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INTERGENERATIONAL EQUITY FOR BIODIVERSITY CONSERVATION: IMPLICATIONS AND PROSPECTS

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ABSTRACT

The rights of future generations to enjoy sustainable development have been formally recognized internationally. The dominant economic paradigm involves no explicit recognition of the rights of future generations. Thus, it gives rise to outcomes of dubious intergenerational equity merit. Rawls' contractarian theory attributes intrinsic value to value the rights and is considered there in relation to the intergenerational distribution of natural resources. An incremental and adaptive learning process in the use and distribution of natural resources is recommended in order to ensure the well being of future generations. Three degrees of intergenerational equity are derived: (i) extensive; (ii) intermediate; and (iii) minimal. In terms of biodiversity conservation, this implies an ethical base for countries to fund the provision of protected areas with economic assessment being focused on: (1) Facets of biodiversity; (2) Ethics and equity; (3) Implications for biodiversity conservation and prospects.

Keywords: biodiversity, intergeneration, equity, sustainable development, natural resources, natural capital, manufactured capital

INTRODUCTION

The right of future generations to enjoy sustainable development has been recognised internationally through the convention on biodiversity of the UNCED in June 1992. The objectives of the convention are the conservation of biodiversity, its sustainable use for the benefits of both current and future generations, and the equitable sharing between countries, of the products derived from gene stocks. Three principles adopted in the final declaration of the conference (Rio Declaration in

Environment and Development) make explicit the preferred underlying approach to biodiversity policies.

a) The right to development should be achieved by equitably meeting the development and environmental needs of the current and future generations;
b) Environmental protection shall constitute an integral part of the development process so that sustainability may be achieved; and
c) The precautionary approach should be widely adopted protect the environment.

Biodiversity is an integral attribute of the biosphere, which provides the resource base and the environmental services needed to support life on Earth and to maintain viable economic systems. Hence, the implications for biodiversity conservation policies of seeking to achieve intergenerational equity are analysed by addressing the wider issue of the use of natural capital.

The recognition that future generations have rights has not had a prominent and explicit place in most economic studies biodiversity. For instance, some authors have discussed methodologies to value biodiversity and to prioritize species conservation efforts (Randall, 1986, 1991; Tisdell, 1990). Norgaard (1987, 1988) has considered the economics of biodiversity from a co-evolutionary point of view, stressing the importance of biodiversity for the evolution of the ecological and economic systems. Swaney and Olson (1992) have agreed, from an institutional standpoint, that Western societies should change their lifestyle in order to reduce the loss of biodiversity, which negatively affects the lives of indigenous people.

This paper takes as given that future generations have rights. It expounds on the question of what constitutes intergenerational equity in natural resources use. The analysis is carried out by: firstly (I) delineating the ecological and economic facets of biodiversity; secondly (II) analysing ethics and equity; and (III) ending by the implications and prospects.

FACETS OF BIODIVERSITY

The concept of biodiversity is a complex one. It is therefore helpful to consider first its ecological aspects and then its economic features.

Ecological Aspects of Biodiversity

The term biodiversity is used here to refer to the diversity of genes, species, populations, communities, ecosystems, and also comprises the linkages between these different levels of the biological hierarchy. This is the meaning of biodiversity adopted in the Convention on Biodiversity adopted by United Nations Conference on Environment and Development (UNCED). The term biodiversity is also used in the all-encompassing meaning of totality of biological resources (McNeely et al., 1990). Problems may arise in analyzing biodiversity issues if this dual meaning is not recognized.

Genetic diversity can be considered at different levels (e.g. population, species), and determines the physical characteristics of a species, its productivity and resilience and provides the basis for speciation. Species diversity refers to the variety of species within a specified area. The degree of difference among species (taxonomic diversity) in an area is also relevant to assess species diversity. The existence of a species in geographically distinct areas is important in order to maintain diversity in the gene pool and do protect the species against events such as epidemics of disease and predators that could exterminate some populations (Norton, 1987). Biological communities (i.e. association of species) found in distinct patches (e.g. forest are the biotic component of ecosystems. The distinct associations in which species are found important as they may lead to varied genetic dynamics and evolutionary processes (Norton, 1987). Ecosystem diversity is more difficult to measure and it is normally considered at a national or sub-national level, such as at the landscape or regional level. At the landscape level, diversity includes a variety of ecosystems and important due to the bio geographical characteristics (e.g. patterns, juxtapositions and interconnectedness), which allow for the free movement of individuals and for the maintenance of the shifting patterns of ecosystems (Noss and Haris, 1986; Salwasser, 1991). Finally, biodiversity may be considered at the biosphere level. Assessing the status of biodiversity at this level is useful in order to gain an appreciation of global trends, but it is certainly difficult, if not impossible, to manage biodiversity at this scale.

Ecological research has greatly furthered knowledge on the complex aspects of biodiversity, such as ecosystem changes, habitat patchiness and on the role of natural and human induced disturbances. However, many and fundamental questions about several aspects regarding the specific levels at which biodiversity may be considered and their linkages remain unanswered. For instance, nothing is known about the impact of habitat fragmentation on genetic diversity and how biodiversity influences the ability of ecosystems to withstand stress; nor is it known how landscape fragmentation impacts on the functioning of ecosystems.

In concluding this section, it is useful to consider the approximate current state of species diversity at the biosphere level. There is great uncertainty about the number of existing species, but estimates stand about five and thirty million (Wilson, 1988b; Erwin, 1991). Some of the major proximate factors affecting biodiversity are ecosystem destruction and fragmentation, pollution, species, over-harvesting and the invasion of exotic species, with the human-induced extinction rate at between 100 to 1,000 times the non-human induced rates (Reid and Miler, 1989). The potential species loss resulting from these processes has been estimated in the range of 25% to 50% of al species over the next fifty to one hundred years (Bawa et al., 1991; Panel of the Board on Science and Technology for International Development, 1992); Bawa et al. (1991) estimates that, after such an extinction event, it would take 20 to 30 million years to return to the present number of species, if further species loss due to human influence is excluded and assuming the same recovery rate experienced after the Cretaceous era.

Economic Aspects of Biodiversity

Ecosystems provide services that are of direct economic value. Raw materials enter the economic process as inputs and other resources such as food are directly consumed. Biodiversity provides an insurance against epidemics of diseases and predators, crop yield variability and contributes to maintain crop productivity under different climatic conditions (Groombridge, 1992). Ecosystems also provide more culturally determined services such as the fulfilment of demands for aesthetic goods. Apart from their economic value, various species and ecosystems have spiritual meanings in many different societies.

In order to determine an efficient allocation of resources, part of the economic literature on biodiversity attempts to derive its economic value by estimating the value of species. What is actually measured in this framework is the value of the biological resources of a specific area, not the contribution of the diversity of those biological resources to the economic process. At a certain point in time, the biological resources of two geographical areas could exhibit an equivalent value; nevertheless these areas could display very different degrees of diversity (e.g. an extensively mono cropped landscape vs. a patchy landscape). The contribution of biodiversity to the provision of biological resources might be better seen from a dynamic standpoint, e.g. by comparing the performance of diverse systems against that of non-diverse systems.

From a dynamic, evolutionary standpoint the assessment of allocative efficiency is not the main focus of the analysis. ‘In a world of uncertainly, no one knows the correct answer to the problems we confront… The society that permits the maximum generation of trials will be most likely able to solve problems through time’ (North, 1990 p.81). Two relevant matters are contained in this passage. First, in an environment characterized by uncertainty, flexibility may be maintained by keeping open a wide range of options. This enhances the probability that as system is sustained in the event of failure of one or more of its components (be they ecological or social). Second, diversity leads to different patterns of experimentation, which may result in a further increase in diversity and new ways of solving problems. This is of particular relevance to the economic process. Marshall (1910; cited in Carlsson and Stankiewiez, 1991) recognized that the tendency of individuals to variation is a major source of progress. The opportunity to innovate is supported by a high degree of diversity in the natural resources available. This can lead to the diversification of the goods and services produced, which is a major cause of economic change.

Biodiversity is a prerequisite for economic adaptability and provides a diversity of options for economic development. On these propositions, it may be argued that the economic analysis of biodiversity should not underestimate the fact that the diversity of natural resources per se contributes to the evolution of economic systems over time. The above arguments suggest that biodiversity is an integral attribute of what is referred to tin the recent economic literature as natural capital. To assess a holistic fashion the implications of biodiversity conservation initiatives for intergenerational equity, this issue is approached in the wide context of the distribution and use of natural capital (NC).

ETHICS AND EQUITY

To clarify the issues underlying the intergenerational distribution of natural resources and of biodiversity, the ethical underpinnings of total utilitarianism (hereafter referred to as utilitarianism), which is the basis of the dominant economic paradigm, and of the contractarian theory developed by Rawls (1972) are considered. Rawls’ theory start from the same human behavioural model as utilitarianism but it arrives at substantially different conclusions is regards to intergenerational equity.

Before proceeding with the analysis it is worthwhile making explicit that the issue of the optimal population policy is abstracted away in this paper. The major reason for doing so is that the availability of natural resources is only one of the numerous factors that may influence population growth, i.e. the number of individuals who will be born in each generation.

Three requirements are at the basis of utilitarianism (Sen, 1987). Firstly, only utility has intrinsic value. Hence, utility is the only measuring rod needed to judge the goodness of some action (welfarism). Secondary, utility is measured by considering only the total of all utilities (sum-ranking). Thirdly, choices are based on the goodness of the consequent outcome (consequentialism). A theological theory such as utilitarianism judges the rightness of an action according to its consequences. If fulfilment of wants is said to be the exclusive good, any action that achieves this end is right. Hence, under a utilitarian maxim, the consumption' of an ice cream of slavery is right, so long as it satisfies wants.

At the basis of the utilitarian paradigm is the conceptualization of a person as a self-interested rational being. Economic man is construed by assuming that individuals are rational, where rational behaviour is equated to as self-interested seeking stance. Thus, people's actual behaviour is assumed to be well-described as the pursuit of self-interested maximization. In this behavioural model, well being is solely a function of utility (which is normally assumed to depend only on one's own consumption), the individual maximizes utility and each action is guided by the pursuit of one's aim. Several studies have questioned the validity of the assumption that actual human behaviour in economic matters is well approximated by purely self-interested behaviour. There have been attempts to include altruism in the neoclassical economic model of human behaviour (Margolis, 1982). However, neoclassical economists do not normally adopt these amended models, one reason being that they would make any applied analysis 'next to impossible'.

Utilitarianism does not attribute intrinsic value to social and economic equity; the goodness of equity is judged on the basis of its contribution to an increase in total utility. In relation in intra generational equity if all people had same utility function, total utility would be maximized by an exactly equal distribution. Of course, this case is only hypothetical given the differences that exist in people's preferences. Sen (1982, Ch.16) notes that individual preferences differ and a Utilitarianism approach would attribute less income to a person (A) who receives less utility at any income level than another person (B). This distribution would maximize total utility. However, A would be worse-off than B, because she receives less income than B and further obtains less utility from that level of income when compared with B.

Sen's example can be extended to an intergenerational context. If the objective is the maximization of total utility, a generation G that received less utility at any given level of resource use than generation J would be assigned a lower resource endowment than J. Hence Utilitarianism could lead to solutions, which are dubiously equitable. Even it is assumed that there was agreement on the ethnical basis of utilitarian, it is obvious that it would be difficult to apply such an ethnic to intergenerational matters. Welfare functions are elusive constructs with regard to current time questions, and this is more so in relation to issues relating to the future, as the needs and values of future generations are unknown. The consideration of altruistic behaviour (e.g. bequest values) might lead to distribution patterns more equitable then those arising from the utilitarian model grounded on selfishness. However, this resource distribution pattern would reflect the current generation's 'selfish altruism' (page 1977). That is, there would be no assurance that future generations' wants and needs were satisfied. The contractarian theory developed by Rawls (1972) starts from the human behavioural model as utilitarianism but it arrives at substantially different conclusions in regards to intergenerational equity.

The agents considered by Rawls (1972) are rational self-interest individuals. However, this contractarian theory is developed as an alternative to Utilitarianism as it seemed unlikely to Rawls that Utilitarianism would be adopted as role for the basic structure of society. The reason proposed by Rawls is that it is implausible that rational self-interested persons would embrace a principle which may require personal sacrifice in order to maximize the total utility of society and which does not guarantee personal self-respect to every-body. The latter is seen as necessary if people are 'to pursue their conception of good with zest and to delight in its fulfilment' (Rawls, 1972 p. 178).

The two principles of justice which Rawls specified as the constitution of a society and will regulate all further agreements, are agreed upon in the 'original position' (OP). They affirm, lexicographically, equality of rights in basic liberties among individuals and that choices are to be made so that they benefit the least advantage in society and provide for equal opportunities. In Rawls' OP, individuals are brought together and are assumed to be under a 'veil of ignorance'. They do not know the position they occupy in society or their endowments, but they do know basic facts about society such as political, economic and psychological principles. This sets up a fair procedure, which leads to the adoption of principles, which can therefore be considered fair.

This approach to intergenerational equity does not recognize that the obligation to avoid harm may be more vital than attempts to improve well being (Barry, 1977).

Rawls assumes that persons gathered in the OP are contemporaries. To extend the analysis (which is mainly concerned with intra generational justice) to intergenerational justice, a motivational assumption is introduced. It is assumed that agents in the OP do care for their siblings. This creates a problem of consistency in the theory. The aim of the theory is to derive ‘all duties and obligations’ from a rational approach.

An application of Rawls’ theory to intergenerational distribution of natural resources is due to Page (1977), who avoids the problem just discussed by assuming that the agents in the OP are ‘all generations’ and that they are ignorant about which generation they will belong to. It is suggested by Page that in the OP agreement would be reached on: (i) the provision of the conditions needed for permanent liveability (which may be taken as the assurance that life supporting systems would not be disrupted), and (ii) the need for generational inter temporal self-sufficiency.

One criticism to the application of Rawls’ theory to intergenerational justice, of particular relevance here, is that there seems to be a problem of circularity. That is, the principles adopted in the OP may determine how many generations will exist and consequently how many generations will be represented in the OP (Pasek, 1992). The above issues are now considered.

IMPLICATIONS FOR DIVERSITY CONSERVATION AND PROSPECTS

The arguments of the previous two sections may now be brought to draw the implications they hold for biodiversity conservation and the distribution of NC across generations. It was noted that biodiversity, which is an attribute of RNC, refers to the diversity within the several levels of the biological hierarchy and their linkages. Ecosystems and ecosystems functions, which are critical to the maintenance of biodiversity and of ecological functions, should be defined and criteria to conserve them established. It has already been noted that many uncertainties exist in regard to the ecological aspects of biodiversity. Hence, the identification of critical components of RNC which influence the condition of biodiversity is not straightforward, NC, and particularly its RNC component, provides some ecological functions that cannot be provided by MC. The relationship between NC and MC in the economic process may imply that a decrease in NC cannot be compensated by an increase in MC. However, it has been noted that the application of MC may enhance the stock of NC. This would attenuate the possible constraining effect on the economic process arising from the limited availability of NC.

Protected areas are considered among ‘the most valuable tools’ for maintaining biodiversity (Reid and Miller, 1989); a large proportion of endemic species could be protected by allocating a relatively modest land area protected areas. Nevertheless, it has been remarked that the majority of biodiversity is not found in protected areas but in landscapes managed by local people (Alcorn, 1991). Also, the current approach to the protection of biodiversity in protected areas has been criticised by Noss and Haris (1986) because, among other reasons, it does not deal effectively with biotic change. Rather, it focuses on single protected areas instead of whole landscapes and it concentrates on species and populations instead of ecosystems and landscapes in which they interact.

It is on this basis that the concept of bioregional management has been proposed for the conservation of biodiversity. A bioregion may be described as an area defined according to bio geographical characteristics such as patterns, juxtapositions and interconnectedness, whose boundaries are determined by the geographical limits of ecological systems and human communities. The bioregion should be sufficiently large to ensure the viability of ecosystems, the maintenance of ecological functions and to contain human communities (WRI et al., 1992). The consideration of biodiversity at the bioregional level allows the integration of protected areas with the surrounding landscapes. It also makes possible the identification of components of RNC which may not be of outstanding diversity value in themselves but which contribute to the maintenance of ecosystem functions. Once critical landscape processes have been identified, eventual modification of components of RNC may be carried out without impairing the functioning of the system.

To summarize this section, NC may be subdivided into NNC and RNC, with the later composed by critical RNC and other RNC. It has also been argued that MC is not a substitute of NC; however manufactured (MC) and human capital (HC) can be used to extend the life of non-renewable natural capital (NNC) and to restore the stock of RNC.

Decisions about the distribution and allocation of natural resources are based on specific ethical viewpoints.

Choosing a pattern of resource distribution generations is not only a question of finding the one that is most equitable. The agents in the OP ‘will not enter into agreements they cannot keep, or they can do so only with great difficulty’ (Rawls, 1972: 145). In terms of the problem addressed here, this implies that it is necessary to identify which resource distribution pattern can actually be achieved.

This is influenced by several factors such as the socio-economic conditions of a specific country and the knowledge of the factors, which make the sustainable use of ecosystems possible. This implies that one, ‘optimal’ (from an intergenerational equity point of view) resource use pattern cannot be identified. Three patterns of resource use are outlined below and are referred to as degrees of intergenerational equity. The specification of multiple resource use patterns is suitable to an incremental and adaptive learning process, and it also facilitates the identification of objectives to be adapted in the ‘real-life’ political process.

Three degrees of intergenerational equity in resource distribution may be distinguished:

(i) Extensive intergenerational equity, requiring equitable access to NC, this may be achieved by not reducing the stock of RNC and by progressively facilitating the substitution of NNC with RNC in the economic process. This degree of intergenerational equity roughly corresponds to the Lockeian principle that each generation should bequest to the following generations at least an equivalent resource base (Kavka, 1978).

(ii) Intermediate intergenerational equity, requiring only non-negative changes in the stock of RNC. This could imply that the stock of NNC is progressively depleted without consideration of the impact on future generations.

(iii) Minimal intergenerational equity, requiring the maintenance of critical RNC, which provides life-supporting functions. This concept of intergenerational equity is the one that is closer to the obligation not to harm future generations.

It may be observed that it is in the case of minimal intergenerational equity that the interests of the current generation and of future one coalesce the most, as it is indisputable that all generations need life supporting systems. Also, as shown in the previous section, different generations may not have diverging supporting systems. Also, as shown in the previous section, different generations may not have diverging interests in maintaining a non-decreasing level of RNC (intermediate intergenerational equity).

Biodiversity, it has already been noted, it is a critical factor in securing the continuing functioning of life supporting systems. The conservation of biodiversity at the bioregional level would mean that considerable progress in achieving intermediate intergenerational equity would be made. In fact, protecting biodiversity at the bioregional scale implies that RNC is managed in a sustainable fashion. While protected areas may be regarded by some of the most important way of protecting biodiversity, they represent only a partial insurance against biodiversity loss. Efforts by countries in protecting unique ecosystems and species would thus contribute to the conservation of part of the critical RNC with which they are endowed. This would therefore comply only partially with the requirement for the achievement of minimal intergenerational equity.

The above arguments have two main implications. Firstly, other studies on the economics of biodiversity conservation have addressed the question of how to allocate a given budget for the preservation of species. They have noted that neoclassical economics alone cannot provide a basis for deciding the amount of resources to be assigned to the conservation of species (Randall, 1986). The task of deriving an ethical basis for determining the resources to be allocated to biodiversity conservations has been attempted here. The adoption by a country of the principle that future generations have rights (and most countries have done so by signing the Rio declaration) seems to imply that they ought to at least plan and found the attainment of minimal intergenerational equity.

Secondly, the approach to the economic assessment of protected areas should be reconsidered. Conserving unique ecosystems and species fulfils the requirement of conserving critical RNC only partially. It would appear therefore that any economic assessment of proposals to conserve these ecosystems should not address the question of whether the initiative should or should not be undertaken, as it is suggested by Dixon and Sherman (1990) and Ruitenbeck (1992). This would be a question to be answered necessarily in the affirmative, on the basis of the interests of future generations, which at this level, it is worthwhile to reiterate, coalesce with those of the current generation. The indication is that economic analysis should:

a) Contribute to a holistic approach to the identification of the areas to be protected (Cf. Mackinnon et al., 1986; Tacconi and Tisdell);
b) Investigate the most cost-effective way of carrying out the initiative;
c) Assess its eventual intergenerational equity outcomes; and
d) Consider the institutional features relevant to the successful implementation of the conservation programme.

The ethical underpinnings of economic analysis and the policies that may result should be exposed and compared to the ethos of the specific society to which they are applied. This would facilitate the identification of dissonances that could hinder the successful application of the policies and suggest viable alternatives.

CONCLUSION

The findings of this paper for the sustainability of the intergenerational equity be summarise as follows: it is necessary to keep the resource base intact in order to achieve intergenerational equity.

However, it was noted above that MC and HC might be used to enhance the stock of NC. Hence, modification of the resource base does not necessarily imply intergenerational inequality. Moreover, problems may be encountered in achieving the target suggested by Page. A non-decreasing stock of RNC may be maintained by definition, while taking advantage of the flow of its services, but the stock of NNC is reduced when extraction occurs. This could possibly limit the number of generations that will inhabit the planet, if RNC alone cannot provide sufficient resources. If the rights to the use of a finite stock of NNC are extended to infinite generations, the share of each generation will tend to zero, assuming away recycling. That is, in practice no one-generation would be allowed to use NNC. All generations would forgo the benefits that could be derived from the use of NNC. This does not appear to be a satisfactory solution. Hence, what should be done with NNC?

Three alternative principles may be considered for adoption. Each generation could be asked to replace the NNC used investing in RNC (Costanza and Daly, 1992). They regard this compensation as a prudent condition to guarantee sustainability. According to them, the compensation rule may be relaxed if there is evidence that a lower of NC will not have negative ecological effects. The problem with this resource-use pattern is that it is difficult to see on what principles the compensation should be based. Moreover, the enforcement of the compensation rule seems to be quite impractical. A second approach may be to limit the rate of NNC consumption to there of improve the mentioned technical efficiency achieved in its use. However, this resource use patter presents implementation problems too. It is not known in advance the rate of technical progress that will be achieved by a generation. Also, this policy would require a particularly interventionist approach.

A possible alternative is the adoption of a more general principle, which specifies that policies should be adopted in order to facilitate the transition to an economic system that relies almost entirely on renewable resources. This may be implemented by:

- Introducing depletion taxes on NC eventually counterbalanced by a decrease in income tax;
- Shifting the focus of a research for development from NNC-based activities to RNC- based activities.

In relation to the sustainable use of RNC, it should be noted that the problems posed by uncertainty and irreversibility in devising sustainable practices should not be underestimated. For instance, while the need to shift to sustainable forest management is often advocated, it appears that no proven sustainable management-logging scheme exists. Trials of such schemes have mainly considered sustainability in terms of yield of commercial timber, not in terms of the sustainability of forest ecosystems.

Having examined the above approaches to NC management, it is obvious that, given the existing degree of uncertainty, it is not possible to guarantee that the chosen resource management conditions will allow the existence of an infinite number of generations. The fact of the matter is that to ecological, economic and social uncertainties, it is impossible to define exactly the conditions that will lead to the indefinite existence of human beings, if this is indeed possible. It is only through an incremental and adaptive learning process that the use of NC will be tuned so as to facilitate the existence of future generations.

A Rawlsian approach to intergenerational equity is useful in deriving general principles of justice and to decide on the potential resource patterns to be followed to achieve intergenerational equity. However, it cannot provide definitive answers to intergenerational resource distribution. It is impossible to know the exact conditions that will allow the certain existence of future generations. In this respect, the critique of circularity levelled against the Rawlsian theory is, thus, of limited practical relevance.

A further weakness of the Rawlsian approach relates the framing of the problem. The question of intergenerational equity is formulated as one of having to decide on the distribution of a limited quantity of resources across generations. That is, a limited amount of resources are assumed to be available and there is competition in use between generations. This is obviously correct in relation to NNC. For the distinction between the interests of different generations may not so stark. In fact, it may be both in the interests of the present and future generations to maintain a non-decreasing RNC. While this issue needs to be documented on a country-by-country basis, some aggregate figures, derived from World Bank (1992), may exemplify the case canvassed here.

Over the past forty-five years, 11% of the world's area covered in vegetation has suffered moderate or severe soil degradation. About one third of the world's arable land is affected by elevated salt concentrations. Soil degradation and erosion negatively affects agricultural product and water quality, and causes the siltation of dams. In some tropical LDCS, soil loss is though to cause economic losses ranging between 0.5% and 1.5% of the GDP. Human and agro-industrial effluent and nutrient-run in agricultural areas cause water pollution. Only one third of the stretches of rivers sampled in China near large cities could support fish. In several countries, metal contaminations in fish have been found to exceed World Health Organisation threshold levels. This list could continue on, but it suffices to show that interests of different generations do not always conflict. This argument is strengthened if maintaining diversity per se is recognized as a relevant objective, as stressed above.

The ethical basis derived here for assessing natural resources distribution questions may not be transferable to all different countries, which are culturally closer to the ethical basis adopted here, other rather different ethical approaches exist. What is important to stress is that because of the separation of economics from ethics, the ethical implications of economic analysis are often not made clear or understood. Lastly, concern has been expressed about the dominance of the preservationist approach in environmental policy-making, because it pays little attention to the needs of the indigenous people (Adams, 1990). The emphasis of this paper on intergenerational equity does not imply that the needs and rights of future generations override the needs of indigenous people. It was stressed above that the economic analysis of conservation initiatives should address intra generational equity questions. These include the participatory assessment of the needs of indigenous people.

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