In the broader arena of the 'natural environment', co-evolution processes are also indirectly affected by humans. In a relatively recent development in scientific research it is now understood that if *"the impact of human activities has the effect of accelerating the rhythm of change, then living organisms will find themselves in a perpetual race to exploit their mutator genes"* (Leveque, 2003). Aiding those species to exploit those genes will aid in the maximum long-term genetic diversity, and is a way in which humans can positively affect biodiversity. It is also beneficial in the short term to implement such ideals as it can create a windfall of potential genetic resource that may aid biotechnology in developing new products and therapies.

The ethical considerations associated with genes, biotechnology and biodiversity are numerous, and there are many books written about these for several decades (Macer, 1990). Genetic manipulation may affect wider populations and have long ranging effects on the socio-economic relationship between humans and affected species, especially in developing regions. Progressing with a clear understanding of the risks is paramount when looking at policy options.

3.4.2.3 Food Production

Biodiversity and food production interact on several levels. Biodiversity has been focused upon as an integral component of sustainable methods to maintain adequate food supplies in developing regions, as well as part of schemes to overcome the current anthropocentric capitalistic derived agro-system. Biodiversity affects agriculture and food production in many ways, from providing genetic resources for adaptation to acting as a stabilizing influence maintaining soil and ecological integrity. Biodiversity acts as a form of insurance for agriculture by helping to ensure that crops can adapt to future environments (Lavery, 2008). In a proposed framework for a cross-cutting initiative on biodiversity for food and nutrition from COP8 Decision VIII/23, it is recognized that biodiversity is essential to food security and nutrition. That decision concluded that current knowledge recognizes that promoting methods of sustainability using biodiversity *"would counteract the simplification of diets, agricultural systems and ecosystems, and the erosion of food cultures"*⁶⁹

In relation to the Millennium Development Goals which connect to COP8 Decision VIII/23, is the FAO's development of an indicator list related to nutrition and biodiversity. The FAO noted that, *"Many factors are known to affect the nutrient content of foods, including climate, geography and geochemistry,*

69 Though economics is mainly concerned with the individual's production, exchange and consumption of wealth, economic rationales can be used to understand a variety of other disciplines. In this case, the section explores how economic value can often replace environmental values. Economics "explains phenomena as consequences of individual choices" (Stanford Encyclopedia of Philosophy, 2010). On the other hand, Aristotle links economics to humans and their pursuit of wealth (in Ross, 1980).

agricultural practices such as fertilization, and the genetic makeup of the species and subspecies” (FAO, 2008). Discrepancy in nutrients between varieties of the same species, sometimes a hundred and thousand fold difference (Englberger, 2003) have been found, and as a result a better system for categorizing nutrition is needed and the effects biodiversity can have on it is needed.

3.4.3 Economic Views of Biodiversity

Economic thought conceptualizes the ethics of biodiversity conservation by yet another perspective. Economic actions of groups depend upon their moral philosophy, however as a generalization, economic motives guide the decisions of humans in many of their interactions with the environment. Economics is the preeminent viewpoint behind the adoption of many policies that affect biodiversity, surpassing environmental and religious considerations. In the modern era, economic values have replaced other traditional notions of morality towards nature. The economic view is one important alternative viewpoint, especially important in light of the fact that economic analyses are often prioritized when states, companies, groups and individuals make environmental management decisions. This view informs the approaches and worldviews used in modern-day bioethical decision-making.

This section presents the predominant economic views useful to understanding the ethics of biodiversity, the economic justification for ethical decisions, and it discusses the tension between ethical arguments for biodiversity management and economically favourable decisions. The moral relationship between individuals and biodiversity is no doubt mediated by economic considerations. Thus, discussion of the economic viewpoint is critical to understanding the ethics of biodiversity.

3.4.3.1 Assigning Economic Value to Biodiversity

The economics viewpoint assumes that human beings are inherently rational and that each individual is profit-seeking in economic transactions. Economics, in this case, would be concerned with the production, exchange and consumption of biodiversity as a *commodity*—the economic view can be powerful to understanding dilemmas faced in the management of biodiversity.⁷⁰ Biodiversity can have direct “consumption” value, as humans derive immediate benefit from the use the natural environment (as for example the farming of animal species for food). Biodiversity can also have indirect value when it is valued in monetary terms.

Several economists have argued that individuals seek to maximize their own happiness (Jevons, 1871; Samuelson, 1947). Others have also argued that individuals, rather, seek to maximize their level of *welfare*—or well-being—and that societies seek to increase their collective welfare. Pareto (1909) instead focused on individuals’ needs, which he argued could be ranked as a set of competing alternatives, with individuals choosing among a set of alternatives when they make economic decisions. All human needs can be ranked according to its subjective value to individuals. The condition of being *Pareto Optimal* means superior efficiency in satisfying society’s needs (Pareto 1909; Adler, 2000). As a variation to this, Arrow (1962) argued that free markets could allow all interests to become optimal. The individual is the fundamental unit of analysis, but decisions do not consider concerns external to humans, such as the environmental impact to the environment. Loss of species is important when it becomes a concern to humans.⁷¹ Taken generally, the economic view has been mostly concerned with discussions of how to maximize *human welfare*, and this is an anthropocentric viewpoint that has generally placed human concerns at the center of ethical thinking towards biodiversity.

Echoing this notion, the CBD acknowledged the conventional value placed on “ecosystem services and how it contributes to human well-being” (Convention on Biological Diversity, 2010). In the context of making decisions with concern to biodiversity, it is worth noting that the economic viewpoint has

70 According to the Pareto condition, an environmental project could be undertaken if it makes at least one individual better off without having negative effect on another individual. The preference of individuals is the most important unit of analysis. This economic view offers insights into the way individuals and groups negotiate environmental decisions.

71 For more financial estimates, see: <http://www.cbd.int/financial/ecobenefit.shtml>

generally prioritized human welfare as a value and objective. Economic views have translated the threat of biodiversity loss and the value of preservation into monetary and welfare implications for human beings. (For further discussion on human well-being, see section 3.3.1)

Economists have made estimates of the monetary value of biodiversity. Constanza et al. (1997) estimated the economic value of the biosphere to be between USD16 - 54 trillion (in comparison to the total GDP of USD18 trillion per year). That report made calculations based upon the known value of 17 ecosystem services for 16 biomes. "Ecosystem services," including gas regulation, climate regulation, soil formation and pollination are among other important processes. The authors argued for the value of biodiversity, reckoning that there are measurable economic benefits to biodiversity.⁷² They proposed that "economies of the Earth would grind to a halt without the services of ecological life-support systems." Information on the importance of ecological resources is not complete, thus it is difficult to fully quantify the value of ecosystems.

A World Bank (2004) report, *How Much is an Ecosystem Worth?*, proposed that the value of biodiversity can be more effectively estimated when using the cost-benefit method. The paper proposes that environmental costs can be more easily quantifiable when it is related to human benefit. Constanza et al. (1997) discuss the existence of "ecosystem services," because biodiversity offers value to humans because they perform ecosystem functions that are absolutely crucial for survival. The regulation of atmospheric chemical composition, for example, is vital for human life. Human welfare would be significantly affected by changes in the natural environment. The authors also cite the fact that the value of ecosystem services is not predictable. It does not rise linearly. After a threshold level, the cost to replace an "ecosystem service" could increase dramatically. Additionally, natural resources are related to each other. Climate change does result in the loss of biodiversity of some plant and animal species.

3.4.3.2 Loss of Biodiversity as a Negative Externality

Early economists viewed the degradation of the natural environment as a problem to the extent that it could be a "resource constraint" to production. As such, it was considered as an impediment to economic growth (Malthus, 1809). Malthus was concerned with the limits of growth, yet differently from the then more modern concerns of sustainable development. Mill (1857, in Spash, 1999) firstly noted that economic growth could be constrained by the diminishment of non-renewable resources. Economic growth could threaten natural ecosystems, which in turn affect humans adversely. Have humans exploited the environment because they are entitled to its use, as an economic resource and nothing else? Modern economic systems do not always account for the destruction and loss of biodiversity in notion of development. Measures of growth and success in modern capitalism do not capture the adverse effects of industrialization on species loss and biological change.

Economic activities can produce unintended effects on society, which can be positive or negative to the welfare of individuals. "Externalities" are not reflected in the costs of the goods and services exchanged. A negative externality is viewed as a "side-effect" of economic activity. Industrial production does not account for environmental damage for this reason—because the economic calculus does not require the inclusion of costs to nature. Firms seek to maximize their profits, with both "benefits" and "costs" being in monetary units. One can consider the existence of *positive externalities* from diminishing biodiversity, such as the increase of an economically valuable animal species due to its overpopulation.

The economic view certainly places human needs and concerns at the forefront of environmental decisions. The global economy is the most important reality in which individuals and businesses interact. Any loss of biodiversity can be considered as an adverse and unintended result of development. Yet the fact that the externality is significant because it is a kind of welfare loss borne by society and its members is conceptually important. In other words it is saying that the risk to humans is more important than the threat to ecological diversity.

72 There are many dimensions of the interaction between economic activity and biodiversity. One indirect relationship is the population growth and industrialization of economies as contributing to the extinction rate of species (Kellert and Wilson, 1993; Pimentel et al., 1997).

3.4.3.3 Assessing the Costs of Declining Biodiversity

The economic view places much attention on costs and benefits, with cost-benefit analyses being an important decision-making tool. The prospect of ecological crisis places a cost on environmental conservation, bringing it into common consciousness. The Paley Report (1952), an environmental paper, was the first to promote cost-benefit analyses in economic decisions. The cost and benefit of resource depletion could be modeled mathematically to aid decision-making.

The loss of biodiversity has important social implications. There are certainly economic costs to fighting global pandemics, to the aftermath of climate change, to the agricultural industry, forestry industries, and to preserving cultural heritage. Both direct and indirect, biodiversity can hold economic value. The development of new pharmaceutical drugs, finding synthetic replacements for plants and microbes that were formerly found naturally in ecosystems requires rich ecologies, all of which necessitate biodiversity. The commercial value of biodiversity factors largely into the ecotourism industry, for instance (as discussed in section 3.3.3.2). It is also possible that invaluable natural resources cannot be attached to a monetary cost, nor can they be replaced when depleted. The negative externalities of biodiversity, considered in terms of their immeasurable value, are not easily attached to an economic cost. This is closely tied to the idea of the *intrinsic value of diversity*, as mentioned in section 3.2. The dangers of losing biodiversity to human life, together with ethical implications, have been mentioned in other sections. Economic models of biodiversity management do not always capture these costs.⁷³

Furthermore, the future value of biodiversity is not easily predicted. In cost-benefit analyses, a discount rate is often applied. A “discount rate”, similar to an interest rate, allows economists to assess a commodity’s value in the present time, factoring in its projected future value (Baumol, 1968). The opportunity cost (welfare foregone) to postpone exploiting the benefit of the commodity is part of assessment of future value. If the cost-benefit is miscalculated, a misallocation of resources can result. Yet, Kapp (1970) proposes that environmental degradation cannot be assessed an economic value, because we cannot assign costs and benefits to environmental resources; the “commodity” cannot be compared quantitatively. While conserving biodiversity is an expensive public undertaking, the costs of a lack of management today could be seen to outweigh the future costs of species loss. Costanza (1997) proposes that one method of conceptualizing biodiversity’s value is to project the costs required to replicate those services. From producing an artificial biosphere to replicating the smallest of microorganisms, economic capital alone cannot replace natural biodiversity.

3.4.3.4 Issues of Equitable Use

Through benefit-sharing, stakeholders have equity in the use of ecological resources. When loss of biodiversity occurs, those who lose from the environmental situation can be compensated in various ways. Some may be compensated for a loss through economic redistribution (and this is notable, because it is not environmental redistribution). When nations discuss environmental justice, it is not surprising that economic compensation enters the discussion. “Losers” in the environmental situation are compensated, often, in economic terms, not necessarily considering or valuating the irreparable and non-measurable losses. When biodiversity is irreplaceable, the estimation of economic costs becomes even more problematic. One cannot always assign economic costs to nature, nor replace the “good” that is the commodity of natural biodiversity.

When states and firms compensate for ecological degradation in monetary terms, this raises questions of the fairness of redistribution. Can economic redistribution truly compensate for the effects of environmental losses? Adler and Posner (2006) suppose that environmental laws “rarely, if ever, provide for compensation of the losers”, but in fact they do not adequately tax those who effect the environment adversely. Instead, environmental externalities are not always accounted for. Aside from the compensation to humans whose livelihoods have been affected, how are ecologies compensated? Other species are not considered as stakeholders within an economic system.

73 The principles of ecotourism according to The International Ecotourism Society minimize impact; build environmental and cultural awareness and respect; provide positive experiences for both visitors and hosts; provide direct financial benefits for conservation; provide financial benefits and empowerment for local people; raise sensitivity to host countries’ political, environmental, and social climate. (see <http://www.ecotourism.org>).

3.4.4 Ecotourism

*Ecotourism is responsible travel to natural areas that conserves the environment and improves the well-being of local people. [It is] about uniting conservation, communities and sustainable travel.*⁷⁴

Acceptable ethical behaviour in tourism settings is a function of how governments, tourists, operators, and local community feel and act about each other and towards the resources bases, which indicates that the ethical aspect in tourism policy-making should take. It is essential to strike a balance between various stakeholders of the tourism industry rather than appeal to the goodwill of a few stakeholders (Fennell, 1999). An example of such a case can be found in Tawushan Nature Reserve in Taiwan (Lai and Nepal, 2005). Value conflicts exist between the local people and the government since the inception of ecotourism plans. Benefits included increased economic revenue for the community, but these impacts could also lead to the loss of local and ancient traditions that have thrived for decades.

One example relates to the hunting tradition. Hunting is regarded as a way of maintaining the community's indigenous identity. However, rules imposed by an external authority to conserve the natural resources may be against the tradition. So it is critical to handle the case in a cautious manner. Sincere communication towards the policy-making mentioned by Lai and Nepal (2005) could be a beneficial approach to maintain both stakeholders in the policy-making process.

We also tend to find that indigenous communities that are permitted to continue their traditional hunting, such as Inuit hunting of marine mammals in the Arctic, are also the main proponents of conservation in their areas. In a number of environments indigenous persons may also remove introduced species in order to protect native flora and fauna, which protects the ecosystem. We could even consider to classify tourists who travel to these areas to hunt in traditional methods as a type of ecotourist, though not if they are hunting endangered species.

Another ethical issue relates to the shallow and deep ecotourism concept raised by Acott et al. (1998). The two types of ecotourism are placed in the context of their concerns of the environmentalism and sustainable development. In the context of deep tourism, the tourists appreciate a high quality of life, respect for the local culture and preservation of the natural areas. Shallow tourism will be the opposite. Then ethics integrated in the tourism policy should be functioning as guidance to direct tourists' ecotourism behavior towards deep ecotourism. As Acott et al. (1998) argue that consideration involving the values, attitudes and behavior of people is fundamental when identifying whether the tourists fall into the category of egotourists rather than being ecotourists.⁷⁵ A good example of the tourism policy in Republic of Korea is that the government emphasizes the importance of interpretation in ecotourism and highlights all ecotourism activities should include interpretation programs (Wang et al., 2009). As Lee, minister of the environment, put, "In particular, we plan to include the demilitarized zone (DMZ) eco-tourism course into the press tour program as a representative case of Korea's green growth policy. Similarly, Hultsman (1995) proposes that ethical issues need to be included in the textbooks used in tourism curricula. In Japan, the major focus of promoting ecotourism lies on the education and interpretation. Institutional support at different levels of government has been placed in promoting guide and interpreter training (Hiwasaki, 2003). These are proposed to emphasize on the role of education in tourism policy, not only being confined to school but also open to the tourists.

The so-called Western versus some Asian concepts of ecotourism is another ethical issue in ecotourism. In the context of China, ecotourism is called "Shengtai luyou". Though both share many similarities in principle and concepts, some key distinctions in terms of the size and scale do exist, the importance of human health outcomes and the interdigitation of nature and culture, both architectural and literary (Buckley et al., 2008). In terms of the size and scale, as Buckley et al. (2008) said ecotourism is considered to be a small-scale, small group activity. "The majority of the Western discourse on ecotourism, either explicitly or implicitly, as a relatively small-scale activity." The small concept of ecotourism doesn't transfer into the Chinese concept of ecotourism either in size or scale. Huang et al. (2003) indicates that the Chinese domestic tourists give high preference to travel in large groups. When coming to human health outcomes, Chinese ecotourism put significant emphasis on the individual physical and mental

74 Ecotourists generally refers to those tourists who might want to visit eco-tourist locations, and who behave in a manner that does not damage the environment.

75 A marketing tool refers to sell products that verge on mass tourism or cause environmental and cultural degradation under the "title of ecotourism" (Acott et al., 1998).

wellbeing; however, the initiatives of considering healthy components are seldom found either under the name of ecotourism or in academic, government or industry literature (Buckley et al., 2008). The other distinction reflects the different perceptions of the relationship between humans and nature. In Chinese cultural perspectives, nature can be improved by human artistic and architectural artefacts; however, the western view it in the opposite way (Buckley et al., 2008). In the Chinese ecotourism law system, Buckley et al. (2008) argue that “there is little or no Chinese legislation designed specifically to regulate ecotourism”. This is also supported by Zhang (2006) who criticizes the fact that legislation regarding tourism put forward by the Chinese government are administrative with limited scope covering only selected areas; and there are no comprehensive tourism laws. These factors, either in principle or in practice, should be considered in the policy-making process.

Ecotourists, in general, have a similar profile. They are highly educated, have higher income levels and have a heightened awareness of the importance of the environment; as a result, they expect high levels of ecological information and demand conservation. At the same time, ecotourism is lauded due to the transaction from human-centered tourism development to recognize the wonder and diversity of the non-human world (Pasarikidou, 2008). However, one very typical ethical issue involved in ecotourism is the disregard of local culture in ecotourism development. In the ecotourism destinations, the ecotourism activities may take priority over and/or conflict with the livelihood of local communities. Two examples would be the elephants or the lions are treated more important than human beings and watching sharks is more worthy than knowing the fisherperson’s life. The local culture has been modified to cater to the needs of the tourists rather than the actual needs of the community (Song, 2007). More seriously, the community’s livelihood has been ignored and given place to what is so called “biodiversity”. Therefore, we need to consider striking the balance between the protection of biodiversity and also the safeguard of the local livelihood.

Many researchers have claimed that ecotourism has been misused as a marketing tool⁷⁶ to attract tourists. Acott et al. (1998) argue that ecotourism has been interpreted in many ways and it doesn’t necessarily need to have an environmental beginning. Wu (2008), vice minister of the Ministry of Environment Protection, remarked at the working conference on China’s national Ecotourism development, “There seems to be no generally accepted definition of ecotourism in China and the local governments just perceive ecotourism as a tourism product and apply the “mass tourism” development model on the eco-tourism destinations.” A clear definition of ecotourism integrated into the regulations at national level that is essential to enhance that the principles of ecotourism could be delivered to organizations at different levels. Along with the regulations urgently imposed by the government, there are increasingly more voices regarding the accreditation in the tourism policy making. The accreditation systems have long been regarded as an effective approach in pursuing real ecotourism. In the study of comparison of government policies within Republic of Korea, China and Japan, Wang et al. (2009) point out there is a lack of ministerial-level policy on accreditation systems for all three countries. When setting an accreditation system, the current context of the nation has to be taken into consideration. In the case of China, with a socialist market economy, the initiative of the government to adopt and operate an accreditation system is critical to the success of healthy ecotourism. At the same time, ecotourism accreditation and certification should be designed with the framework that involves the private sectors, e.g. tour operators and the organizations e.g. UNESCO, WWF, etc. together with the government. However, the accreditation system should be set with space being provided for innovation that is beyond the standard of the core criteria. Fennell (1999) questions to what degree could the industry emphasise innovation and accessibility at the expense of ensuring the proper standards? The policy-makers have to take those factors into account when making tourism policy.

76 Information on the Tonle Sap Management Project funded by the ADB can be found here: http://www.adb.org/projects/tonle_sap/background.asp

4. Case Study: Environmental Management and Biodiversity of the Tonlé Sap, Cambodia

According to the Asian Development Bank, “Tonle Sap, Cambodia, is the most important inland wetland in Southeast Asia covering an area of 250,000-300,000 hectares during the dry season, and 5 to 6 times more surface during the wet season. The large wetland system supports one of the world’s most productive freshwater fisheries and the ecosystem is essential to the survival of many globally significant species.”⁷⁷

4.1 Background of Geography, Biodiversity of Tonlé Sap

Inland water ecosystems are amongst the most threatened ecosystem types of all. Physical alteration, habitat loss and degradation, water withdrawal, overexploitation, pollution and the introduction of invasive alien species are the main threats to these ecosystems and their associated biological resources (CBD, 2010). Erika Techera of Macquarie University, Australia, said, “Freshwater biodiversity is by most estimates the most endangered category of biodiversity in the world” (Techera, n.d.).

The Tonlé Sap, a UNESCO Biosphere Reserve in central Cambodia, is the largest freshwater lake in South East Asia. Various anthropogenic pressures may have already caused the loss of local populations of species such as *Crocodylus siamensis* (Siamese crocodile), *Orcaella brevirostris* (Irrawaddy dolphin) and *Batagur haska* (mangrove turtle) yet this lake remains a home to several worldwide endangered bird species, five endemic fish and one endemic watersnake. This case study illustrates the importance of ethical considerations in maintaining biodiversity.

The Tonlé Sap stretches North-Westerly from just outside Phnom Penh; being bordered by Battambang to the West and the major tourist center of Siem Reap to the North-East. It has a unique hydrology and substantial species level biodiversity. The Tonlé Sap basin is comprised of several different ecosystems including open lake and stream, flooded forest and scrub, flooded grasslands and agricultural land that is subject to seasonal flooding.

4.2 Hydrology of Tonlé Sap

The Mekong River flows Southwards through Cambodia from PDR Lao to Vietnam and is joined by the Sap River near Phnom Penh. During the dry season the Tonlé Sap is fed from tributaries such as the Siem Reap River flowing southerly yet in the rainy season the flow reverses as the force of the increased Himalayan flood water in the Mekong river forces water back up the Sap River from Phnom Penh. The depth increases by more than 10 m and the Tonlé Sap increases in surface area from 2 520 km² to 15 780 km², a natural reservoir storing over 70 billion m³ (Carbonnel et al., 1965). This floods surrounding mangrove forest and rice growing areas providing a rich supply of nutrients and breeding grounds for fish and amphibian animals. The pulse flooding nutrient supply allows for complex food webs to have developed that has supported the wide range of species to evolve and coexist within this aquatic and wetland habitat.

The importance to the environment of this pulse flooding lies in the nutrients that the waters supply, furthermore for human importance is the supply of water for crop plant irrigation and fish, amphibians, birds and reptiles as direct food sources. The monitoring of the flooding raises issues relating to the access to shared data from satellite mapping of seasonal floods or land use, flow rate monitoring in upstream reaches of the Mekong in other countries and water quality e.g. nitrate or salinity levels. The right of access to this data is of value to Cambodian authorities, development and environmental NGOs, research scientists, journalists and regional environmental committees or agencies. This right of access to data applies to other sections in this case study too, such as biodiversity levels and demographic or other socioeconomic data.

⁷⁷ Satellite data shows more extensive coverage in recent years. The figure quoted is from reliable data based on physical measurements. Recent data could indicate changes due to climate change or may be due to more accurate methods.

Figure 1: Water Resources and Tonlé Sap Basin from Tonlé Sap Biosphere Reserve Environmental Information Database Project



Source: http://www.tsbr-ed.org/english/map_gallery/map_enlarge.asp?ab=&pid=74

4.3 Aquatic and Terrestrial Biodiversity

In 1997 the Tonlé Sap was nominated as a Biosphere Reserve under the Man and the Biosphere Program of UNESCO and in 2001 was designated as the Tonlé Sap Biosphere Reserve (TSBR) by the Royal Government of Cambodia due to its significant biodiversity and socioeconomic importance. The estimates of biodiversity are extremely variable with some environmental NGOs quoting figures of over 300 species of fish and 20 species of watersnake. In a limited survey Junk et al. (2006) report the identification of 123 algal, 148 herbaceous plant, 70 woody plant, 149 fish, 2 amphibian, 24 reptile, 11 mammal (including three primates) and 220 bird species. This record of only 2 amphibians is possibly under-representative as there are likely to be a variety of frogs let alone other orders, given the climate, sheer area and variety of habitats within the Tonlé Sap. Thy and Holden (2008) provide photographic evidence of 57 of the species. The Tonlé Sap measures of species diversity are from a small number surveys that are often site specific and data in the three decades prior to 1998 is patchy due to political instability and warfare.

There are a number of endemic plant species that are not found elsewhere such as *Samandura harmandii*, *Terminalia cambodiana*, *Coccoceras anisopodum*, *Diospyros bejaudii*, *Diospyros cambodiana*, *Garcinia loureiri*, *Acacia thailandica*, and *Hydnocarpus saigonensis*.⁷⁸ Indeed the plant kingdom may provide scope for future bioprospecting for potentially therapeutic drugs from the genetic resource base of wild populations of *Barringtonia acutangula* (freshwater mangrove), *Breynia vitis-idaea*, *Merremia hederacea*, *Nelumbo nucifera* (sacred lotus), *Nymphaea lotus* (water lily), *Nymphaea nouchali* (blue water lily) or *Sonneratia caseolaris* all of which have uses in traditional Khmer medicine.⁷⁹

78 Data from a Mekong River Commission report for discussion available at [http://www.mrcmekong.org/programmes/bdp/Tech-Notes/Tech-Note10-Impacts-on-the-Tonle-Sap-Ecosystem\(June-10\).pdf](http://www.mrcmekong.org/programmes/bdp/Tech-Notes/Tech-Note10-Impacts-on-the-Tonle-Sap-Ecosystem(June-10).pdf)

79 Kham, L. 2004. Medicinal Plants of Cambodia: Habitat, Chemical Constituents and Ethnobotanical Uses. Bendigo, Australia: Bendigo Scientific Press.

The focus on a globally threatened species such as *Lutra sumatrana* (hairy nosed otter) can highlight wider reaching issues. Navy (2009) discusses the ultimate causes of the population decline of this flagship species from a socio-economic perspective. Extreme poverty may both excuse trapping for furs and justify fishermen's hostility towards a natural predator that is competing for food that an animal rights supporter may not condone. However, Navy notes that this does not necessarily prevent conservation schemes from operating.

Most of people whose lives depend on the lake or fishing are struggling to survive on a very low income. For these villagers, conservation would therefore be a second priority after they have filled their stomachs. However, this study revealed that most of the fishermen in Tonlé Sap area are willing to cooperate to serve the purpose of otter conservation if appropriate compensation is set to reduce their expenses on nets repairs and lost fish production.

An anthropocentric argument for maintaining biodiversity may be for the potential human benefit discovered through bio-prospecting. This may include a search for medicinal properties of certain plant species, or for genetic value from the excess of 200 submergible rice strains or disease resistance in wild fertile banana species that reside within the riparian flood plain. A further argument in favour of biodiversity could be that a species which although seemingly dispensable from the food web now may be of pivotal significance in the future as food webs are not static. In a dynamic system under the pressures of changes to abiotic variables such as global warming organisms like amphibians become a more crucial or vulnerable link in a chain. There is a pertinent point here that a choice should be made between conservation that often focuses on the rarity of exotic species and preservation, which is more ecocentrically positioned, seeking to maintain more biodiversity with non-human systems and processes regulating population levels. Aldo Leopold (1949) developed the concept of "The Land Ethic" that identifies the right of the biosphere of the Earth to exist without human influence, in some places, in an undisturbed state. This perspective may ignore the fact humans are a part of nature and it could be argued that the impact we have is "natural". Lovelock put forward the Gaia Theory during the 1980's and during the following decades the theory has been modified to become a tool to view the Earth as a living entity with self regulatory systems analogous to homeostatic systems in organisms. These suggestions from deep ecologists assist viewing the intrinsic value of biodiversity from biocentric and ecocentric perspectives.

4.4 Socioeconomic and Cultural Importance

The importance of the lake cannot be understated, as the lake provides for a large portion of the daily dietary needs of the Cambodian people. It is integral to maintain the food security of the country. Tonlé Sap has been an underpinning factor of human activity in the region since ancient times, yet continues to the present day.

4.4.1 Tonlé Sap as a Food Source

Fish is a central part of the Cambodian diet, estimated to constitute up to 60 per cent of the average dietary protein and is a significant part of the food security for most individuals, households and communities (FAO, 1999). Over one million households are believed to be involved in fishing at least some time of the year (World Bank, 1995), and as the Tonlé Sap basin is home to over one million people many of these are dependent upon the lake as their main source of fish and other food. In addition small fish are caught and used as feed for larger carnivorous fish raised in aquaculture farms such as fast growing *Channa sp.* (snakehead fish) that only feed of live prey. In a similar vein an enormous trawl of watersnakes, estimated at 6.9 million individuals are removed annually for various purposes including direct consumption by people, for export to manufacture snake skin products and as feed stock for *Crocodylus siamensis* (Siamese crocodile) farm enterprises.⁸⁰ All in all with a total catch of 177,000-252,000

80 Estimate of 6.9 million snakes is from Brooks et al. (2007), available at <http://www.aseanbiodiversity.info/Abstract/53006263.pdf>

tonne per year the Tonlé Sap fishery is probably the most intensive fishery worldwide (Lamberts, 2001). Frogs, crabs and various insects are also valuable protein sources that are readily available at most local markets having been trapped locally in the rice growing areas. There are few reliable estimates of the extent of this harvest, although the unreliability of export stocks to meet consumer demand together with concerns over insecticide consumption and the environmental impact of non-selective capture techniques of insects has led to locust farming in parts of Thailand. The value of fish, amphibians and insects that contribute essential amino and fatty acids to the diet that is otherwise mainly carbohydrate fruit and rice based must not be underestimated.

Homo sapiens is an omnivorous species and even from an ecocentric perspective individuals have a basic right to food. For the average adult this diet should include about 0.8g protein for every kg of body weight according to US Recommended Daily Allowance (RDA) data.⁸¹ Since fish and insects are both high in protein and oils this adds weight to the ethical arguments in favour of allowing reasonable harvesting of food from this common resource base. The right to food and food security should have a higher priority than the right to economic development and wealth, as discussed in needs as opposed to wants debates. Nonetheless, the since national demand for fish and fish products is so high there is a risk that the Tonlé Sap may be subject to the concept of the “tragedy of the commons”.

4.4.2 Non-Food Products

In an attempt to reduce extreme poverty in rural districts a number small NGOs, often with the assistance of larger agencies such as ASEAN, FAO or UNDP, have developed micro industries that utilise other resources available within the lake and surrounding forest. These include activities such as traditional pottery making that uses charcoal from firewood, paper making from various local plant sources, silk farming, fabric weaving and clothing production, and home furnishing products manufactured from dried *Eichhornia crassipes* (water hyacinth).

The 1987 Brundtland Commission defines sustainable development as being that which, “meets the needs of the present without compromising the ability of future generations to meet their own needs.” This is a good starting point for the debate concerning the desire for development as it refers to needs rather than wants, whilst recognizing that there is a level of capacity to finite resources and that the rate of use of these resources cannot exceed the rate at which the environment can replace them. The low level of income of the average household in the Tonlé Sap region places a high demand on the consumption of local resources for their immediate use, such as the gathering of firewood for domestic use. It is the extra burden upon the environment of resource use for export to other regions or countries that has to be regulated if sustainability is to be achieved. It is also important to bear in mind that the current generation represents a minority in terms of democratic representation of all the subsequent future generations. Therefore the precautionary principle should apply to the rate of consumption so as not to overly restrict or even prevent the access to and use of these resources in the future.

4.4.3 Ecotourism

In recent years there have been over one million tourists annually to the neighbouring Angkor Wat world heritage site, located less than 20km from the fishing village of Phnom Krom that is 5 km outside the rapidly expanding town of Siem Reap. This influx of tourists has led to a large construction projects such as new roads, an international airport and hotels that indirectly caused changes to surface water run-off and provided an additional market for fish. The attraction to promote ecotourism is that it benefits some of the most rural and poorest communities, supports environmental and education programmes and can be instrumental in awareness raising. The TSBR is a breeding ground of some of the world’s most threatened waterbird species. The Prek Toal floating village area of the lake is the

81 Full details of recommended Dietary Reference Intake values are accessible from various countries. The United States Department of Agriculture provides links such as <http://iom.edu/en/Global/News%20Announcements/~media/Files/Activity%20Files/Nutrition/DRIs/DRISummaryListing2.ashx>

only remaining breeding site in South-east Asia for two globally threatened species; the *Pelecanus philippensis* (Spot-Billed Pelican) and *Mycteria cinerea* (Milky Stork). This TSB core area of Prek Toal is also the largest remaining site for several other globally threatened bird species including the *Leptoptilos dubius* (Greater Adjutant), *Threskiornis melanocephalus* (Black-headed Ibis) and *Mycteria leucocephala* (Painted Stork). This is a major attraction for bird watchers and the income from this and the associated hospitality services provide a much needed source of income in this rural economy.

There are concerns however that ecotourism itself is potentially damaging to the long term fitness of this fragile environment and is ultimately unsustainable beyond low levels of visitor access.

Table 2: Some globally threatened breeding birds of the Tonlé Sap swamp forest. Data from Goes (2001) and Seng et al. (2002)

Common name	Binomial name	Conservation status
Grey-headed Fish Eagle	<i>Ichthyophaga ichthyaetus</i>	Largest population in mainland SE Asia
Darter	<i>Anhinga melanogaster</i>	Largest colony in SE Asia. >30 % of global population
Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Largest colony in SE Asia. c. 5 % of regional population
Spot-billed Pelican	<i>Pelecanus philippensis</i>	Largest colony in world. c. 25 % of global population
Milky Stork	<i>Mycteria cinerea</i>	Only freshwater colony in the world population
Painted Stork	<i>Mycteria leucocephala</i>	Largest colony in SE Asia. c. 20 % of regional population
Greater Adjutant	<i>Leptoptilos dubius</i>	Only colony in SE Asia. c.10 % of global population

The notion of a right to free access to the natural environment for research, spiritual, enjoyment or recreation purposes is considered by many nations as a basic entitlement of any human. The principle is based upon freedom of movement, collective or common ownership and a presumption that no human can really claim possession of the "wilderness". If territory is claimed then the possessor individual or group has responsibilities as well as rights. Following this argument would include a duty of care. Ecotourism may well be in principle a right for people from other countries or regions who do not inhabit the lake, and they bring with them a very welcome and much needed source of income for lake dwellers. However the footprint that tourism leaves on the environment must be taken into account. Numbers may have to be restricted to limit environmental damage. Furthermore, if tourism to remote areas involves air flights or extensive use of fossil fuels then there ethical arguments against this if it merely satisfies the wants of a few people rather than real needs. The carbon dioxide contribution towards climate change that is produced by mechanised travel places a footprint outside the Tonlé Sap itself, but is a part of the global footprint nonetheless and must be accounted for as a negative externality.

4.4.4 Cultural Significance

The Tonlé Sap is currently home to at least three different people groups. It has been a food source for millennia; the sustenance provided through the sediment rich flooding that enabled rich production to feed the ancient Khmer empire and all the subsequent generations. The bas-relief carvings within the Anchor Wat Temple complex depict the dependency and cultural value of the lake and floodplain to the kings who ruled from this part of South East Asia for several centuries. The biodiversity itself is not documented as being of central importance, but the dependency upon the natural environment to provide nourishment is clearly revered. The ability for a natural system to provide such abundance, to millions of people, sustainably over hundreds of generations may be dependent upon the ecological stability provided by a rich biodiversity coupled with the respect for "nature" held by earlier civilizations.

Further research on the biodiversity, cultural diversity and productivity of natural systems needs to be carried out before this argument can be qualified.

Figure 2: A bas-relief carving on Bayon temple depicting the abundance and diversity of species



The historical precedent that the lake has always provided food and therefore it is a right for all residents to harvest this natural larder does not sit in accordance with Kantian ethics. Indeed Kant encourages that ethical principles be rooted in rationality and be free to break with tradition. This ethical perspective also places an onus upon the moral duty of individuals and society as a whole to do what is deemed right in the light of logical reasoning. A drawback here is the complexity of human reasoning and the potential for unforeseen consequences if absolute principles are held to, despite new evidence of damaging effects coming to light. A stark reminder if this is clearly illustrated here in the millions of deaths suffered during the Khmer Rouge's attempt to establish a self supporting agrarian society during the 1970's. So, rigid adherence to tradition or breaking free without following precautionary principles may both have detrimental consequences.

4.4.5 Biocultural Diversity

UNEP 2002 stated that: *“Cultural diversity mirrors biological diversity. It is the concern of many people that biodiversity must be appreciated in terms of human diversity, since different cultures and people from different walks of life perceive and apprehend biodiversity in different ways due to their distinct heritage and experiences. Diversity in humanity and diversity in nature are inseparable. They are assets of peoples and our planet for prosperity for present and future generations. These are essential for achieving sustainable development.”* (Appadurai, 2002).

In the Tonlé Sap flood plain there are people from different cultures including Khmer, Cham, Chinese and Vietnamese communities. Approaching 100,000 people who live in nearly 200 floating villages debatably have the most intimate knowledge of the lake.⁸²

82 Referring to Cambodian People.

4.5 Pressures on the Biodiversity of the Tonlé Sap

A main threat to biodiversity on the Tonlé Sap is that it is an external entity to other anthropogenic activities such as population changes, agricultural industrialisation or hydroelectric dam construction.

4.5.1 Poverty, Economic Growth and Environmental Sustainability

The extreme poverty of rural communities makes the environmental resources an opportunistic source of income and materials. The impact of poverty has been identified as the greatest threat to the vitality of other freshwater bodies in developing countries such as Lake Titicaca in Bolivia (UN World Water Development Report 2, 2006). The levels of over fishing referred to above exemplify this as do the methods of fishing used from the use of small mesh sizes (mosquito netting) to electric fishing or dynamite methods employed at times when munitions were easily available. Furthermore in extreme poverty some illegal activities become a lucrative source of income; in January 2001, authorities encountered three suspicious boats leaving the Prek Toal Core Area Protection Zone. One of the boats was intercepted and found to be carrying 1,400 cormorant eggs.⁸³ Deforestation of flooded forest is associated with the need for firewood or charcoal for domestic use as well as for commercial use such as brick-making as the construction industry booms in other parts of Cambodia. The denuded forest areas provide rich soils for growing valuable rice. However, the change in land use leads to smaller habitats and increased water pollution from agricultural run-off. This takes its toll on the collective biodiversity, "indicator" species being especially vulnerable and this has consequential negative effects on the local people.

The central ethical issue in dealing with poverty is inequity. Even from birth children born into low income households are more vulnerable to malnutrition, at risk from higher infant mortality rates and get less access to the opportunity of education. This puts tremendous pressure upon parents to get all they can to meet immediate needs and often without making full consideration of the long term consequences. Unrestricted use of the resources of the lake occurred in the expansionist period up until current times. Now the decision must be made whether to conserve harvestable stocks for future times or more active preservation of the ecosystem as a whole is best for human wellbeing.

4.5.2 Invasive Species

There are a number of non-native species found in the Tonlé Sap that have arrived through natural and anthropogenic processes. These include mammals like *Rattus rattus* and *Rattus norvegicus*, a small number of fish species including *Cyprinus carpio* (common carp), *Hypophthalmichthys molitrix* (silver carp) and *Labeo rohita* (rohu) that are regularly caught on the Tonle Sap. Deepwater rice produces relatively low yields and is frequently subject to damage by rats, but the reduction in numbers of certain birds of prey and snakes that are natural predators of rats means that the pests are more abundant. According to the Invasive Species Specialist Group of the IUCN Species Survival Commission:

Giant mimosa can be clearly identified as an invasive species and poses the biggest threat to biodiversity of all the exotic plants found in the TSBR. It is also a well known invasive alien species in other countries where it has occupied vast areas of productive wetland by forming dense mono-specific stands of very little to no value for wildlife and people alike. Although it is a recent introduction to Cambodia, having first been reported around the early 1980's, it is rapidly spreading along the Mekong, Bassac and Tonle Sap river systems. In the TSBR it has formed scattered populations and will quickly invade open disturbed habitats. The only way to prevent it from establishing itself is through efforts at population control and by conserving the natural vegetation cover, which prevents the seedlings germinating.⁸⁴

83 Monitoring of Large Waterbirds at Prek Toal, Tonlé Sap Great Lake 2001-2007; See T. Clements et al., *As part contribution to the UNDP/GEF-funded Tonlé Sap Conservation Project*.

84 Data from http://www.issg.org/pdf/aliens_newsletters/A24-25.pdf

Eichhornia crassipes (water hyacinth) is species to native South America that is exotic to the Tonle Sap ecosystem. The arrival of *E. crassipes* is likely to have been during the 19th century when it was also first recorded in Africa and in the United States. It was deliberately brought to the US as a decorative plant, which raises issues about human interference with ecosystems by introduction rather than extraction or a complete change in land-use. It is one of the most invasive species causing blockages in navigation channels and its spread is largely unchecked. Although *E. crassipes* is an angiosperm it also reproduces vegetatively, rapidly forming dense mats of floating vegetation. These dense mats reduce the light availability for submersed plants thereby reducing the dissolved oxygen levels, which subsequently impacts upon the fauna. However, it may be of benefit as a source of shade and provide a microhabitat for insects and insectivorous fish. Furthermore, it has some economic value, being used as food for people, pigs and farmed fish and for making products such as soft furnishings, hammocks and string.

Many invasive species have and are becoming established through direct human activity or deliberate cultivation such hybrid crocodiles. Depending upon the lack of natural predators, diseases or other regulatory mechanisms these species can spread exponentially causing a strain on limited resources and an imbalance on the biodiversity. This calls into question humankind's rights and responsibilities to maintain the status quo of the various populations within a community.

The industrial utilization of noxious invasive species such as *E. crassipes* for soft furnishing manufacture is highly pragmatic in the short term, yet if the products sold provide a significant profit mark-up this could encourage a dependency upon the harvest of this plant. That in turn could cause reluctance to establish a restoration programme that preserves the indigenous water plant species causing a shift towards a preference for conservation of the current status of all species. There is no guarantee that in time the latter approach will maintain ecological stability or fitness and biodiversity of the ecosystem as a whole.

4.5.3 Population Growth

Since the 1980's the Khmer population has rising under the security of peace and rising economic conditions that have seen rapid development in this war ravaged nation. World Bank (2008) data shows that during the mid 1980's population growth levels soared to over 4 per cent per annum, the latest data from 2008 is that the rate is still significant but closer to the world average. The level of 2.52 per cent is significantly higher in the Tonlé Sap region than the national rate of 1.81 per cent.⁸⁵ Tourism and the fluctuating levels of migrant workers from Vietnam complicate the picture as these sectors have differential consumption patterns and environmental footprints than agrarian Khmer village communities. However, the population rise has been accompanied by higher levels of food and water consumption, agricultural chemical usage and sewage production all of which impact upon the water quality of the Tonlé Sap. Direct impacts of rising population numbers are habitat destruction for housing, agriculture and forest product harvesting, and overfishing to meet increased food requirements.

Deep green, ecocentric political philosophy demands unreservedly that current consumption patterns must be reduced to the sustainable carrying capacity of each ecosystem and environment. The current population is representative of a minor fraction of all future generations and ethically it could be argued that therefore they have a minority vote in the decision making regarding environmental issues. Counter arguments recognize that future generations may be able to access food from other sources and more significantly the survival of the current generation is prerequisite for the very existence of subsequent ones. Thus taking a utilitarian perspective, that does not accept that the benefit to the majority is justifiable at the expense of a minority, may help to shed light onto debates involving the rights and duties of current lake dwellers.

85 Kerrigen, L. ed. 2006. The Atlas of Cambodia: National Poverty and Environment Maps. Save Cambodias Wildlife: Phnom Penh. Data also available from <http://www.cambodiaatlas.com>

4.5.4 Concerns of impact of decreased flow from Mekong River due to hydroelectric dams

China and other upstream states are currently planning and constructing a series of dams for hydroelectricity generation. There is a fear that the energy withdrawn from the Mekong would reduce the flow into the Tonlé Sap. The claimed and projected impact of these dams on the pulse flooding and hence biota of the Tonlé Sap has some qualities of myth as there is a lack of reliable quantitative data. This quote from *Time* magazine (2007) is illustrative,⁸⁶

“For generations, Bun Neang’s family has depended on the bounty of Cambodia’s Tonle Sap, a vast lake fed by one of the world’s greatest rivers, the Mekong. Two decades ago, his father could rely on a daily catch totaling about 65 lbs. (30 kg). When the water gods were feeling particularly charitable, he would land a Mekong catfish, a massive bottom-feeder that can weigh as much as a tiger. But today, when Bun Neang dips his net into the caramel-hued waters near Chong Koh village, all the 30-year-old can hope for is a few kilos of sardine-sized fish. Overfishing is partly to blame. But Bun Neang knows of another reason Tonle Sap’s big game have all but disappeared. “China,” he says of the country that is now tiny Cambodia’s biggest foreign investor and economic patron. “Instead of sharing the Mekong, they dam the river and keep it for themselves.”

To lay the blame of dam building solely on China is naive as most of the riparian states benefit from and endorse the use of this reliable and renewable source of power and welcome the Chinese investment. In addition many factors influence the volumetric flow in the lower parts of the river such as; upstream irrigation and consumption levels, global warming affecting melt water from the Himalayan mountain system or the undeniable climate change of recent decades. Nonetheless, electricity is necessary for economic and social development. Electrification of rural areas is a quantifiable national development indicator. The UNDP states that,⁸⁷

“Sustainable Energy Development is “energy produced and used in ways that support human development over the long term, in all its social, economic and environmental dimensions.”

The rights of lake dwellers to have access to the same reliable, cheap and sustainably sourced electricity as people in urban areas can be clearly argued from a traditional human rights point of view, especially so as the urban community are clearly dependent upon the food producers and harvesters on the lake. The voice of the downstream countries that are affected by the hydroelectric schemes have a right to be heard and it should be determined whether fisheries or agriculture should have *a priori* claim over water management. The poverty levels in Cambodia limit the consumption of electricity so the Khmer people are least likely to see the benefits gained from harnessing the energy higher upstream, furthermore food production and hunger alleviation are immediate needs that should be met and if electricity generation puts these in jeopardy then this is an example of the needs versus wants debate in the ethics of sustainable development. John Locke’s “sufficiency restriction”, that limits users of a shared resource to leave “enough and as good” for the benefit of others, is a relevant guideline here for extracting the energy from the Mekong.

4.6 Governance and Management Policies

Governance and management policies may be analyzed through the local regulations and international frameworks of which Cambodia is a party to. Following is a description of the regulatory bodies which are relevant to Tonle Sap.

4.6.1 Cambodian Regulations

Cambodia is a signatory country to the Convention on Biological Diversity and has developed its National Biodiversity Strategy and Action Plan. This has a key goal of maintaining biodiversity and

86 The full article is available at <http://www.time.com/time/magazine/article/0,9171,1657580,00.html#ixzz0uOLTjpEu>

87 UNDP World Energy Assessment (2000).

productivity and was developed following the country's accession to the Convention on Biological Diversity in 1995. The strategy provides a framework for the TSBR to promote sustainable development and promote monitoring of the species diversity. The challenge remains in the enforceability of the recommendations and goals under the pressures of illegal activities and corruption.

4.6.2 Fishery Regulation

The prohibition of fishing out of season beyond levels for personal consumption and regulation of mesh size and fishery methods are perhaps the most important conservation steps and are also relatively enforceable. The FAO has provided a framework that led to larger fishery companies being able to bid for and secure sole rights over certain lots on the lake and also the provision of community fisheries to ensure local communities had some protected rights. After some initial conflicts between armed security guards protecting the productive lots the number of lots was reduced and a more equitable system of allocation to the communities was developed.

4.6.3 International Law, Conventions and Agreements relating to the Mekong River Basin

The Convention Concerning the Protection of the World Cultural and Natural Heritage (CCPWCNH) unified thinking on a worldwide heritage of value to all mankind, now and in the future. Although more categorically applied to legislation for more global environments such as the UN Convention on the Law of the Sea (1982), the cross boundary implications of CCPWCNH are evidently applicable to the impact of upstream activities to the environmental fitness of the Tonlé Sap and there is a responsibility of Cambodia too towards the water's that flow onwards into Vietnam.

The biodiversity of the Tonlé Sap is dependent upon the seasonal flooding from the Mekong River and although the lake itself is not subject to transnational boundary laws, the waters within it are affected by the activities of several other countries. The sole international convention relating to the sustainable use of wetlands is the Ramsar Convention to which the lower Mekong countries are all signatories. There are a number of regional agreements relating to the Mekong River basin at large that are in place such as navigation, fisheries or dam constructions for hydropower. The Mekong River Commission (MRC) promotes cooperation to ensure sustainable development within the region harnessing the resources of the Mekong and its tributaries. The 1995 *Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin* provides a framework for the MRC and article 3 states the aim:

To protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin.⁸⁸

The Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (funded jointly by UNDP, MRC and IUCN) is working to produce a regional red data book and has successfully secured regional agreements on the cessation of fishing for certain key species such as the Giant Mekong Catfish.⁸⁹

4.7 Current Issues and Future Resolutions

Issues which must be addressed pertaining to the near to long term future are the need for further monitoring, the role of environmental education, implementing national and international agreements, questions on how to proceed with enforcement, the effects industrialized food production will have, and finally adapting to the potential effects of climate change.

88 From http://www.mrcmekong.org/agreement_95/agreement_95.htm

89 For a copy of the release follow this link [http://www.mrcmekong.org/download/press_releases/MGC_cease_fishing_Thai_web_April2006.pdf#search="biodiversity"](http://www.mrcmekong.org/download/press_releases/MGC_cease_fishing_Thai_web_April2006.pdf#search=)

4.7.1 Further monitoring

There needs to be accurate, reliable and open access to scientific and economic data on the status of bird or other animal populations such as fish stocks, catch quotas and sizes, surrounding land use and other impacting factors such as disease outbreaks. For example access to reliable climate, geological and other geographical data has enabled some progress has been made on gene-ecological zonation with the aim of improving forestry conservation.⁹⁰ Other species level biodiversity to be monitored more thoroughly in the future includes amphibians, invertebrates, fungi and micro flora and fauna. The coordination of combined and independent surveys is vital for efficiency and to ensure total coverage. The fact that many independent parties have different interests and expertise makes this coordination of efforts all the more important. The right to access of information is essential to enable informed decision making at all levels too. This is most clearly required in the case of dam building on the Mekong for hydroelectric energy provision to other states.

4.7.2 Environmental Education

Environmental education should incorporate learning about factors that impinge upon the environment including development and socioeconomic factors. The emphasis should be to understand the complex and interdependency of systems that influence the vitality and stability of the Tonlé Sap. For example, various inputs and sinks in the hydrological cycle are interconnected with agricultural productivity and rural development and any of these may reduce the current biological diversity. Knowledge of the significance and current vulnerability of biodiversity is essential and a basic right for the survival of all people. This education should be accessible to all students and given the status within the curriculum that it is due since this knowledge and understanding empowers learners to make informed decisions regarding sustainable use of and in the environment. Incorporating traditional knowledge from minority groups within the Tonlé Sap basin may draw on a valuable resource. Three main issues of poverty, overfishing and high population growth rates would be strong central themes for a non-formal EE programme, which should be run with the full participation of community groups. At this point it is worth noting that a pragmatic gender issue raised by Resurreccion (2006) regarding women's participation in community fisheries management is also relevant in community education programmes.

Therefore, there is a need to engage women on their own terms, with a firm recognition of their actual social and political conditions, and with them, create realistic options for their participation (Resurreccion, 2006).

Participants' should develop an appreciation of values, rights and responsibilities towards future as well as the current generations. Therefore, to ensure sustainable use of and existence within the Tonlé Sap, environmental ethics education needs to be a central tenet. This may include justice and equity together with other virtues relating to the precautionary principle. Practical ethics education may focus on a consequentialist approach where the benefit of raising the fitness of the Tonlé Sap's ecology will be achieved through activities such as *E. crassipes* harvesting for light industries.

4.7.3 National and International Discussion and Agreement

The Cambodian National Biodiversity Strategy and Plan (NBSP) identified several factors that put protected areas at risk including:⁹¹

- Weak legal, institutional framework and law enforcement
- Information base to support decision making is limited
- Promoting public awareness is limited and not properly managed
- Lack of technical expertise and human resources

90 Kerrigen, L. ed. 2006. The Atlas of Cambodia: National Poverty and Environment Maps. Save Cambodias Wildlife: Phnom Penh. Data also available from <http://www.cambodiaatlas.com>

91 The complete NBSP for Cambodia is available as a download from <http://www.cbd.int/doc/world/kh/kh-nbsp-01-en.pdf>

Given the regional importance of the Tonlé Sap as a biodiversity reserve there are ethical justifications to urge other countries to support Cambodia with the provision of technical expertise or cooperation with preventing illegal trade of endangered species. The need for data sharing is also identified for decision making at local, national and international levels.

A national strategy should be drawn up to determine the long term food security and production within Cambodia that is not over reliant upon the stocks of the Tonlé Sap. The over-harvesting of marine fish, reptiles and mammals is frequently regulated by international laws. Similarly the restriction of international trade of endangered species is often accompanied by focusing attention on consumer and producer countries in parallel. The level of harvesting and export of individual species should be determined within sustainable limits. The regional negotiations over the use of the Mekong by riparian states must lead to enforceable agreements. The ethical issues here highlight the need to consider that meeting needs of the majority may seriously restrict meeting the needs of a minority. This raises issues of power and that the minority are entitled to have their voice heard. There is also a Cosmopolitanarian argument of distributive justice that suggests that upstream beneficiaries have a responsibility to downstream communities if their livelihoods are deleteriously impacted.

4.7.4 Enforcement Procedures

Cambodian development and environmental protection has been plagued by corruption and a lack of enforcement of protection regulations. This has even led to allegations of human rights or freedom of speech abuses. For example Khim Sambor, of the Moneaksekar Khmer newspaper, was allegedly shot by an unidentified gunman in 2008. He wrote articles that were critical of senior government officials covering stories on corruption, illegal logging and deforestation, overfishing and depletion of the country's fish stock, and land grabbing.⁹² With weak protection the environmental assets are vulnerable to overexploitation, which is particularly so when corrupt officials can be gagged or persuaded to turn a blind eye to such activities. The poverty in Cambodia, where household incomes are so low and the numbers of dependents within households are generally quite high, makes illegal activities with weak law enforcement, more inviting. The relevance to biodiversity is that specific protected species become more valuable and may be targeted. So, income generation schemes and education are likely to play a large part in law enforcement. Ethically this raises the importance of equity and equal rights to improved standards of living. There is also a need for continued transparency in the future allocation of fishery lots to counter corrupt practices.

4.7.5 Industrialisation of Food Production

To meet the demands of a growing population, enhance economic development and increase exports agriculture is becoming rapidly more industrialized. On the lake there is intensive fish harvesting within the lots, which are allocated for a limited tenure meaning that stake holders make little investment in long term conservation schemes. There are growing numbers of fish farms where the risk of disease to stock is increased and this cost must be borne in mind.

Arable farming in the surrounding floodplain is using an increasing quantity of pesticides and herbicides that together with nitrogenous fertilizer run-off is a serious source of pollutants in the lake as a whole. The pesticides are of particular concern if they are persistent in food chains and through bioaccumulation build level to levels that are toxic to higher predators such certain fish or bird species.

Rice cultivation is changing from tradition practices in two significant ways. Firstly there is a reduction in the number of varieties grown, tending towards the monoculture of high yield varieties (HYVs). These HYVs may only have a small number of disease resistance genes leaving the rice open to attack and crop failure. Dependency upon one variety of rice may also be unwise in the light of foreboding climate change as postulated in the final section below.

92 This story was taken from Wasley, A. (2009) 'Forest Activists' in *The Ecologist* (April 2009, p.43). There are further details of alleged human rights abuses at Asian Human Rights Appeal <http://www.ahrchk.net/ua/mainfile.php/2008/2929>

4.7.6 Climate Change

Climate change due to anthropogenic activity is already producing uncertain weather patterns in Cambodia. This has included seasonal extremes in terms of rainfall and temperatures that have led to excessive flooding and prolonged droughts. There have also been uncharacteristic unseasonal events that have led to flash floods. The direct impact of this climate change upon the Tonle Sap is under investigation. Most significant to the lake would be how the flow to the Mekong is affected as Himalayan melt water and rainfall within the Mekong catchment area change. Changes in pulse flooding may not necessarily match the breeding cycles of all fish. Flood levels may be different as well as occur at different times of the year. This is relevant in rice cultivation as many strains of deep water rice are more strongly photosensitive than terrestrial varieties, and by definition they are less flexible in their growing period. This highlights another reason for maintaining biodiversity in terms of a wide genetic resource base.

5. Law, Governance and Biodiversity

There has been, undoubtedly, a progression of ethics in the modern history of humankind that has expanded into ever greater circles of consideration for the rights of life. While this is not the first time in human history that nature has received moral consideration, as more ancient civilizations have found a balance with nature that could be called ethical or contained ethical principles, it is the clearest period in memory where example of a progression of codified laws encompassing those moral ideals and extended rights have existed.⁹³ This is not to say that earlier legal concepts such as the Magna Carta, forest protection laws, and Indian, Chinese and Roman laws for example in history have not protected animals even since the era of King Ashoka. Over the past several centuries laws have gained stronger footholds in the consciousness of the international forum, due in part to the ethical considerations of its members. This chapter considers some of the ethical considerations of current laws in relation to biodiversity.

5.1 International Law

Many of the regulations and laws relating to biodiversity that are in place today are the manifestations of states meeting their international obligations. These obligations stem from two main sources of public international law which are customary international law and treaties.

International agreements including treaties and conventions are agreements which create legally binding rules for the parties involved with reference to a particular subject matter. Legal obligations are only incurred when the state concerned ratifies the treaty. While treaties are formally written, customary international law is not. Instead, customary international law arises out of consistent state practice and a sense of obligation (*opinio juris sive necessitatis*)⁹⁴. They are binding on the states once the custom has been proven to exist.

Some of the multilateral environmental agreements which focus on the issue of biodiversity that will be discussed in detail in this section are the *Convention on Biological Diversity* [CBD], *Convention on International Trade in Endangered Species of Wild Fauna and Flora* [CITES], and the *Convention on Wetlands*.

There are a great number of multilateral environmental agreements that affect the protection and sustainable use of biodiversity and marine environment. Such conventions include *the Convention on the Conservation of Antarctic Marine Living Resources*, which protects the Antarctic marine biodiversity, as well as the *Convention on the Conservation of Migratory Species of Wild Animals*, which aims to protect the animals listed in the Convention by controlling factors that might endanger them, for example maintaining their habitat and migration path.

The *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* and the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* are examples of conventions that protect biodiversity and human health by regulating pollution and wastes. By extension of a healthy ecosystem, these treaties help to protect biodiversity by preserving the lives of the living organisms within those ecosystems.

However, there is a lack of protection of forest ecosystems at the global level.⁹⁵ Multilateral treaty agreements that are in existence often deal with trees in trade⁹⁶ or with forest ecosystems as a sub-topic. This means that not all “environmental, social and economic aspects of forest ecosystems” are dealt with

93 This modern progression begins at the Magna Carta, 1215, and progresses through the Endangered Species Act of 1973 (Nash, 1989), and extended further to the CBD.

94 *Opinio juris sive necessitates*: an opinion of law or necessity. See further under 6.1.5 *Customary International Law*.

95 There are, however, various treaties and agreements of regional or bilateral in scope between few countries relating to certain forests. For example, Norway and Indonesia's agreement to reduce deforestation in Indonesia signed in May 2010 (See further: <http://www.redd-monitor.org/2010/05/27/norway-and-indonesia-sign-us1-billion-forest-deal>).

96 For example, the International Tropical Timber Agreement (1994).

(Ruis, 2001). It is important to protect forest ecosystems as they house great biodiversity and provide a number of ecological services, for example regulation of local and global climate. Thus, it deserves genuine attention and protection in the international arena.

In addition to the multilateral environmental agreement there are other laws which affect biodiversity including agriculture and trade, intellectual property, food safety standards, transportation regulations, for example.

5.1.1 National Implementation

Each state will implement treaties (conventions) and customary international law according to their own understanding of international law. There are two main approaches to international law and each approach takes into consideration how international law relates to national law. The monist theory asserts that there is one all-embracing legal order comprising international and national law, while the dualists would view that there are two separate legal systems; international and national.

Often, a state will have different approaches to treaties and to international customary law (Bilderbeek et al., 1992). In New Zealand, for example, treaties are regarded as part of a separate legal system (dualist approach) that must be adopted and implemented by domestic laws in order for it to have any legal effect, whereas customary international law almost automatically applies in New Zealand (monist approach).

Unlike New Zealand, Mongolia has the principle that if the national legislation is inconsistent with an international treaty agreement, the treaty will apply. This principle embodies the monist approach and has been legislated in many of Mongolia's environmental laws.⁹⁷ However, there is little evidence that this principle has been used and some have seen it as a half-hearted approach of Mongolia to their international obligations.

Treaties create contractual obligations that have been agreed by the parties and are legally binding on only those who are party to it. Customary international law on the other hand, is binding on all states unless the state concerned has explicitly objected to the custom during its formation period. Once a party to the treaty, the state must observe and implement it in good faith. That is, states cannot excuse non-compliance with the treaty by saying that national law prevents them from fulfilling certain international obligations under the treaty.

Some treaties are "self-executing", that is they do not require any national legislation to bring the treaty into effect at the domestic level (Bilderbeek et al., 1992). But most treaties tend to be "non-self-executing", which requires national legislations for legal effect at the domestic level, in order to respect state sovereignty (Bilderbeek et al., 1992).

States may sometimes be able to unilaterally modify their obligations by entering a reservation when they become a party to the treaty. A reservation is a unilateral statement made by the State purporting to exclude or modify the legal effect of certain provisions of the treaty in their application to that state. However, the change must still be compatible with the object and purpose of the treaty in question. States may also make declarations, which set out their intentions with respect to applying the provisions of a treaty, as well as make interpretations which can have legal effect or may simply be interpretative.

Most multilateral environmental agreements provide frameworks, as opposed to prescriptions, for states to legislate and govern within. This flexibility allows states to adapt their obligations to their respective economic, political and social factors. If states earnestly implement their obligations into law, they can benefit greatly as the environment and biodiversity will be properly conserved and biological resources sustainably used. But such flexibility can also be taken advantage of or be improperly used by governments that have a lack of experience due to being newly formed. It may be politically convenient for States to take advantage of the flexibility by half-heartedly implementing their obligations and at the same time being able to say they have discharged their obligations to the best of their ability. Other governments that lack experience may need to go through a long process of trial-and-error of

97 For example, the Environmental Protection Law of Mongolia (1995) and the Minerals Law (2006).

laws before being able to implement a successful and effective law that will help protect and conserve biodiversity.⁹⁸

It can be said that international multilateral environmental agreements are relatively soft in their approach; they lack the force that treaties and conventions relating to human rights have.

5.2 Convention on Biological Diversity (CBD)

The CBD aspires to conserve biological diversity and to use its components in a sustainable manner.⁹⁹ It also promotes the sharing of the benefits that flows from the utilization of genetic sources without any bias or prejudice against anyone. There are 193 parties to the treaty of which 168 states have ratified it.¹⁰⁰

5.2.1 Sovereignty

Previously, biodiversity was considered to be a common heritage of humankind which implied that all were free to access biodiversity resources. There is discussion on whether biodiversity should be regarded as a global public good¹⁰¹ or a national property.¹⁰² With the advent of the CBD, however, biodiversity is now considered to be “national patrimony of host countries and is under their sovereignty” (Laird, 2005). Sovereignty in this sense however, is qualified and that qualification is that states are given a “responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment...of areas beyond their jurisdiction” (Article 3 of the CBD).¹⁰³ This is based on the international law principle of common concern, which takes into account and balances against one another two factors. One of the factors is that global issues, such as biodiversity, concerns humankind as a whole. Secondly, the principle recognises the sovereign rights of states to govern their respective territories. The principle of common concern is both spatial¹⁰⁴ and temporal¹⁰⁵.

An ethical question arising out of a state’s sovereignty over biological resources is whether or not biodiversity can be owned. Sometimes conventional morality¹⁰⁶ insists that certain entities should not be influenced by commercial values. However, conventional morality is not applicable to all human cultures and is subject to social and political changes and so it may not be a strong enough argument that biodiversity cannot be owned in terms of property rights.

From an anthropocentric world-view, where nature is viewed to serve humans, it would be acceptable for humans to have ownership of biodiversity. Conversely, it would be unacceptable when viewed from an ecocentric¹⁰⁷ or a cosmocentric¹⁰⁸ point of view.

98 For example the newly formed democracy, Mongolia. See further discussion in Hannan (2010)’s report.

99 For further information about the convention see <http://www.cbd.int>

100 For a full list of parties to the convention see <http://www.cbd.int/convention/parties/list/>. For a list of Asia-Pacific countries and their status of ratification see Table 3.

101 UNESCO Convention on the Protection of Cultural and Natural Heritage (1972).

102 UN Resolution 1803 (XVIII) on Permanent Sovereignty over Natural Resources (1962).

103 Please also refer to Principle 21 of the Stockholm Declaration (1970) which articulates the concept of limited sovereignty.

104 The spatial aspect of common concern implies that there is “cooperation of all states on matters similarly important to... the whole of international community” (Secretariat of UNEP, 1991).

105 The temporal aspect of common concern arises from “long-term implications of environmental challenges which affect rights & obligations not only of present but also of future generations” (Secretariat of UNEP, 1991).

106 A concept of proper behaviour that reflects the values of a particular social or political context. Distinguished from a moral understanding which is authoritative across space and time. http://wiki.answers.com/Q/What_is_Conventional_Morality#ixzz18M0vyYiN

107 See further under section 1.1.6. *Ecocentrism*.

108 See further under section of 1.1.11. *Cosmocentrism*.

5.2.2 Benefit-Sharing

Because states are considered to have sovereign rights to exploit biological resources that are found within their own territories, the CBD introduced the concept of “benefit-sharing” in pursuit of its goals to protect biological diversity and to ensure that indigenous rights over their traditional knowledge is respected. However, the issue of what “benefit-sharing” means in every context remains open, as there is a lack of an official and coherent definition.¹⁰⁹

The term, in the discipline of law, illustrates a situation where one accords to the other person an access to a resource in return for some form of payment, which can be either pecuniary or non-pecuniary (Schroeder, 2006). In the context of the CBD, the resource concerned in the exchange does not include human genetic resources (CBD COP Decision II/11). With consideration towards legal principles, ethical justifications¹¹⁰, and the Aristotelian concept of commutative justice¹¹¹, Schroeder (2006) provides us with a useful definition of benefit-sharing,

“an action of giving a portion of advantages/profits derived from the use of [resources, of which human genetic resources if not included,] with particular emphasis on the clear provision of benefits to those who may lack reasonable access to resulting products and services”.

An ethical issue that arises from this type of transaction is whether we should have open access to biodiversity resources (which may be seen as more ethical from an altruistic world-view), as opposed to exchanging biodiversity resources in return for some pecuniary or non-pecuniary benefit.

The altruistic view of open access is also known as the common heritage of humankind principle.¹¹² From this perspective biological resources would be available to all without prejudice or discrimination, as it is viewed that the use of these resources will be beneficial to the common good (Shroeder and Pisupati, 2010).

Theoretically, the principle is desirable as it is implied that all users of genetic resources would respect the resources as well as each other. However, genetic resources are often disrespected in the sense that they are used selfishly (as opposed to it being used for the benefit of humankind) and greedily (Shroeder and Pisupati, 2010). It was reduced to a “first come, first served principle, which gave access to the richest, fastest or most powerful” (Shroeder and Pisupati, 2010: 22).

This then does not appropriate benefits of the biological resources accurately, which leads to injustice. For example, it would be unethical and unjustified to allow a wealthy group to develop and solely profit off their access to the biological resources that have been maintained by an indigenous group for decades. In such a scenario, the indigenous group’s contribution to the wealthy group’s success would not have been accounted for.

Benefit-sharing continues to be subject to ethical analysis, and is considered by many as a just option as a contribution to the global needs. In a policy we need to consider that indigenous people are accounted for should another party generate a profit from it. The concept thereby encompasses notions of justice in exchange¹¹³ and distributive justice¹¹⁴.

109 Consider the Nagoya Protocol On Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (2010).

110 Biological diversity is a common concern of humankind (Article 15(1)).

111 Commutative justice calls for fundamental fairness in all agreements and exchanges between individuals or private social groups. (<http://definitions.uslegal.com/c/commutative-justice>)

112 Please refer to Riyuichi Ida, “Human Genome as a Common Heritage of Mankind” <http://www.eubios.info/ASIAE/BIAE50htm>, and “Birth of Universal Declaration on the Human Genome and Human Rights” (p. 50, 58, 68).

113 There must be fairness or equity in transactions.

114 Distributive justice deals with the division of existing, scarce resources amongst qualifying recipients.

5.3 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES is a convention that provides a framework for its 175 state parties¹¹⁵ to implement national legislations in relation to the regulation of trading wild animals and plants specimens (CITES website). CITES protects wildlife species that are endangered as well as those that are not endangered in order to “ensure the sustainability of trade... [and] to safeguard these resources for the future” (CITES website).

An ethical issue that arises from the convention concerns the value of animal and plant species. CITES protects both endangered and unendangered animal and plant species that are in trade. Thus, the convention focuses on the economic value of wildlife. This can be seen as an anthropocentric approach to biodiversity as the values of animals and plants are decided based on the economic value they have for humans. Furthermore, a few of CITES’ protected species (e.g. bears and whales) will often get more attention than others (e.g. corals and frogs) which may sometimes lead to deficits in protection for other animals and plants.¹¹⁶

Why do some animals/plants receive more attention, and by extension more value, than others? Some may receive more attention due to the status of endangerment that an animal or a plant has. This seems to be a logical approach as the severity is higher and so more attention and protection will be needed to preserve endangered lives. Others receive greater attention due to the animal’s charisma and adorableness as it appeals to the population at large who readily sympathise with a cute face. This is again an anthropocentric approach. There seems to be an ethical acceptance here that “human domination of all species on earth is ethically acceptable” (Garrison, 1994).

The criticism as stated above is that moral consideration should also encompass all forms of life, not just those that have value to humans. Such a criticism would be propounded by those with a biocentric, ecocentric or cosmocentric world-view. The commonality between these three latter world-views is that they ascribe intrinsic values, values that exist independently of humans, to living organisms.

Arguably though, a value assignment based on economics in international trade of wildlife may be necessary in order to ensure the sustainability of wildlife that is subject to trade (Garrison, 1994). On the other hand, it could be argued that a “price-tag” approach to nature may be inadequate for the protection of wildlife as market values and demand for goods may change unexpectedly (Garrison, 1994). Therefore, the best approach would be to take both market and non-market values into account when considering the level of protection the animal or plant concerned should be given.

5.4 Convention on Wetlands of International Importance (Ramsar Convention)

Many of the international conventions seek to protect biodiversity by regulating the trade of animals and plants, in order to prevent it from overexploitation. However, overexploitation is only one of the factors causing the loss of biodiversity. Other significant factors include climate change and the loss of habitat. The Ramsar convention is the first global convention to address the grave issue of habitat loss.¹¹⁷

The Ramsar Convention promotes “wise use”¹¹⁸ of 1907 wetlands and their resources. There are 160 contracting state parties.¹¹⁹ The term wetlands has been defined widely by the Ramsar Convention to include natural sites such as lakes, rivers, oases, estuaries, tidal flats, mangroves, as well as artificial sites such as reservoirs, fish ponds and rice paddies.¹²⁰ It has been defined by the convention as:

115 For the status of ratifications of states in the Asia-Pacific region see Table 3.

116 This issue has also been noted by the CITES programme.

117 Another habitat conserving convention is the World Heritage Convention which protects cultural and natural sites of universal values. The habitats protected by the World Heritage Convention include the Great Barrier Reef, the Everglades and the Olympic Rainforest.

118 Encompasses both the conservation of biodiversity as well as the sustainable use of biodiversity.

119 For the status of ratifications of states in the Asia-Pacific region see Table 3.

120 See <http://www.ramsar.org>

"...areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres." (Article 1.1. of the Convention on Wetlands of International Importance). Unlike CITES and other conventions that focus on the protection of plant and animal life, the Ramsar Convention aims to protect the whole ecosystem of wetlands. By extension, the Ramsar Convention protects living organisms that depend on those wetlands on the Ramsar list.

Wetlands are ecological systems which support a variety of mammals, reptiles, amphibians, fish, birds and invertebrates. They also store plant genes such as wild rice, fruits, vegetables and herbs. Simply put, some have considered it as a "biological supermarket" (Barbier et al., 1997).

From an anthropocentric view, wetlands provide many benefits to humans. For example, they supply humans with resources such as fish catches which is an economic value. There is also an indirect use value of wetlands for humans such as flood control. Others would propound that wetlands have intrinsic value independent of humans and so should be conserved regardless.¹²¹

5.5 Customary International Law

The formation of customary international law requires that there is consistent and concrete state practice over a period of time as well as a sense of obligation (*opinio juris sive necessitatis*). *Opinio juris sive necessitates* is latin for "an opinion of law or necessity", this means that an action was carried out of a sense of legal obligation, or where a rule of law requires the action be performed. Such a practice would be the norm and would be binding on states regardless of whether the state concerned has specifically consented to it or not. However, it may not be binding if the state expressly objected to the rule during the period of its formation.

Because of the unwritten nature of customary international law, it is often difficult to determine when it has been formed and what the content of the particular custom is. Especially in the environmental sphere, many national legislators and courts exercise caution in applying customary international law as a certain principle or rule may be in dispute as to whether it is customary international law (Bilderbeek et al., 1992).¹²²

Since biodiversity is a relatively recent international concern, it is unclear whether there has been any customary international law relating to biodiversity directly. General environmental customary international law, however, is better established and some may relate to biodiversity as well.

Customary international environmental law emerged out of the idea of state sovereignty and so one of the most prominent customs is the obligation of each state to not use or disallow the use of its territory in a way that would cause transboundary environmental damage (Brunnee et al., 1993). This concept has also been stated in the Stockholm Declaration (1972) and the Rio Declaration (1992).¹²³ From this custom, states have an obligation to "warn, notify, inform or consult" matters regarding serious environmental damage in another state's territory (Brunnee et al., 1993).

Another matter regarding environmental issue is the use of resources that are shared between states, for example transboundary water systems. Here, it is customary that there be equitable use of such resources.

However, the application of these customary international laws is another issue that arises from the vague and unwritten nature of these rules. For example, it would be easy for a state to avoid responsibility of environmental damage in another state's territory or a shared resource such as the ozone by claiming that there is lack of evidence in determining who is responsible. There are also environmental issues that failed to be covered by customary international law such as climate change. This is because of customary international environmental law being "bias toward the territorial interests

121 This is the view propounded by biocentrism, ecocentrism and cosmocentrism.

122 Application of customary international law will depend on whether the state's approach is monist or dualist (Previously explained under section 5.1.).

123 Principle 21 of the Stockholm Declaration (1972) and Principle 2 of the Rio Declaration (1992).

of states” (Brunnee et al., 1993). Other debatable international customary environmental laws include the custom that whales having a right to life, and that there is a customary duty on all states to protect endangered species (Bodansky, 1995).

Another debated customary law is the precautionary principle.¹²⁴ The precautionary principle is embodied by Principle 15 of the Rio Declaration 1992, which states that “Where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”. It is also recognized in the preamble of the Convention on Biological Diversity. This principle is material to the protection of biodiversity as there are still many uncertainties surrounding the extent of biodiversity issues (Bodansky, 1995).

5.6 National Law

All multilateral environmental agreements, including those that have been mentioned above, require national compliance and enforcement in order for the ethical goals of the international community to be realised. Thus, there is a need for the implementation of national policies and laws that will effectively execute the internationally agreed form of environmental protection.

5.6.1 Policy-making and Law-making

Compliance can be achieved by taking issues of biological diversity into consideration at the policy-making level, which will then lead to the making of laws that will enforce and comply with international agreements.

The foundation of a successful biodiversity management regime is careful and systematic planning, which requires a comprehensive framework of laws that clarifies responsibilities, obligations and procedures. There is no one overarching biodiversity management regime that will be able to be successfully applied in all countries due to the cultural, political and economic differences that exist within the different jurisdictions. However, successful mechanisms can be used as framework for other jurisdictions where the same problems of conservation exist. Cultural, political and economic circumstances of a particular jurisdiction will need to be taken into account by legislators in order for that jurisdiction to have an effective biodiversity management regime (Holdgate, 1999).

5.6.2 Biodiversity Legislation

As a federated country, the Malaysian Constitution accords state governments substantial autonomy over natural resources. As such, the national government of Malaysia needs the cooperation of the state governments in order to protect biological diversity. The Protection of Wildlife Act 1972 was the first indicator of the federal government’s initiative to protect biological diversity. Following this, Malaysia became party to the CBD and formulated a national policy on biological diversity in 1998, which is to use biological resources in a sustainable manner as well as conserving it for future generations (Sen, 2009).

Other legislation has also been passed by the federal government including the Protection of Wildlife Act 1972, which enabled the federal government to be directly involved in biodiversity related policy development in Malaysia. The legislation has also allowed for a unification of the states under the Department of Wildlife and National Parks, which was formed to enforce laws on behalf of the federal government. State governments have also taken on their own initiatives to protect biodiversity by implementing their own legislations and state enforcement agencies.¹²⁵

124 Many countries, especially European countries, regard the precautionary principle to be part of customary international law. But this is not accepted in other countries, including the United States.

125 For example Sen (2009) notes that the Johor state government has passed the National Parks Corporation Enactment (Johor, 1989) along with a state agency, Johor National Parks Corporation, in order to protect ecosystems within its state territory. This initiative has been followed by other states such as the Perak state government and the Selangor state government.

After India's ratification of the CBD, there were several problems with the implementation of an enforcing and complying legislation due to the differences in opinion within the government. A draft notice on the exportation of indigenous material was issued under the Foreign Trade Development and Regulation Act 1992. The notice attempted to regulate the export of biological material from the country and recognised the benefit-sharing principle of the CBD. However, major agricultural resources are excluded due to fear of adverse affects on the country's export enterprise. There are also problems in practice regarding the monitoring of exports at customs.

There have been a number of discussion groups and meetings formed consisting of environmental NGOs, researchers, activists, as well as different ministries of the government and non-government sectors. Most of the law on biodiversity, however, has not been successfully legislated. Criticisms on these discussions groups include the lack of an organisation to represent local and indigenous communities, insufficient consultation with state governments and lack of an informed debate (Anuradha et al., 2001). It is also important to note that these discussions are primarily concerned with the transfer of biodiversity to foreign agencies.

Finally, in 2002 the biodiversity legislation was passed that sought to regulate access to genetic resources and associated knowledge by foreign individuals, as well as promoting equitable sharing of benefits. Unfortunately, the legislation excludes agriculture from such protection and did not adequately address the issue of intellectual property rights.

Because of the size of India's population, one of the main critiques arising out of the biodiversity law-making process concerns consultation. Problems of illiteracy, limited access to information and lack of a legal mandate for public participation and consultation in law-making all contribute to a poorly planned and sustained approach to the consultations (Anuradha et al., 2001). Some have also said that a lack of political commitment to biodiversity has also contributed to the lengthy and inconsistent process to formulate law on biodiversity (Anuradha et al., 2001).

Australia's approach to conservation of biodiversity provides a useful model for action for other countries in the Asia-Pacific region. As a federated nation Australia's federal government faces problems of political limitations on powers relating to the conservation and management of natural resources. To solve this predicament, the federal, state and territory governments negotiated the obligations of each level of government in the Intergovernmental Agreement on the Environment in 1992, which was subsequently incorporated into federal and state statutes. State and territories have also enacted a variety of legislations to protect endangered species and ecosystems within their jurisdiction.

The main legislation that aims to protect and conserve biodiversity in Australia is the Environment Protection and Biodiversity Conservation Act 1999, which was enacted by the federal government. This legislation is an example of the integrated approach, whereby federal environmental responsibilities are placed under one statute and one set of principles.¹²⁶ There is, however, room for improvement as not all of Australia's environmental responsibilities are included in this statute¹²⁷ and a greater coordination between federal, state and territorial governments is needed.

5.7 Courts and Enforcement of Laws Relating to Biodiversity

The judiciary plays an important part in ensuring that laws are properly implemented by public authorities, private companies and citizens; environmental and biodiversity laws are no exception. Traditionally the judiciary is confined to interpret and apply statutes that have been enacted by the legislature. However, some judges are more active and innovative in their interpretations and usually will seek to apply the law in a way that most align with international environmental obligations and principles.

126 The traditional approach is a sectoral approach which means there are different statutes for national parks, endangered species, wildlife and so on (Boer, n.d.).

127 For example, Australia's responsibilities stemming from their ratification of the Convention on Climate Change has been omitted from the statute.

It would appear that enforcement of laws and sanctions for noncompliance with laws relating to the environment and biodiversity is dependent on the political will within that jurisdiction. Other limitations to the successful enforcement in the Asia region include lack of an environmental institution, inadequate funds and technical expertise (Boer, n.d.).

5.7.1 Environmental Damage and Liability

If the law provides for civil and criminal sanctions, then accordingly courts will comply. However, where there are no sanctions the courts are unlikely to be able to do anything.

In India, one of the ways in which the courts can protect the environment and its biodiversity is by upholding the right of citizens to a clean environment as a fundamental right (Nagendran and Joseph, 2004). This is a way of protecting certain ecosystems and by extension protecting biodiversity.

In terms of liability, India's courts adhere to the international environmental principles of polluter pays¹²⁸ and absolute liability principle (Nagendran and Joseph, 2004). The polluter pays principle means that polluters will be liable to compensate the losses suffered by victims, including cleaning up of and the reversal of the damage. This principle has been applied more so at the domestic level than at the international level as there is not enough support to make this principle a customary international law. The absolute liability principle is a tortious legal principle. In India, the absolute liability principle is considered strict¹²⁹ without exceptions.

India's environmental laws are enforced with criminal sanctions for non-compliance. Violations may lead to imprisonment and fines. In the case where a company is involved, the person who was in charge at the time and the company itself will be found guilty of their offence. A criticism with India's all-or-nothing approach to sanctions is that the extent of violations are not considered which means that sanctions are either too heavy or too light (Nagendran and Joseph, 2004).

The Protection of the Environment Operations Act 1997 in New South Wales (Australia) aims to reduce harmful wastes and pollution in order to protect and restore the environment, and by extension biodiversity-rich ecosystems. The Act also provides for criminal sanctions.¹³⁰

5.7.2 Potential Harm to the Environment

Courts have dealt with potential harm to the environment using the precautionary principle, which has often been included in domestic legislations. As stated earlier, the precautionary principle is the fifteenth principle of the Rio Declaration 1992 and is embodied by the CBD. Its status as customary international law is currently debated but it has been widely adopted due to many countries' ratification of the CBD.

Indian courts have also recognised this principle in environmental law and articulates that government authorities should anticipate, prevent, and attack the causes of environmental pollution (Nagendran and Joseph, 2004). As environmental pollution is one of the major causes for loss of biodiversity, this application of the precautionary principle is important in the conservation of biodiversity.

Another example of the precautionary principle in action is the Sri Lanka Eppawala phosphate mine case in 2000. In this case, the proposed development of the phosphate mine was suspended due to the adverse impacts it would have on the jungle ecosystem that supports rare plants and wild elephants.¹³¹

128 Principle 16 of the Rio Declaration (1992).

129 Standard for liability which can exist in either criminal or civil context. The rule specifies that strict liability makes a person legally responsible for the damage and loss caused by his or her acts and omissions regardless of culpability.

130 To increase public involvement and participation, the criminal enforcement actions by individuals are permitted with the leave of the Court (section 219 Protection of the Environment Operations Act 1997).

131 For more information: <http://www.elaw.org/node/1135>.

5.8 Ecotourism

By nature, ecotourism is a business that transforms the local people, their culture and the environment into a product to be sold as a package to tourists. However, a criticism on ecotourism is that it is unethical to assign economic values to people, culture, and the environment as they have inherent values that are independent of human perspective.¹³² Ethical implications aside, the industry of ecotourism are capable of making a profit while effectively reducing negative environmental effects.

Profits gained from ecotourism in developing countries are often heavily leaked to foreign companies from developed countries. In such cases, the principle of benefit-sharing of the CBD should be applied to ensure that local and indigenous communities who help to protect biodiversity are respected and are treated fairly.¹³³ However, some governments, such as the Filipino government under the Foreign Investments Act of 1991, encourage foreign investment at the expense of the domestic and local communities. Even where foreign companies are not of concern, ecotourism is likely to be dominated by the national's elites rather than by the local and indigenous community.

Since ecotourism is generally agreed to be nature-based (The Ecotourism Society, 1991), the laws enacted by countries to conserve the environment, certain ecosystems and wildlife, governs the conduct of the industry of ecotourism. For example, in the 1990's the government of the Republic of Korea, in an effort to prevent exploitation of the natural environment from the tourism industry, enacted laws and regulations protecting the environment and wildlife (Kim, 2001). Many countries have legislated to protect certain areas and national parks, and in fact these protected areas and national parks are "*a major component of ecotourism resources*" (Chettamart, 2003).

There are three prominent legislation that aim to conserve biodiversity by protecting certain ecosystems and wildlife. These are the National Park Act 1961, the Wild Animals Preservation and Protection Act 1992 and the National Reserved Forest Act 1964. They are further reinforced by prescriptive regulations issued by the Ministry of Natural Resources and Environment (Chettamart, 2003).

Thailand's National Park Act 1961 aims to provide for public enjoyment and education to the public while mitigating any adverse impacts on the park's ecosystem and its components in order to protect biodiversity for the present and future generations. Ecotourism largely serves the former of the legislation's mandate. The Tourism Authority of Thailand (TAT) has developed an Ecotourism Policy in 1997, which provides a direction for all stakeholders involved in the development and the operational aspects of ecotourism.¹³⁴ Concordantly, national parks have utilized the concepts and principles of ecotourism as a framework for tourism management.

Thailand's national parks are not open only to eco-tourists but also to other types of tourists that may not necessarily have conservation and protection of the environment and biodiversity in mind. This means that there is still a strain on biological resources in these protected areas as a result of a high concentration of tourists (Chettamart, 2003). Apart from the need for ecotourism to be more widely promoted and encouraged, there also needs to be sensitive management and development of the national parks and protected areas.

5.9 Labelling Laws for the Protection of Biodiversity

Labelling laws aid the protection of biodiversity by making the public conscious of their decisions and its effects on the environment and other living organisms. As well as making environmentally conscious decisions, consumers are also demanding ethical labelling of products that may have no immediate damage on public health or safety.¹³⁵

132 Assignment of economic value to the environment and other biological resources is exemplary of an anthropocentric approach to the environment and biodiversity. On the other hand, ecocentric and cosmocentric worldviews recognise that there is an inherent value that is not determinable by humans.

133 See section 5.2.

134 The policy includes the management of tourism resources and environment; building awareness of ecotourism, and providing training and education; encourage community involvement; develop ecotourism facilities and services (TAT, 1997).

135 For example, the 2008 Newspan survey found that Australians increasingly opt to eat free-range chicken meat and are concerned about the conditions of farmed chickens (Humane Society International, 2010).

One of the main causes of loss of biodiversity, as mentioned earlier, is the issue of over-exploitation. Purchasing power of consumers significantly contributes to efforts to alleviate over-exploitation. Consumers then need to be able to rely on labels such as 'sustainably sourced' and 'responsibly farmed'.

An example of labelling on fish products that help conserve biodiversity is that of dolphin-friendly labels on tuna products. Such labels aim to inform consumers that dolphin-friendly methods of fishing tuna have been used and no dolphins have been harmed in the process.

However, since there is no international certification body for dolphin-friendly labelling, the standard of dolphin-friendliness varies according to the law of the country of origin. Such labelling is also misleading as dolphins are not the only marine life adversely affected by tuna fishing; rare sharks and sea turtles are also caught in the process with purse seine nets (Gray, 2011).

An emerging problem is the lack of a consistent standard in the usage of labels such as 'dolphin-friendly' and 'sustainably sourced'. These labels can often be misleading as the standard and criteria for these labels are inconsistent due to a lack of effective laws. Different companies may apply different assessment criteria as to what is considered 'dolphin friendly' to their products (ClientEarth, 2011). In Australia, for example, the Greenseas dolphin-friendly label are used to show that the tuna has been caught without the use of driftnets or gillnets in Australian waters and Western Pacific Ocean; on the other hand the company John West Australia tuna cans uses the label to show that they have only used line fishing.¹³⁶ Fish labelling and other green labels need to be better regulated and have a set standard in order to not mislead consumers in any way.

Food Standard Australia New Zealand (FSANZ) have recognised consumers' demands of environmentally friendly products and ethical methods for food production and thus are currently developing regulations on appropriate labelling. However "*there's a lot of power in the hands of the food importers and the multinational food industry... who have always had a big say over what FSANZ does*" (Munro, 2010). This reality may compromise the efforts to conserve and sustainably use biodiversity as such companies prioritise their profits before the ethical and environmental concerns of some consumers.

In a submission report to the Australia and New Zealand Food Regulation Ministerial Council, the Humane Society International suggests, inter alia, the development of national standards of green labelling that is legally enforceable in place of voluntary codes of labeling.

¹³⁶ The John West Australian tuna can labelling is not monitored by an independent party.

Table 3: Country analysis of membership of environmental treaties

Country	Air Pollution	Air Pollution-POPs	Antarctic Environmental Protocol	Antarctic Marine Living Resources	Antarctic Seals	Antarctic Treaty	Biodiversity	Biosafety	Climate Change	Climate Change Kyoto	Desertification	Endangered Species	Environmental Modification	Hazardous Wastes	Law of the Sea	Marine Dumping	Marine Life Conservation	Ozone Layer Protection	Prior Informed Consent	Ship Pollution	Tropical Timber 83	Tropical Timber 94	Wetlands	Whaling	
Afghanistan	N	N	N	N	N	N	Y	N	N	Y	Y	Y	Y	NR	NR	Y	NR	Y	N	N	N	N	N	N	
Armenia	Y	NR	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y	N
Australia	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Azerbaijan	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	N	Y	N	N	N	Y	N
Bangladesh	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	Y	N
Bhutan	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	NR	N	N	Y	N	N	N	N	N	N	N
Brunei Darussalam	N	N	N	N	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	Y	N
Cambodia	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	NR	N	Y	Y	N	Y	N	Y	N	Y	Y
China	N	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Cook Islands	N	N	N	N	N	N	Y	N	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N
Democratic People's Republic of Korea	N	N	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	NR	N	N	Y	Y	Y	N	N	N	N	N
Fiji	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	N	N	Y	Y	Y	Y	N
Georgia	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	N	N	N	Y	N
India	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Indonesia	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N	NR	Y	NR	Y	N	Y	Y	Y	N
Islamic Republic of Iran	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	NR	Y	NR	Y	NR	Y	Y	N	N	N	N	Y	N
Japan	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Kazakhstan	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	N	Y	N
Kiribati	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	N	N	N	N	N	Y
Kyrgyzstan	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	Y	Y	N	N	N	N	N	N
Lao People's Democratic Republic	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y
Malaysia	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N
Maldives	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N
Marshall Islands	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	N	N	N	Y	Y
Micronesia (Federated States of)	N	N	N	N	N	N	Y	N	Y	Y	Y	N	N	Y	Y	N	N	Y	N	N	N	N	N	N	N
Mongolia	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	N	Y	Y
Myanmar	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	N	Y	Y	Y	Y	Y	N
Nauru	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	N	N	N	N	N	Y
Nepal	N	N	N	N	N	N	Y	N	Y	Y	Y	Y	N	Y	Y	N	NR	Y	Y	N	N	Y	Y	Y	N
New Zealand	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NR	Y	Y	Y	Y	Y	Y	Y	Y
Niue	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	NR	N	N	Y	N	N	N	N	N	N	N
Pakistan	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NR	Y	Y	Y	N	N	N	Y	N
Palau	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	Y	N	N	Y	N	N	N	N	N	Y	Y
Papua New Guinea	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	N
Philippines	N	NR	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	NR
Republic of Korea	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Russian Federation	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y
Samoa	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N
Singapore	N	N	N	N	N	N	Y	N	Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	N	N	N	N	N
Solomon Islands	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	N	N	N	Y
Sri Lanka	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	NR	Y	Y	Y	Y	N	N	Y	N
Tajikistan	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	Y	N	N	N	N	Y	NR	N	N	N	N	Y	N
Thailand	N	N	N	N	N	N	Y	N	Y	Y	Y	Y	N	Y	NR	N	Y	Y	Y	N	Y	Y	Y	Y	N
Timor-Leste							N												N						
Tonga	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
Turkey	Y	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	NR	Y	N	N	N	Y	NR	Y	N	N	N	Y	N
Turkmenistan	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	N	N	N	Y	N	N	N	N	N	Y	N
Tuvalu	N	N	N	N	N	N	Y	N	Y	Y	Y	N	N	N	Y	N	N	Y	N	Y	N	N	N	N	Y
Uzbekistan	N	N	N	N	N	N	Y	N	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	N	N	N	Y	N
Vanuatu	N	N	N	Y	N	N	Y	N	Y	Y	Y	Y	N	N	Y	Y	N	Y	N	Y	N	Y	N	N	N
Viet Nam	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	Y	Y	N

Jennifer Sangaroonthong, RUSHSAP, 2010

Y- (Ratification/Acceptance/Approval/Accession/Member)

N- (Not Party to/Non-Member)

NR- (Signed not Ratified)

Green labels need to be standard both nationally and internationally. Standardized green labels at the national level may be more attainable, however, as it may be difficult to achieve consensus on the criteria for certain labels at the international level due to the many economic, political and cultural differences between countries. Such differences between countries can cause misunderstandings which will then hinder the development of a sense of common involvement and joint responsibility. On the other hand, a regional consensus may be feasible as there are similar problems and interests of nations, particularly in a limited geographical or cultural region of the world. Within a region, international solutions to problems, such as that of sustainable use and conservation of biodiversity, can be intelligently carried out and commitments by states to each other are more confined and manageable. Such commonality is needed for the effective functioning of multi-lateral institutions.¹³⁷ However, the Asia-Pacific covers a large territory of diverse cultures, religions, social systems, values and different types of governance. This may then mean that a separate regional mechanism for Asia and the Pacific is needed.

At the national level, the government will need to revise national labelling laws or consider creating such a law, especially with regards to those labels that claim to benefit the environment and biodiversity in some ways.¹³⁸ To have a legal document governing such labels may be more beneficial than having different industries regulating the use of environmentally friendly labels, as the law may be able to provide more transparency and accessibility to the public. It will also mean that sanctions can be provided for the incorrect use of labels which will ensure that producers and marketers of products are more vigilant. For example, fishermen will adhere to a specific quota for fishing and use appropriate fishing methods if they are supplying to businesses that intend to use a 'sustainably-sourced' label.

At the same time, it is important to keep in mind that the consumer protection law must also be enforced.

137 The European Union and ASEAN are examples of regional institutions, which have certain regulations enforced upon all member states. Under Chapter 1, Article 1 of the ASEAN Charter (2007), one of the purposes of the ASEAN organisation is *"To create a single market and production base which is stable, prosperous, highly competitive and economically integrated with effective facilitation for trade and investment in which there is free flow of goods, services and investment; facilitated movement of business persons, professionals, talents and labour; and freer flow of capital"*. Under this purpose, it is possible for the ASEAN organisation to establish a standard form of green labelling for products.

138 Green labels such as dolphin-friendly labels and sustainably sourced labels.

6. Ethics in Policies and Strategies in Preserving Biodiversity

Preserving biodiversity necessitates action that will need to be instigated in a diversity of forums, from international to national to local. With a clear lack of consensus on what are the guiding principles, normative or other, a unique opportunity exists for non-linear approaches which incorporate the ideals of biocultural diversity. By acknowledging the role of a wide range of actors such as the roles of indigenous peoples, traditional farmers, environmental NGOs, small nations and other concerned groups the process of deciding upon the best course of actions can be diversified and summarily approached from a broad range of angles, ideally those that best preserve both biodiversity and its locally derived socio-cultural values.

6.1 Sustainability

During the 1970s protection of the environment became a pivotal issue. It was during the next decade however, that it became a universal concern and sustainable development a common goal. It became apparent that the earth's natural resources were not inexhaustible and further action was required. In 1987, the Brundtland report defined sustainable development as development that would meet "*the needs of the present without compromising the ability of the future generations to meet their own needs.*" This report was and remains crucial in the sense that it explains how economic development and environment preservation can coexist in the development process. Other multilateral environmental agreements also promote the protection of, and the sustainable use of biodiversity. The Convention on Biological Diversity (CBD) is a good example of such and highlights the international community's will to create a partnership for the preservation of the environment.

However, working towards sustainability through a common partnership is not as simple as signing or ratifying an international agreement, particularly when all states are at varying levels of development. In a book entitled *A qui profite le développement durable*, Sylvie Brunel (2008) focuses on this very idea and examines how developed countries are able to adopt sustainable strategies and policies, which often come at a higher price, while developing countries in their peak of economic development are struggling to deal with rapid growth and change without even considering the 'green' option. For example, China who uses coal as its main energy source is severely criticized for its choice, as are other states who are stigmatized as big polluters. Developing countries in these situations can transform their international image by implementing sustainable policies and strategies "*...this must be supported by incorporating sustainable development considerations into the decision-making process.*"¹³⁹ In working towards sustainability, governmental policy must take into consideration the economic, social and environmental factors of each particular context (Hammond et al., 1995).

Thailand, for example, has several policies regarding biodiversity in accordance with their obligations under the CBD; one of which the Policy, Measure and Plan for Sustainable Biodiversity Conservation and Utilization (2008-2012).¹⁴⁰ The aim of the policy is to reduce biodiversity loss and protect the components of biodiversity. The policy encourages research on biodiversity in order to raise its economic value and has in place mechanisms that will equally distribute benefits that results from the development on biodiversity. Several organizations are tasked to carry out this policy; these include the Department of Agriculture and the Department of National Parks, Wildlife and Plants.

The second strategy that stems from this policy relates directly to sustainability. The strategy incorporates the sustainable use of biodiversity, aims to protect traditional knowledge, and promoting the fair and equitable sharing of benefits arising from use of resources. The action plans include "*promoting the development of biological resources for commercial use, create incentives for conservation and sustainable*

139 Inputs from the Asian Pacific Region to the Commission on Sustainable Development at its Fifteenth Session, p.1.

140 A policy statement was made to conserve and sustainably use biological diversity in Thailand in order to achieve national ecological security and resource base, which are foundation of the country's sustainable development.

*use of biodiversity, and develop forest resources for economic use and alternative energy*¹⁴¹. From this action plan, at least 10 biological resources have been promoted for further use as a source of alternative energy, and for commercial use. It is also important to preserve traditional knowledge associated with the conservation and sustainable use of biodiversity and accordingly the government has created a national inventory on traditional knowledge and local wisdom.

One of the goals of Maldives's National Biodiversity Strategy and Action Plan (NBSAP) is to conserve biodiversity and sustainably use of its components. Some of its objectives include implementing appropriate policies and management systems for sustainable use of natural resources as well as adopting economic incentives for conservation in order to promote sustainable utilization. The government has achieved through laws and the constitution a macro strategy for biodiversity conservation and sustainable management of natural resources, and is working on reviewing existing policies.¹⁴²

Many other member states to the CBD¹⁴³ have similarly implemented their obligations by setting up policies and strategies that will promote sustainable use of biological resources and conserve biodiversity.

6.2 Biodiversity and Environmental Movements

During recent decades environmental movements that string from religious, cultural and intellectual origins have become more common. These movements can be seen as a by-product of awareness of regionally degraded ecosystems and an intermingling of cultural, social and personal beliefs which may not be perceived as being represented through current economic, political and social structures. This section first considers some case studies that exemplify cultural, social, as well as theological motivations directed at affecting change in policy related to the ecosystem or biodiversity.

A recent case of socio-cultural movements which encompasses civil society and theological environmentalism, arose at a biodiversity workshop held under the aegis of Eleutheros Christian Society (ECS) in 2009 at Nagaland, from the conference was formed Eastern Nagaland Conservation Areas Network (ENCAN) with a directive to create *"an eastern Nagaland biodiversity conservation corridor, to support each other's conservation efforts, to create a neutral space for sharing, learning and knowledge management and to address ecosystem service issues for mutual benefits."*¹⁴⁴ Such a movement exemplifies the diversity of views that find common ground in the conservation of biodiversity and the potential power that can be harnessed.

Social and cultural movements can exist in many forms and affect varying levels of influence on policy. Some indigenous peoples remain close to the biodiversity, with spiritual attitudes of conservation and preservation towards ecological systems. The traditional Maori paradigm in Aotearoa-New Zealand follows sustainability practices like leaving land fallow, where they allow food sources to recover with guided harvesting. These views have influenced environmental policy from the outset of European colonization. Social science studies conclude that many Maori feel a strong personal connection with species and that they are aware of the threats facing the species and have a strong interest in conveying traditional ecological knowledge towards conserving species such as the tuatara (Ramstad, 2007). Such a case could be useful for future examples of socio-cultural dynamics between indigenous groups and policy makers.

A common theological perspective can act as a unifying factor in regards to grass roots environmental movements. Examples can be found where religion has influenced conservation programs and ultimately policy. One such example may be found in Thailand. It was not until the 1980s that nature conservation

141 For further information about Thailand's biodiversity policies and strategies, please refer to the *Thailand's National Report on the Implementation of Convention on Biological Diversity* (available at <http://www.cbd.int/doc/world/th/th-nr-04-en.pdf>).

142 See <http://www.cbd.int/doc/world/mv/mv-nr-04-en.pdf>

143 Please see the Table 3 for the status of ratification of states in the Asia-Pacific region under the *Biodiversity* column.

144 See <http://governancenow.com/gov-next/green-gov/bio-diversity-conservation-effort-gains-momentum-nagaland>

became a widespread concern within the nation, despite operations by environmental NGOs such as Wildlife Fund Thailand and the Project for Ecological Recovery. It was not until the adoption of the issue by ecologically minded monks beginning in the late 1980s which raised the movement to a new moral level. After years of preaching ecological messages based upon Buddhist scripture, they began performing rituals to promote a deeper understanding of conservation ideals such as tree ordination ceremonies (Darlington, 1998). Such projects have often instigated dialogue with policy makers that included themes related to traditional religious beliefs and views of ecology and biodiversity.

Another example of a theologically inspired environmental movement can be found on Misali Island in the Zanzibar archipelago of Tanzania. It was a response to actions by roughly 1,600 local Muslim fishermen from Misali and Pemba islands who had resorted to the extreme practice of using dynamite blasting to recover fish in one of the most significant coral reefs in the western Indian Ocean, and an area which is a principle site for sea turtle nesting and regional biodiversity. Leaders within the Muslim community applied principles from the Qur'an and Shari'a in order to successfully halt the dynamite fishing.¹⁴⁵ That success came after years of a government ban on fishing with dynamite, reinforced by gunboat patrols and educational programs by environmental agencies which was ultimately unable to prevent the extreme practice. This example of an Islamic conservation initiative has become a model for other Muslim fishing communities around the world.

An example of an established network of faith based environmental conservation groups is the UNEP project, Interfaith Partnership for the Environment, which aims at promoting collaboration with policy makers. Another network is the Alliance of Religions and Conservation which has garnered declarations on the ethics of conservation of ecology of 11 major faiths. ARC is currently working on about a hundred conservation projects with 11 major faiths.¹⁴⁶ Therefore we can see that government policy initiatives will be implemented when combined with civil society movements.

6.3 Economics

The fact that environmental concerns are assigned economic costs and benefits raises important ethical questions of the way in which humans interact with their natural environment. When nations assign a monetary value to environmental damage, they place an economic value on environmental change (carbon trading programs, as an example). Economics can also predict individual choices and alternatives.¹⁴⁷ The economic view also supposes that prices can be "signals" for individual preferences and needs. Following this, it can be argued that economic value is a kind of ethical value system that signals what is valued by individuals. If biodiversity is valued, a high cost can be attached to it.

Conserving biodiversity is an expensive public undertaking, but the costs of a lack of management today extend beyond the future costs of species loss. Beyond these rationales, the fact that environmental concerns are assigned economic costs and benefits raises important ethical questions of the way in which humans interact with their natural environment. When states and firms compensate for ecological degradation in monetary terms, this raises questions of the fairness of redistribution. Can economic redistribution truly compensate for the effects of environmental losses?¹⁴⁸ Aside from the compensation to humans whose livelihoods have been affected, how are ecologies compensated? Other authors have noted that industrial countries are the ones who primarily make decisions, while developing countries seldom have choices or the capacity to positively influence the environmental situation. Economic forces have influence in how the global ecology is preserved. Added to this (Mendelsohn et al., 2006) noted that greater biodiversity exists in the ecologies of those poor countries that have less capacity to make economic decisions.

145 See http://ifees.org.uk/index.php?option=com_content&task=view&id=47&Itemid=61

146 See ARC's Website for project descriptions <http://www.arcworld.org/projects.asp?projectID=170>

147 There are many further nuances to the nature of individual preferences, and theories of the collective versus individual rationalities.

148 Mansbridge (1990) raises questions of the public consultation process—are all stakeholders involved in the decisions that effect the public good, and in this case, the environmental good? In making decisions that concern biodiversity, who is consulted?

Alternatively, some economic tools can protect biodiversity (Perrings, 1992; Polasky, 2005). Economic values need not be in opposition to environmental concerns. For example, by assigning high economic costs to activities producing carbon emissions, an economic system can signal a change in behavior towards those activities.¹⁴⁹ Prices can serve as signals, which can be constructed by societies to place emphasis on environmental values and objectives. The assignment of monetary value, in this case, places an ethical value on environmental choices. It can serve to allow actors to make environmentally conscious choices. Taxes and fines can deter behavior that would adversely impact biodiversity, and pro-environment subsidies that can be redistributed towards ecological preservation. When economics can signal human values, individuals can indeed make choices in favor of environmental conservation. The economic tool can be a deterrent to biodiversity loss.

The economic view is important to critical discussions of biodiversity, as economic analyses are often in “the policy mix” of countries (Sorrell, 2003). Public policy places increasing emphasis on economic analyses and metrics. Nussbaum and Sen (1993), Hausman and McPherson (1996) have critiqued the role of economics in individuals’ ethical decisions, reckoning that monetary concerns often preoccupy decision-making. Economic concerns take precedence in government and industry. States make decisions based on the cost-benefit analysis of environmental damage, but still the costs of biodiversity loss are not taken into consideration. In a rapidly industrializing world, ecological management is even more imperative.¹⁵⁰ Both economists and environmentalists can find sustainable strategies for biodiversity management, Baumgartner (2007) suggests. Economic growth does not need to hinder the biodiversity, as environmentally conducive policies can be negotiated with economic policies. While economic and ethical views are not necessarily incompatible, the two perspectives differ markedly in their conceptualization of environmental value. The economic view is not necessarily incompatible with ethical views, and economic decisions are a kind of ethical choice. This is especially important as economic values factor prominently into political and social discussions.

6.4 Lifestyle Change

Sustainable development does not only concern governments but a myriad of stakeholders. Governments, the private sector and civil society all play a critical part in working towards sustainable development. Playing such a role requires people to have a personal understanding of environmental issues to be able to trigger a change in their lifestyle and participate in overcoming the ongoing crisis.¹⁵¹

The implementation of policies and strategies at regional, national and sub-national levels are pivotal in the way they can influence change and bring a sense of responsibility for people in the Asia Pacific region. In *Sustainability and Sociology*, Redclift underlines the importance of society as well as governments, stating that “*the bounds of sustainability are set by our sociological models, as well as by ‘the real world’. Consequently, it is in our models, as well as in our policies, that we must make decisive changes.*”

Education also plays a pivotal role in the quest for sustainable development.¹⁵² It equips people for action, especially concerning the choices they make regarding their lifestyles. As the future policy and decision makers of the world, it is especially important that children have access to environmental and sustainability education. As a leading effect, it would be easier for children to adopt a “green attitude” from the very early age. In *The Value of Life*, Kellert (1996) agrees that there is an imperative need for education and thinks that “biodiversity education should seek to inform people, emotionally and intellectually, about the role of the living environment in their lives.” At the same time though,

149 Refer to ECCAP WG7 report for a discussion of the ethics of emission trading.

150 Globalization has accelerated the rate of economic change. With a strong economic and financial dimension, globalization has seen the greater ease of communication, facilitated by technologies, converging ideologies and culture (Held, 2002). Perhaps this is contributing to the greater speed of biodiversity loss. Increasing industrialization and economic growth are of foremost concern to biodiversity. Economic forces have perhaps exerted pressure on the natural ecology.

151 *It calls on us to think and act locally as well as globally. It calls for a new, deeper moral consciousness.* Yang, T. 2006. *Towards an Egalitarian Global Environmental Ethics*, p. 25.

152 Refer to ECCAP WG11 on Environmental Ethics Education.

Kellert notices a lack of support in the implementation of effective and long-term measures within the educational sector. For this reason, it is vital for governments in the Asia Pacific region to work effectively at a national and sub-national level (regional partnerships) to support the cause through the implementation of educational programs and the hiring of teachers specialized in environmental issues.¹⁵³

In addition to education, there are also a number of other ways to promote sustainability and encourage positive lifestyle change. Indeed, without communication, environmental issues would remain dead letters, with no possible change for the future. The Asia-Pacific Forum for Environment and Development (APFED)¹⁵⁴ is a good example of this: it organizes several conferences to encourage different stakeholders to speak about biodiversity and sustainable development. These opportunities for dialogues are useful in the sense that the participants can share their opinions, fears but also hopes and ideas for a sustainable biodiversity. Such conferences contribute to the process of public awareness-raising. Once again, governments in the Asia Pacific region could be facilitators and encourage such initiatives. Similarly, there are several resources which can be effective and play a major role in the promotion of sustainability, these include the media and especially the Internet. These examples are indeed a wonderful way to present environmental issues to many people all around the world.¹⁵⁵

As mentioned above, a shift towards sustainability requires changes in the daily lives of people, in other words people have to be willing to adapt their lifestyle. Such changes though are often difficult to achieve, particularly for the poor. For instance, how is it possible to curb air pollution when more than two thirds of the population in the Asia Pacific region utilizes energy from traditional biomass fuel sources?¹⁵⁶ In the same way, Brunel (2008) severely criticizes the so-called universal will for sustainable development which she considers as a religion to be converted to. Presently, only rich people can afford to adopt environmental-friendly attitudes.¹⁵⁷ To ground this opinion, Brunel takes the instance of a middle-class-French woman, a five- children mother who lives in the centre of Paris.¹⁵⁸ To be "green", this woman would have to swap her car for a bicycle (which is not convenient to transport her children), get her food shopping in several local places where items are much more expensive than in supermarkets, recycle and using non-polluting (but expensive) energy supplies...Adopting such a lifestyle would not only bring her back to the woman's traditional role it would also be an unproductive use of time and money. In this sense, efficient and accessible measures in the Asia Pacific region have to be implemented to improve people's opportunities in working towards sustainable development.¹⁵⁹

6.5 Tourism Policy

In many countries, ecotourism is currently being considered or implemented as an alternative tourism policy, with the recognition that the social-economic, environmental and political coordination must exist to ensure sustainable development. Policy serves as guidance for various activities and programs to ensure the effective and successive development of ecotourism. The Chinese National Tourism Administration (CNTA) officially launched the Chinese Year-2009 of ecotourism¹⁶⁰ with the slogan,

153 *Towards an Egalitarian Global Environmental Ethics* (in Kellert, 1996, p. 38).

154 The Asia-Pacific Forum for Environment and Development (2009). *APFED Policy Dialogue Report Conserving Biodiversity and Promoting Sustainable Development - Key Agenda for the CBD/COP10 in 2010 and Future Challenges*. <http://www.apfed.net/publications/index.html>

155 Inputs from the Asian Pacific Region to the Commission on Sustainable Development at its Fifteenth Session. Op., Cit.

156 Brunel (2008)'s example in *A qui profite le développement Durable?* can also illustrate the life of a woman in the Asia Pacific Region.

157 For further information about the question of gender equity and environment, please read the ECCAP Working Group 15 draft report *Gender, the Environment and Energy Technologies*. <http://www.unescobkk.org/rushsap/ethics-and-climate-change/energyethics>

158 For further information about Chinese ecotourism year. Chinese Hospital News (2008).

159 Sikkim set up a panel for ecotourism policy (2010).

160 Further information regarding the cooperation in tourism sector between ROK, Japan and China. China daily (2010). http://www.chinadaily.com.cn/cndy/2010-08/27/content_11210843.htm

“being a green traveler and experience eco-civilization”, which is part of overall planning on building an ecological civilization as outlined in the 17th National Congress of the Communist Party of China (CPC). This requires each level of tourism departments to focus on ecotourism themes in major fields and sectors.

At the same time, many tourism policy makers are considering or have implemented the adoption of different policy strategies recognizing that tourism must operate within a region’s capacity limits, among which the sustainability of the ecosystem. The plan advocated in the Ecotourism Conference held in Dalian, China in 2008 is regarded as the most comprehensive document on ecotourism, which specifies the mission, goals, types of ecotourism, roles of ecotourism stakeholders, etc. (Wang et al., 2009). Similarly, Sikkim also sets up panel for ecotourism policy to ensure the vision of making Sikkim the “Ultimate Ecotourism Destination” is fully achieved in the years to come.¹⁶¹ Regionally, Lee and Lee (2008) perceived that ecotourism could be one of the most promising fields of regional cooperation of the Republic of Korea, China and Japan. It also appears that promising discussion and cooperation will facilitate the improvement of tourism policy within the three countries. One significant improvement is Republic of Korea’s and Japan’s modified visas requirements and simplified procedures for Chinese tourists.¹⁶²

On a global level, United Nations World Tourism Organization (UNWTO) Global Code of Ethics for Tourism¹⁶³ was approved by the UNWTO General Assembly meeting in Santiago, Chile in October 1999. One highlight of Article 3¹⁶⁴ is that all the stakeholders involved in the tourism sector should seek to safeguard the natural environment and strive towards sustainable growth. In addition, the Quebec Declaration on Ecotourism¹⁶⁵ issued in 2002 highlights the role of government especially, in tourism policy, to conserve the natural heritage and biodiversity. As ecotourism itself is nature-based tourism dependent upon natural resources, the UNWTO Global Code of Ethics and the Quebec Declaration will serve as a guideline and also an obligation for the governments to consider biodiversity conservation in their tourism policy making process, especially in regard to ecotourism.

Within a national and regional context in the tourism policy making process, legal directives, cultural principles, social inclusion, biodiversity conservation and national interests have to be coordinated and consistent. Environmental ethics is one perspective that needs to be taken into consideration. “Ecotourism projects that are not sufficiently informed or guided by environmental ethics are easily being transformed into just another type of mass tourism where nature is confined to small reserves and/or treated as a commodity to be bought and sold.” (Smith, 2009). Therefore, it is necessary to strike a balance among national, sub-national and local-sector interests and choose the respective instruments to stimulate genuine changes in human behaviour, making tourists fully aware of their actions’ immediate impacts on environment, but also on the well-being and survival of local communities (Psarikiidou, 2008). Therefore, the tourism policy as a legal instrument should have a significant role in shaping sustainable development within a more non-anthropocentric worldview and respectful to the intrinsic value of species and ecosystems framework.

The tourism policy varies according to different criteria based on different perspectives. Two highlights from Richter (1993) in his “Tourism Policy-making in Southeast Asia” report are that policy-making is based on tourist segmentations and centralization or decentralization system.

161 UNWTO Global Code of Ethics for Tourism comprises 10 articles serving as a comprehensive set of principles with the purpose to guide stakeholders in tourism development involving governments, communities, visitors and professionals in the tourism sector. For further information, please refer to <http://ethics.unwto.org/content/global-code-ethics-tourism>

162 Article 3 states that tourism is a factor of sustainable development and all the stakeholders in tourism development should safeguard the natural environment with a view to achieving sound, continuous and sustainable economic growth geared to satisfying equitably the needs and aspirations of present and future generations.

163 For further information regarding the Quebec Declaration on Ecotourism, refer to <http://www.gdrc.org/uem/ecotour/Final-Report-WES-Eng.pdf>

164 Further information about the tariff <http://www.tourism.gov.bt/plan-your-trip/travel-requirements>

165 Definition of ecotourism by the international ecotourism society. “Responsible travel to natural areas that conserves the environment and improves the welfare of local people.”

The criteria regarding the segmentation of the tourists in the tourism policy-making is essential. This criterion will focus on what kind of the tourists nations will attract. In the case of Bhutan, the Bhutanese government set a high tariff¹⁶⁶ to prevent mass tourism and to attract a selected segment of upper-class tourists who are primarily interested in exploring the Buddhist culture and the Himalayan Region (Gurung and Seeland, 2008). However, this policy is questionable. Gurung and Seeland (2008) suggested that throughout the process of rural development, little process has been made regarding ecotourism. They criticized the policy-makers and stated that their main interest was in foreign exchange to modify the policy without taking the wide impact of ecotourism on the rural community into consideration. One example is the human-wildlife conflicts that occur in the protective areas, the wildlife sometimes will be viewed as a threat to agriculture by the local people. In the definition raised by International Ecotourism society states that ecotourism should improve the welfare of people¹⁶⁷. Regarding these drawbacks, the authors proposed that the local control of the local ecotourism business in order to diversify the ecotourism products and the establishment of a community development fund¹⁶⁸ to compensate the loss of farmlands to extend ecotourism's benefits to rural communities, which in return will help build up the harmonious relationship with the wildlife animals and the tourists.

Richter (1993) also examined the criteria regarding centralization and decentralization in tourism policy-making. She argues that in developing nations' tourism policy will generally be centralized. Forsyth (1995) noticed that due to the fragmented nature of the tourism industry, different sectors have different objectives in their support of sustainable tourism, which are often not consistent with each other. The government needs to bear the responsibility to support the establishment of ecotourism, such as the drafting of the guidelines, providing education and supporting nonprofit endeavors (Wang et al., 2009). Jenkins and Henry (1982) also support this idea by stating that in the absence of a strong and experienced private sector, the government' active role in tourism development is essential. However, the authors proposed that these roles vary according to the situation and needs of the community, industry and one can expect the roles to change over time. In the analysis of Zhang et al. (1999) on the tourism development in modern China, the roles of the government as an operator, regulator, investment stimulator and educator vary in different historical periods starting from the adoption of open door economic reform policy (Gray and Campbell, 2007; Wearing, 2001, 2004).

An important criterion advocated by Lai and Nepal (2006) suggested that tourism policy needs to consider the tourism area life cycle (TALC).¹⁶⁹ Previous studies found that all communities at an early stage of tourism development tend to hold favorable attitudes (Butler, 1980). Similarly, Zhang et al. (1999) point out that establishing a framework which involves the coordinators, planners and regulators in initial stages of tourism development is critical. The tourism policy should vary accordingly with the tourism area life cycle and serve as a stimulator to provide various concessions and incentives to entrepreneurs in tourism related activities. One typical example is in the case of Zhangjiajie National Forest Park, China. When entering the stage of consolidation starting from 2000, the government has been making continuous efforts at various levels to market and advertise the park internationally with major focus on South Korea. This market strategy could be perceived as a signal identifying the Zhangjiajie, China entering the stage of consolidation but also should be perceived as an inner requirement of this stage to push the government to modify their tourism policy.

The community-based ecotourism approach advocated by Gurung and Seeland (2008) in the Bhutan case study proposes establishing an appropriate policy framework where local communities would

166 There is no general definition for a community development fund. The idea is that the fund generated from tourism development could contribute to the community.

167 For further information regarding the roles of the governments, see Zhang et al., 1998, *An Analysis of Tourism Policy Development in Modern China*.

168 Tourism area life cycle (TALC) is measured by tourist number and time line. It involves a six-stage evolution of tourism, namely exploration, involvement, development, consolidation, stagnation and post-stagnation. The last stage of post-stagnation contains decline, rejuvenation or stabilization. This model is aimed to assess and measure a tourism destination's development (Butler, 1980).

169 Volunteer tourism refers to those tourists who, for various purpose, volunteer in an organized way to holidays that might involve aiding or alleviating the material poverty of some groups in society, the restoration of certain environments or research into aspects of society or environment (Wearing, 2001).

be able to manage micro-facilities like ecolodges and ecoresorts in particular. This approach would be compatible with traditional Bhutanese society valuing communal harmony. It is no surprise that if not managed well, this approach will lead to the leakage of the benefits and economic inequality. Regarding the leakage, the authors (2008) suggested a community development fund so that the ecotourism benefits could be shared equally among community members, which will substantially contribute to National Gross Happiness. Similarly, Wang et.al (2009) also suggested that the Chinese government should place emphasis on community-based ecotourism. As indicated in the principles, successful ecotourism should be comprised of three fundamental elements; i.e., preservation of nature, education of tourists, and ensuring there are benefits to local people.

Another approach could be volunteer ecotourism. Volunteer ecotourism is regarded as a new form of alternative tourism with specific emphasis on the role of volunteers on ecotourism that is coherent with the principles of ecotourism. "Volunteer ecotourism as a bright alternative that promotes host-self determination, local control, sustainability, environmental stewardship and the privileging of local culture and values."¹⁷⁰ In Gray and Campbell's study (2007), it examined the volunteer ecotourism in terms of aesthetic, economic and ethical values and though they didn't make a final conclusion on how the volunteer tourism could work out, they hold positive view of developing volunteer ecotourism. Brightsmith et al. (2008) further examined volunteer ecotourism in their study that volunteer tourism is beneficial to ecotourism based on the fact that the volunteer tourism¹⁷¹ could be a means of providing funding and labour to the local community as well as the biology conservation and suggested a mutually beneficial triumvirate model combining ecotourism, conservation biology, and volunteer tourism to maximize the benefits.

170 Further information regarding the model referring see Brightsmith et al., 2008, *Ecotourism, conservation biology, and volunteer tourism: A mutually beneficial triumvirate*.

171 As a result of a feedback loop of which biodiversity plays an integral part and the direct correlation between the decrease in plants and soil organism species and soil erosion and nutrient loss which spirals into further biodiversity loss etc. (Millennium Ecosystem Assessment, 2005).

7. Conclusions

Understanding ethics and biodiversity is a fruitful exercise, as it may lead one to consider the immensity and complexity of the dynamics of life balanced through the mutual reliance and dependency that all species share, as no species exists alone. Humans in general have not often been motivated by ideals associated with any concept of a healthy balance with other species. It could be said that our modern relationship with biodiversity can be summarized as parasitic, as we have survived and thrived at the expense of other forms of life. This report contends that our ethical awareness must grow in relation to biodiversity, and the benefits of doing so will be wide ranging and positively affect the well-being of humans and non-humans alike.

A major achievement in ethical evolution came after the outset of the invention of nuclear weapons as previous generations were able to avoid actions which would have left Earth uninhabitable for humans. Remembering this evolution of ethical understanding, of co-existence with other humans as being preferable to self-extermination, may once again be useful as we try to redefine our co-evolution with other members of the biosphere. The wide agreement to the CBD and CITES have assisted increase in awareness of the values of biodiversity, and provided a stimulus for national policy development.

As a species we are once more faced with the a serious challenge to our well-being and possible self-extinction if the trends extend to the worst scenario, through our contribution to direct and indirect drivers of biodiversity loss and climate change, which are contributing to shifts in the ecosphere such as the potential for spiralling soil erosion resulting in accelerated desertification and loss of species. With these challenges comes an opportunity to gain a transformative realization of our role within the vast network of millions of species which maintain what most would consider as a healthy Earth.

The challenges to overcoming this potential loss of life are arguably the most difficult policy choice in environmental ethics. The degradation of the integrity of the ecosphere is not immediate and it may be tempting to put off the necessary shifts to try and glean every last benefit of the old paradigm, but fulcrum points exist and most estimates assure that we are on the edge of a slippery slope which may end in the loss of the beauty that is the diversity of life on Earth. However, the plethora of action and thought from concerned institutions and individuals who hope to avert such a tragedy suggests that like the calamity of nuclear annihilation, humans can once again overcome the obstacles towards a new ethical awareness and evolve towards a mutually symbiotic role with the biosphere and the biodiversity that is life on Earth.

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