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STUDY OF THE NEXUS BETWEEN BIOLOGICAL AND CULUTRAL DIVERSITY

Note by the Executive Secretary

1. To assist the International Conference on Biological and Cultural Diversity in its deliberations, the Executive Secretary of the Convention on Biological Diversity, in consultations with partners, commissioned the following study concerning considerations of the nexus between cultural and biological diversity, and the possibility of joint work on this issue, between the Secretariat of the Convention on Biological Diversity and UNESCO.

2. The views expressed are those of the author and do not necessarily reflect the views of the Secretariat of the Convention on Biological Diversity. The study is reproduced in the form and the language in which it was received by the Secretariat of the Convention.

[Paper prepared by Pierre Lasserre, consultant]

Consideration of the Nexus between Cultural and Biological Diversity

Introduction

1. Within the pressing need to ensure the conservation of biodiversity, and sustainably exploit its resources, attention has increasingly turned on the fascinating recognition that the diversity of life comprises both biological and cultural diversity.

2. How do we balance the rights and interests of human populations with our equally human obligation to preserve some measures of biodiversity and a healthy functioning planet for future generations? A complex debate where a clear consensus has not been attained. Although various compromises and standoffs have been reached throughout the long and turbulent history of this debate, the vast majority of debates up to the present day belonged to one of two camps, "conservation first" or "people first." Those who embraced the former rarely accepted the assumptions, arguments, data, and conclusions of the latter, and vice versa. In this important debate, there is a plenty of thoughtful people who in their day-to-day work negotiate successfully between competing sets of interests regarding "conservation" and "people", and the CBD has been taking stocks of the importance and urgency of the problem, however, there is still little for incoming specialists from the natural or social sciences, decision makers, indigenous and local communities and the public at large struggling to give voice to the interests of their respective interests and perspectives. Activists who eloquently represent the interests of indigenous and local communities are firmly endorsed by many in the social sciences, the humanities, and development circles. One can find equally motivated conservation biologists, struggling to give voice to the interests of the natural world. Reconciliatory solutions can be reached if they move beyond political agendas or personal ethics. For too long, social and biological scientists have been talking past each other. Our commitment to a multidisciplinary approach to studying the human dimensions of biodiversity conservation is inspired by E.O. Wilson's arguments (see "Consilience" 1998): he proposes that to reach honest, pragmatic, and effective solutions we need to move freely between ethics, environmental policy, biology and the social sciences. Indeed, conservation biologists facing the contemporary ecological crisis now, more than ever before, need to build on contributions from the social sciences, including economics, anthropology, sociology, and the political sciences to forge their solutions. Increasingly, their goal is to maintain biological diversity in the context of exploding human populations, changing livelihood patterns, global markets, and a shrinking base of natural resources and habitats. There is no single solution to the puzzle of how to balance the rights of indigenous and local communities with the obligations of conservationists. There is of course no one solution, no one answer. Our goal is to outline a checklist whereby the politicians, decision makers, stakeholders at large can determine the range of appropriate solutions to particular conflicts that arise from the need to protect biodiversity and cultural diversity.

3. Anthropologists, biologists and linguists have noted a striking coincidence in species diversity and human cultural or linguistic diversity. One simple explanation is that factors thought to be important in the generation or maintenance of language's richness may also be important for the generation, or maintenance of biological diversity. The general argument for this position is that small-scale, indigenous and local communities protect the biological resources on which they depend for subsistence and survival by means of customs and traditional practice, that limit or at least disperse ecological impacts. This view is held by many studies of anthropologists and ethnobiologists, and is based on field observations, documented by numerous case studies (e.g. Brunois, 2007).

4. The defence of cultural diversity as an essential component of the biodiversity conservation and sustainable use seems to be in doubt. Indeed, the reasons which lead human communities to value some aspects of biological diversity on their territories do not inevitably interconnect with objectives and values of the national or international conservation programmes. For example, the diversity which culturally counts is not always the one which counts for the agronomist, the landscape manager, or the decision maker.

5. How to reconcile the plurality of perceptions in biodiversity, and the values, sometimes contradictory, that societies, as well as different scientific disciplines can attribute to it? What do we measure? What indicator to choose, and for which objective? Anthropologists, ecologists, geneticists, agronomists and indigenous and local communities do not necessarily refer to the same 'biodiversity'.

6. The United Nations Permanent Forum on Indigenous Issues, the Secretariat of the Convention on Biological Diversity, along with UNESCO and the indigenous working group on indicators has done some fascinating work on a broad range of indicators, including indicators for indigenous well-being and indicators specifically for traditional knowledge and culture. In particular, the sixth meeting of the Working Group on Article 8(j) recently adopted an additional two indicators to be considered by COP 10, which will bring the total number of adopted indicators for traditional knowledge to three. Those indicators are: the status and trends in linguistic diversity and speakers of indigenous languages (Decision VIII/15); status and trends in land-use change in the traditional territories of indigenous and local communities; and finally status and trends in the practice of traditional occupations1. The indigenous working group on indicators have arrived at these three indicators in an attempt to develop a holistic picture of the state of traditional knowledge on the ground.

[1] Refer UNEP/CBD/COP/10/2Focal area - protection of traditional knowledge, innovations and practices, in order to assess progress towards the post-2010 biodiversity target, as well as to assess progress in the implementation of the revised Strategic Plan;

Beyond Nature and Culture

7. Ecological (or environmental) anthropology first appeared in the 1960s, as a response of cultural ecology, a subfield of anthropology, and investigated the ways that a population shapes its environment and the subsequent manners in which these relations form the population's social, economic, and political life. At the heart of the approach is an understanding that proceeds from a notion of the mutualism of person and environment (Ingold, 1996). A recurring criticism is that the nature-society dichotomy hinders true ecological understanding. Analyzing the figure of the "optimum forager" in human ecology and its relation to "economic man", Ingold (2000) showed that whereas economic man is credited with the design of his own strategies of maximization, foragers are construed as the mere executors of strategies assigned to them by natural selection. Even in cultures, which have an explicit concept of wilderness, the distinction between wild and non-wild is not necessarily clear-cut. The notion of wilderness fluctuates according to context. One response to the current division of labour between the natural and the social sciences is to exchange concept and emphasizing the fundamental similarities of the natural and the social domain. Thus, some of the natural sciences have borrowed the concepts of community and society from social scientists. Likewise, some branches of anthropology have adopted the biological concepts of natural selection and genetic fitness

8. A disciple of Claude Levi-Strauss, the anthropologist Philippe Descola and his colleagues paved the way to the highly complex relationship problems posed by the nature-culture dualism (Descola and Palsson, 1996; Descola, 2005), drawing upon developments in interactive sub-disciplines of social sciences and natural sciences: in social theory, ethnobiology, epistemology, sociology of science, ecology and taxonomy, co-evolution and human genomics, statistics and mathematics, physics and climatology, and a wide array of ethnographic case studies and laboratories of molecular biology, statistics, mathematics and high energy physics.

9. Some broad questions posed "beyond nature and culture" are:

- Are the different cultural models of nature conditioned by the same set of cognitive devices?
- Are we to replace the historically relative nature-culture dualist category with the more general distinction between the wild and the socialized?
- Do non-Western cultures offer alternative models for rethinking universality and the issue of moral attitude towards non-humans?
- Will the blurring of the nature-culture opposition in certain sectors of contemporary science imply a redefinition of traditional Western cosmological and ontological categories?
- Can we think of the world without distinguishing the culture of the nature?

1. The links between cultural and biological diversity are only beginning to be understood.

10. The fact that regions of high biological, cultural and linguistic diversity tend to overlap has led a growing number of anthropologists to suggest that the three are interdependent, in a "biocultural" diversity entity (Maffi 2001, Maffi and Woodley 2007). Any hope of saving biological diversity, or even recreating lost environments through restoration ecology, is predicated on a concomitant effort to appreciate and protect cultural diversity (Pretty, 2007). The proposal to create a network of "biocultural" diversity conservation practitioners is appealing, however the precise mechanisms have not yet been made explicit, and the relationship between biological and cultural diversity may instead be indirect (Currie and Mace, 2009). Anthropologists Pretty et al. (2010) in a recent review article took an integrative approach, combining approaches and ideas from 42 different sub-disciplines concerned with the intersection of nature and culture, they underline that the intersection of biological diversity and cultural diversity "is only beginning to be understood", and moreover, "it is precisely as our knowledge is advancing that these complex systems are under threat." This may explain why the connection is more conspicuous today in communities that retain a direct dependence upon nature, although many people in industrialized countries still acknowledge a spiritual or effective relationship with nature and the outdoors (Milton, 1999). This idea is supported by the subjective evidences that "exposure to nature has a positive effect on physical and mental health (Pretty, 2004, 2007; Pretty et al. 2010). Biologist Edward O. Wilson in his "biophilia hypothesis" conjectures that all humans have an innate connection with nature based on our common histories as hunter-gatherers (Kellert and Wilson, 1993).

11. Today questioning of the way globalised industrial societies exploit and exhaust the living and non-living natural resources of the planet, comes along with a reappraisal of traditional forms of development of environments and lifestyles which are attached to them, and with the merits of recent basic research on the genome sequences of different human populations, that yields highly valuable information that may help to pinpoint genetic adaptations to different lifestyles. Here the provision of advanced basic research on molecular biology opens a major breakthrough. The complete genome sequences on an indigenous hunter-gatherer from Namibia's Kalahari Desert and of a Bantu from South Africa are presented in a recent issue of Nature (Vol. 463, 18 February 2010) together with protein-coding regions from three other hunter-gatherer groups from the Kalahari. Analysis of genetic variance in what is probably the oldest known modern human lineage will contributed to understanding human diversity (Schuster et al., 2010). In this study, the sequence variants found in the genomes may reflect an ancient adaptation to a foraging lifestyle, Bushmen hunter-gatherers having never adopted agricultural practices throughout their cultural history. Adding the described variants to current databases will facilitate inclusion of southern African in medical research efforts and "the physiological and genetic differences may guide future studies into the much debated questions of whether population replacement, rather than cultural exchange, has driven the expansion of agriculture in the southern regions of Africa." (Schuster et al., 2010). The gene-culture dynamics are typically faster and operate over a broader range of conditions than conventional evolutionary dynamics, leading to argue that gene-culture co-evolution could be a dominant mode of human evolution.

How the culture shaped the human genome

12. The concept of a co-evolution gene-culture is not totally new because, from 1971, the anthropologist Claude Levi-Strauss invited in a "positive collaboration between geneticists and ethnologists, to look for together how and which way the distribution cards of the biological phenomena and the cultural phenomena get clearer mutually". But both the biologists and the researchers in human sciences remained reluctant to consider seriously this hypothesis, until the 1990s when the concept found a wider echo within the community of biologists and ecologists and the work developed by anthropologists. Smith (2001) captures this in his definition of cultural change as "a form of co-evolution between cultural information and the social and natural environment."

13. Since pioneer works, 30 years ago, and the classical book of Cavalli-Sforza and Feldman (1981) that describes the mathematical modelling of human culture and its co-evolution with genes using theoretical population genetics, as well as of Boyd and Richerson (1985) also based on mathematical modelling on human culture and its co-evolution but with a more anthropological perspective, convincing research has demonstrated that genes and culture can be viewed as two interacting forms of inheritance, with offspring acquiring both a genetic and a cultural legacy from their ancestors (review by Laland et al., 2010). Cultural practices have shaped the human genome through eco-evolution. This fundamental evolutionary process gene-culture co-evolution continues even today within the human populations. According to Claude Combes, a French specialist of co-evolution, humanity has the capacity to introduce new processes into the process of co-evolution by having deleted natural predators (during pre-historic periods) or by domestication or by altering the lifestyle of numerous species, and nowadays by altering the climate of the planet. The consequences of the human activity, which results from a trans-generation culture including more and more sophisticated know how in medicine, cloning, genetic engineering etc., thus are to take away more and more human beings of the processes of natural selection.

14. It has only recently been shown that natural selection can bring about substantial changes in human genomes that are detectable over thousands of years, as revealed by measurements of the typical rates of response to natural selection among animals in the wild and statistical analyses that detected recent rapid adaptation in the human genome. According to Laland et al. 2010, a revision of evolutionary theory is overdue and the current outpouring of new data, particularly in molecular biology and genomics, will necessitate comprehensive approaches into different scientific fields, considering that there is now a general agreement, among researchers, that human evolution has been shaped by gene-culture interactions and that the complex evolutionary process gene-culture continues even today within the human populations. A strong reinforcement in field and laboratory research is needed. According to Laland et al., 2010:

- "Theoretical biologists use models to demonstrate that cultural processes can affect human evolution, anthropologists are investigating cultural practices that modify current selection, and geneticists are uncovering alleles that have been subject to recent selection because of human activities."

- Theoretical population genetics models are used to explore how genes and culture interact over evolutionary time, including how and why culture can affect evolutionary rates.
- Niche-construction theory is a branch of evolutionary biology that emphasizes the capacity of organisms to modify natural selection and thereby act as co-directors of their own, and other species', evolution. Humans are the ultimate niche-constructing species. We specify how variation in buffering through cultural niche construction could explain geographical variation in human genes.
- A further source of evidence for gene–culture co-evolution comes from anthropological studies of contemporary human populations, which demonstrate gene–culture co-evolution in action. Examples include Kwa-speaking yam cultivators in West Africa whose agriculture favoured the haemoglobin S (HbS) 'sickle-cell' allele, and Polynesian voyages that led to positive selection for thrifty metabolism, leading to type 2 diabetes susceptibility.

15. Human ecologists define culture as a mechanism that organizes the flow of information essential for survival. Cultures develop traditional knowledge based on experience and adaptation to a local environment. Traditional knowledge is commonly well developed for genetic resources because of their paramount importance for the survival of communities practicing subsistence agriculture. The transmission of this knowledge is biased by language and local cultural differences; an example of this bias is individuals conforming to local practices because doing so is less costly than experimenting and learning (Boyd and Richerson, 1985). Recent studies focused on the contribution that cultural diversity might take to generating and maintaining crop diversity in Mesoamerica, recognized as a "megacenter" of biological diversity and one of the world's most culturally diverse regions, with more than 200 language groups. It has been shown that ethnolinguistic diversity influences crop diversity. Factors suggest a correlation between biological diversity of maize and cultural diversity in Chiapas, Mexico (Perales et al. 2005). Although this correlation has been noted, little systematic research has focused on the role of culture in shaping crop diversity.

16. Tropical habitat heterogeneity can be expected to facilitate diversification of both species and human languages. Similar observations, however, have been drawn under other latitudes in relation to cultural aspects. One advocated factor is the total availability of resources or energy (measured as temperature, potential or actual evapotranspiration, net primary productivity) which, by limiting total biomass production, may limit the number of viable populations and hence the number of species that can be reasonably expected to persist (Currie, 1991). A similar rationale can also be applied to language richness (Smith, 2001). One explanation is that habitat heterogeneity could allow a variety of specialist cultures to coexist (Smith 2001). Alternatively, one could argue that habitat heterogeneity allows a single group more options for subsistence and so a viable cultural group can be smaller, or more narrowly distributed, which still maintaining self-sufficiency. Cultural history of local human populations may play an especially important part in determining the pattern of language distribution, and the kinds of societies they develop, relying on an in-depth knowledge of the

natural milieu for their livelihood, and unique know how in biological diversity conservation and sustainable use.

17. In a careful study of the distribution of cultural and biological diversity in Africa, Moore et al. (2002) have shown in a quantitative description of this coincidence that across sub-Saharan Africa, cultural diversity and vertebrate species diversity exhibit marked similarities in their overall distribution. They show that 71% of the observed variation in species richness and 36% in language richness can be explained on the basis of environmental factors, suggesting that similar factors, especially those associated with rainfall and productivity in three major biome types (forests, savannahs and arid areas), affect the distributions of both vertebrate species richness and languages. Moore et al. (2002) underline that "language richness is insufficient to describe all cultural diversity." Numerous cases exist where the distinctiveness of language does not correspond to the distinctiveness of culture and/or ethnicity. Similarly, vertebrate species richness does not represent all biological diversity. Nevertheless, language richness and vertebrate species richness does represent important and quantifiable aspects of cultural and biological diversity. This study demonstrates strong latitudinal gradients in both language richness and species richness. Moreover, language richness correlates with species richness, supporting previous suggestions that cultural diversity can mirror biological diversity. According the authors, it is important to consider several limitations. Correlations by themselves do not demonstrate causality. Furthermore, even where species and language richness are correlated with similar environmental factors this could well arise through different processes. "Moreover, the fact that the environment factors considered here explain less than half of the variation in language richness indicates that other factors, many of which are likely to be historical or social, also influence the distribution of languages."

The coincidence of biological diversity and cultural or linguistic diversity

18. The reason which leads human communities to value some aspects of biological diversity on their territories do not inevitably interconnect with objectives and values of national or international conservation programmes. For example, the diversity which culturally counts for indigenous and local communities is not always the one which counts for the agronomist, the landscape manager, or the decision maker. How to reconcile the plurality of perceptions in biodiversity, and the values, sometimes contradictory, that societies, as well as different scientific disciplines can attribute to it? Again we must ask ourselves: What do we measure? What indicator to choose, and for which objective?

19. An appealing explanation for the increasingly noted coincidence of cultural and biological diversity is that biodiversity persists because of cultural diversity. The general argument for this position is that small-scale, indigenous and local communities, following traditional lifestyles, protect the biological resources on which they depend for subsistence and survival by means of customs and traditional practice, that limit or at least disperse ecological impacts. As traditional communities, today, are generally found in parts of the world with high levels of cultural diversity, these communities are seen as responsible for maintaining high levels of biodiversity. This view is held by many ethnobiologists and

anthropologists, and is based on numerous observations (reviewed in Pretty et al., 2010). They consider that biodiversity and cultural diversity (including linguistic diversity) are linked, often inextricably, and mutually supporting, providing as unified whole, a "biocultural" diversity (Maffi, 2001). Any hope of saving biological diversity, or even recreating lost environments through restoration ecology, is predicated on a concomitant effort to appreciate and protect cultural diversity (Pretty et al., 2007). Human ecologists define culture as a mechanism that organizes the flow of information essential for survival. Cultures develop traditional knowledge based on experience and adaptation to a local environment (Gadgil, 1998).

Traditional knowledge and Resources Management Systems

20. It is impossible not to be struck by the extraordinary similarity of the traditional methods of management and conservation of terrestrial, coastal and island systems that have been devised by peoples of very different origins and cultures (Lasserre, 1979; Lasserre and Ruddle1983; Gadgil, 1998). According to Madhav Gadgil, "human influence on natural systems has often been portrayed as destructive. It is only relatively recently that ecologists have started to appreciate how traditional peoples use their resources without destroying them". Several studies have documented systems of traditional knowledge. For example, the yields obtained from coral reefs and lagoon fisheries in Oceania, tambaks in Indonesia and multiple species fisheries in China, acadjas in West Africa, vallicoltura in the Venice lagoon, fish-crawls on the Mediterranean and Atlantic coasts, and small-scale traditional fisheries all over the world, have been close to the optimum during centuries (Lasserre and Ruddle, 1983). Many islanders are rediscovering the resource management value of traditional beliefs and practices suppressed by colonial government and missionaries (Hickey, 2007). All this should not be taken to mean that traditional fisheries enjoyed a perfect relationship with nature and that all their actions were governed by environmental wisdom and restraint. For example, in the Pacific islands, environmental destructive practices continue to coexisted, as in most societies, with efforts to conserve natural resources (Johannes, 1978).

Modern Ecological challenges

21. One of the major accomplishments of the ecological research over the past 50 years has been an increasing awareness of the complexity and subtlety of natural ecosystems and their traditional forms of management. An important part of this complexity lies in the feedback loops of energy, nutrients and other materials that have evolved as part of virtually all successful ecosystems.

22. Faced with the rapid depletion of the earths non-renewable resources, it is not surprising that there has been a recent resurgence in the awareness and appreciation of the traditional resource systems used by past generations or by less technologically advanced contemporary societies. Those techniques and 'savoir-faire' that have survived were designed empirically, often over centuries, and it may be supposed than an important element of their success was the inclusion of feedback loops, by which a system could be developed and maintained to provide a yield for human use. Attempts to replace such traditional resource systems with those based on higher technology and large fossil fuel flows often cause

feedback loops to be lost, resulting in resource exploitation rather than resource management. Such a linear arrangement may produce high yields in the short run, but they are neither stable nor enduring. As yields decline, one common human response is to develop regulated systems which attempt to keep the flows of the resource system small enough to permit its support by the natural system without requiring human investment in either its running or maintenance. The history of resource management in the industrialized world, particularly in the marine environment, emphasizes the difficulty of designing and enforcing regulated systems, even where yields limits can be estimated.

23. The modern ecological challenges are, therefore, to combine the great power of energy subsidies and technology with the approach and insight of traditional management to produce enduring and sustainable resource systems. An important aspect of this challenge is that we cannot rely, as in the past, on empirical methods to design new higher energy resource systems. The urgent need for food precludes trial and error, and the potential serious consequence of errors is much greater than with low technology. Yet it should not be overlooked that major operational and epistemological constraints inhibit the identification of components, structures and functions of natural ecosystems. Difficulties are magnified when attempts are made to quantify resource systems. The flow of energy is a principal organizing characteristic of natural ecosystems and one of which permits a distinction of subsistence systems. Moreover, energy flow is theoretically amenable to fairly precise measurement, but because of both impracticalities of instrumentation and the overwhelming complexity of most ecosystems, only a few "energy paths" can be measured in human societies and between them and the biological and physical environment.

24. From a small nucleus of measured and observed relationships supplemented by estimates to assign empirical values to those which are missing, attempts are made to describe and explain systemic relationships. Often, when the assumptions underlying the estimates are made explicit, they are sometimes extensively flawed by cultural biases. A simple and yet profound problem arises from this use of western models and methods to measure energy flows in non-western man-modified ecosystems, researchers must fill in data gaps from their own cognitive appraisal and what constitutes the "whole system". Often, the "system" appears to be simply an association of free-functioning elements over which an investigator has imposed a unifying matrix. Thus the traditional knowledge handed down through the generations of operators of resource system should assume an increasing role in modern management designs.

The value of traditional knowledge: the delicate balance between tradition and modernity

25. Only part of what is known about the nature, exploitation and sound management of renewable natural resources can be found in libraries. On the other hand, the users of such resources are at least an important secondary – and for some parts of the developing world at primary – source of information. It has been realized by scientists only relatively recently that such local, unrecorded and not uncommonly encyclopaedic traditional knowledge, handed down across the generations, is often of great value in terrestrial and coastal zone

management and in the design of resource systems. There are, for example, far more fish species in the tropics than occur in higher latitudes, and managing ecosystems in which they are imbedded require prodigious amounts of knowledge about their natural history. Interviewing small-scale fishermen and other coastal resource users has proven a valuable shortcut to the acquisition of some aspects of such knowledge. However, this is not to say that traditional wisdom on living terrestrial or coastal resource utilization is necessarily useful to modern resource managers as it stands, rather it must be verified and blended with sophisticated scientific analysis, of, for example, genetics, genomics, population dynamics, metabolism, mathematics and physics before it can be put to optimum use. And this is no small undertaking. How traditional knowledge should interface with other knowledge systems remains, including western science, remains a preoccupation of the Working Group on Article 8(j) along with other international bodies grappling with these issues. The value of such information can be exemplified by the traditional knowledge of surviving native ethnic groups such as South Pacific islander or Amazonian, or Sub-Saharan African, who are an exceptionally rich source of information on the biological characteristics of coral reefs or tropical forests, that for centuries have supplied the great bulk of their animal or vegetal protein and medicine. This knowledge remains deeply linked to their cosmology, fine arts, crafts, architecture, technology, and ethnoscience. .

26. As in terrestrial habitats, traditional knowledge of the marine environment, as applied in traditional resource management techniques, is a highly valuable source of information for modern fisheries managers, as such techniques and customs have often stood the test of time over centuries. These include measures to manipulate and modify coastal ecosystems; for example, the various forms of traditional aquaculture used in the tropics as well as in the temperate zone. Also included are various measures to protect wild fish populations from over-exploitation.

27. In the industrialized Western civilizations, the great sea fisheries were largely perceived of as being inexhaustible, until some 90 years ago, when catches began to fall and attitudes began to change and marine fisheries conservation measures were gradually introduced, particularly in Europe. In contrast, Pacific islanders had known for centuries that their marine resources could be easily depleted and so had devised a variety of measures to guard against this eventuality, including TURFs (territorial use rights in fisheries), closed areas or seasons, and size restrictions, among other devices (Johannes, 1978). One widespread traditional device has nevertheless, been overlooked by modern fisheries managers until recently (Christy, 1982).

28. The foregoing should not be taken to imply that the Pacific islanders enjoyed an idyllic relationship with nature and that all their resource management actions were governed by environmental wisdom and restraint. Environmentally destructive practices co-existed, as they do in most societies and continents, with efforts to conserve resources. But it is important to realize that the existence of the former does not diminish the significance of the latter. Today, there is a growing awareness to understand, record, and support the best of those traditional management customs, and to tailor environmental legislation where feasible to harmonize with local practices and customs that have culturally stood the test of time. Governments

would do well to replicate this and to profit from the often sophisticated knowledge used to manage and sustain traditional resources systems, incorporating them in their administrations and education programmes.

29. More and more, we pass from a model of protected wilderness to a management model focused on the sustainable use of biodiversity. We pass from a "care space", inside which human populations are just statically maintained, to active man-modified spaces where biodiversity increases. From this viewpoint, we pass from an imposed top-down vision to a bottom-up vision generated by indigenous peoples and local communities, and more generally by local populations, a vision which is ethically sound. If the imposed top-down globalization turns out to be a dead end, one important predicament would be a growing increase of local experiences, up to their globalization, through active States' cooperation and international mediation.

Instrumental values with or versus intrinsic values

30. From the end of the 70s, the development of environmental ethics gave rise, from the end the 70s, to moral thinking and arguments to protect nature, including direct and indirect reasons for human society to save nature. Those ethics were arguing the direct relation of man to nature and the many reasons to respect nature. They were founded on the relationship between instrumental values and intrinsic values. Utilitarian approaches to the value of biodiversity find their purest expression in ecological economics, focusing on environmental policy and sustainable development (Costanza, 1997). Though global environmental-social modelling had been pioneered in the Club of Rome's doomsday forecasts of the late 1960s, ecological economics took the approach much further, essentially arguing that nature's monetary value is the key to its conservation. Particularly challenging has been the monetary evaluation of nature's diffuse roles in providing climate control, organic waste disposal, soil formation, nitrogen fixation, biological pest control, plant pollination, pharmaceuticals, and recreation. These economic approaches are useful. Not only do they offer powerful tools in advocacy, but they expose the pressures that work against conservation (Edwards and Abivardi, 1998). They are also rather controversial. Most species and natural processes are probably not very useful to "save humanity". Furthermore how a utilitarian ethic can conserve species that are economic liabilities, species that are dangerous, or species whose medicinal products can now be fabricated synthetically. All in all, if we are to enlist the market in the cause of conservation this must be done very carefully, and on a case-by-case basis. Utilitarian arguments are probably never sufficient, and science alone cannot protect biodiversity (Ehrlich and Wilson, 1991).

31. Intrinsic value of nature is a more subjective matter. Issued from the sense of "wilderness", Leopold attributes intrinsic values to all things to include the soils, waters, plants, and animals or collectively: the land, whereas Soulé (1985) claims that it is diversity itself that has intrinsic value, not its entities. The variety of modern natural rights or ecophilosophies that developed in the 1960s and 1970s predicated on intrinsic values differ on this dimension: i.e Deep ecology calls in 1973 the liberation of land and nonhuman life from ownership and abuse; bioregionalism, calls for a reorganization of human consciousness, and

bioregionalists live in place and are able to adopt a lifestyle better suited to their surroundings; Biophilia is a term coined by E.O. Wilson (Keller and Wilson, 1993) It is based on two related ideas: first that humans have an innate interest in and attraction to all things living, and second, that understanding other organisms and the natural world fosters greater appreciation of their value, biophilia calls for deep social change, in contrast; however; it relies more on science than moral transformation to achieve these ends, furthermore, biophilia is concerned not with the intrinsic value of each and every biological specimen but rather with that of genes, species, ecosystems, and evolutionary processes; Gaia, the Greek word for Earth, was used by James Lovelock to capture the idea that Earth is a single organismic entity with an integrated system of feedbacks and interrelationships, of which life is the most important; Spiritual ecology is defined as a mystical attitude towards nature, emphasizing a deep unity with land and animals, and promotes the idea that while industrial society has lost touch with nature, tribal and indigenous peoples have not (Nollman, 1990). Long prior to the emergence of these recent philosophically based movements, ancient traditions and scriptures guided recognition of moral and ideological (not legal) rights of nature. Most of the world's religions furnish powerful worldview that sanction spiritual interconnectedness among all living beings and obligations of stewardship (Callicot, 1989). Given the very different ethical values people bring to conservation it is not surprising that preservation, conservation and management also mean distinct things to different people.

Reconcile economic and sustainable development with cultural diversity

32. The delicate balance between tradition and modernity, between local culture and globalization are carefully analyzed in recent enlightening approaches leaded by Philippe d'Iribarne and his colleagues on successful companies in the developing world ("Le tiers monde qui réussit", d'Iraibarne, 2003), which emphasizes the potential for modernization in different cultures. Companies ought to make use of this potential rather than impose their own culture. How coherence around corporate values can, in spite of cultural diversity, be reached in an international company with clear humanistic values? In the developing countries, one can find extremely high- performing companies. What is their secret? Do they faithfully replicate best practices that have proved their worth in the most advanced economies? Or do they adopt create approaches to management by leveraging the cultural resources offered by their environment? Successful companies located in Latin America (Mexico, Argentina), Africa (Cameroon, Morocco) relied on a modern re-interpretation of traditional forms of co-operation present in their surrounding society but normally absent from the sphere of business (d'Iribarne, 2003).What the research into these firms reveals is that promoting development is not a matter of trying to change cultures that are allegedly incompatible with progress. What is needed are ways of organizing companies and economies in tune with the form of good co-operation specific to each culture. The question keeps returning of whether other development models exist besides the one followed by the richest Western nations: does modernization inevitably mean abandoning local culture and adopting Western values? In other words, can a different balance between tradition and modernity be achieved involving varying forms of compromise related to local cultural requirements? (d'Iribarne, 2010).

From global to local ecosystem management

33. The global vision is typically the attitude shared by scientists. To the environmental crisis and biodiversity erosion, the scientific answer is that humanity is unique (not only in the Kantian viewpoint of "moral humanity, but also physically unique. The lesson to be learnt is: let us forget our differences, let us silence our divergences, let us unite to bring a global solution of the environmental crisis. Thus let us forget politics, conflicts and antagonisms and let us unite our views to face the same question. Finally the scientists are going to say what there is to make, and then it belongs to the people and politicians to apply their predicaments and take decisions. Thus call to expertise and political decision, as it is currently evoked in environmental debates. To this "authoritarianism of the truth" (i.e. scientists know what it is necessary to make) we should add an "authoritarianism of the good" (i.e. made for the common good). Al Gore and his scientist partners say: let us silence the politicking debates and let us unite for the common good (without putting it in debate!). Furthermore, major international NGOs such as WWF and Green Peace are agitators of the good. The global model vision of the environmental crisis is to strengthen the" authoritarianism of the truth" (i.e. the classical solution of expertise) with the "authoritarianism of the good". A vision which would not be desirable.

34. Considering that we have been in the classical view of the conflict man versus nature, with only two opposite alternatives: nature with man or man against nature (a vision shared by scientists, international NGOs and also by many States), we must admit now that the authoritative global perception has changed. Modern advances in ecology favour ecosystem models based on a more dynamic vision of nature than strictly "in balance" and where man is not always perceived as a trouble maker. Recent advances in human ecology and ethno-biology showed evidence of the mutual reliance of cultural diversity on biological diversity, as a result of a not yet well understood process of co-evolution man-nature. We can now admit that the association of man in nature has not always generated disasters in our biosphere, conducing to a better understood co-evolution man-nature process, a key towards ensuring sustainability.

A Cooperation between UNESCO and the CBD: a possible joint work programme

35. In this International Year of Biodiversity, a joint work programme between the CBD and UNESCO on cultural and biological diversity will be particularly welcome. It should be setting ambitious but realistic targets for biodiversity and culture diversity policy over the next ten years. Those shaped at last year's meetings, including: "Life on Earth", Ottawa (16 March 2007), the UNESCO High Level Event on the occasion of the International Year of Biodiversity, in Paris (21-22 January 2010), followed by the UNESCO IYB Biodiversity Science Policy Conference (25-29 January 2010). The specific contributions of secretariats of the CBD and UNESCO will be reviewed on the occasion of the International Congress on Biological Diversity and Cultural Diversity, in Montreal (9-11 June 2010), and be aimed at

the longer-term objective of supporting consideration of cultural and biological diversity by the Conference of the Parties to the CBD, in October 2010, and the UNESCO member states.

36. The proposed draft elements for a Joint Programme of Work on Biological and Cultural Diversity by UNESCO and the SCBD, identify four main objectives:

(a) Identify provisions linking cultural and biological diversity in the texts of the conventions and related work, including decisions, adopted by the respective Parties as a guide for initiating collaboration and coordination between the Secretariat of the CBD and the Conventions on Intangible Cultural Heritage and Diversity of Cultural Expressions and other relevant Agencies and partners;

(b) Explore conceptual/theoretical and methodological issues related to the implementation of the identified provisions linking biological and cultural diversity;

(c) Promote/encourage/catalyze the collection/compilation of information from on-ground reality on the links between biological and cultural diversity using, on the one hand, UNESCO designated sites, biosphere reserves and world heritage sites, and on the other hand areas where the Convention on Biological Diversity is being implemented (e.g. ecosystems/landscapes vulnerable to selected threats such as climate change, and where biodiversity loss has had significant impact on livelihoods). The information can serve as background for identifying good practices to feed into management and decision/policy making processes;

(d) Catalyze activities that could contribute to raising awareness (including through dissemination of information and training workshops) on the importance of linking biological and cultural diversity in decision-making.

37. The Report of an international workshop organized by UNESCO: "Links between Biological and Cultural Diversity" (UNECO, Paris, 26-28 September 2007) is worthy of consideration. It demonstrates the considerable amount of activities achieved by UNESCO and its UN partners, including the CBD, and NGOs, of particular relevance to indigenous communities, traditional knowledge, and more recently, language issues. The objective is "to produce comprehensive guidelines and measures to protect biological and cultural diversity, to develop indicators, define proper methodologies, set research agendas, and educate the general public."

38. An appropriate set of recommendations for the future policy work on the links between biological and cultural diversity is provided: (1) for future policy work, at the international, regional, national and local levels, (2) for future research and future work. (UNESCO: "Links between biological and cultural diversity concept, methods and experiences; Report of an International Workshop", UNESCO, Paris, 2008). Up to now UNESCO has no specific budget line for the ambitious targets that emerged from the 2007 Paris Workshop. It is expected that the main targets of the joint work programme between the CBD and UNESCO will find credible financial resources.

39. Furthermore, one important point concerns possible agreement on the status of negotiations under the CBD (October meeting in Nagoya, Japan) of the international regime on access and benefit-sharing of genetic resources. Instead of "stymieing research" (see "Biodiversity law could stymie research" in Nature, 463, page 598, 4 February 2010), this emerging international regime could in fact foster and facilitate research around the globe: "Surely no one in the research community would fear a deal that addresses their needs and is based on principles of fairness, equity and effectiveness." (comments posted on behalf of co-Chairs Working Group on Access and Benefit-sharing of the CBD).

40. This very appropriate and timely improved framework should also benefit the international research community, and appropriate training and education programmes for assessing the links between biological and cultural diversity, and considering that research needs to be coupled with on ground research in collaboration with all the relevant stakeholders, starting with indigenous and local communities. This point should obviously be considered in the framework of Articles 8(j) and 10(c) of the Convention, considering that basic research is a necessary adjunct of in-depth understanding of the interdependencies between cultural and biological diversity which should be advanced at many levels.

Conclusion

41. Many, if not most, indigenous or local community people are not scientists. However, they are the depositaries of what Claude Levi-Strauss (1962) in the "Savage Mind" has called the "science du concret", a native pre-existing set of theoretical and practical knowledge based on our physical universe, living nature and humanity expressed in beliefs, institutions, religions. The science of concrete or mythical thought is prior to the other, modern scientific inquiry. Levi-Strauss stressed that both modern scientific and concrete mythical thought should be understood as valid and that one does not supersede the other. They are two autonomous ways of thinking rather than two stages in an evolution of thought. Thus science du concret is not primitive science.

42. Furthermore, it is expected that an increasing number of research community representatives participating in the CBD talks, in October in Nagoya, Japan, will confirm that "there is a growing appreciation amongst the 193 governments and numerous stakeholders involved of the genuine needs of researchers and the central role played by scientific enterprise." (T. Hodges and F. Casas, co-Chairs WG on Access and Benefit-sharing CBD, Nature, vol 463, p. 598, February 2010). This means an unprecedented attempt to foster and facilitate dissemination of research around the globe and to facilitate participation of researchers from all countries and origin, "based on principles of fairness, equity and effectiveness".

43. The links between cultural and natural diversity are only beginning to be understood: a challenging problem, for a major breakthrough

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ANNEX A

Elements for a joint work programme between the CBD and UNESCO:

(compiled from information provided by the Secretariats of CBD and UNESCO).

CBD

Recognizing the fast disappearing languages and local usages and savoir-faire, going with high rates of biodiversity loss, the CBD in its Article 8(j) promotes the knowledge of indigenous peoples and local communities, "including those in voluntary isolation, and the role played by their knowledge, innovations and practices in the conservation and sustainable use of biological diversity". In its annex I, Article 8(j) recognizes that "a number of studies have highlighted the fact that many of the centres of highest biological diversity are places of high cultural and linguistic diversity, and have demonstrated that the relationship between biological, cultural and linguistic diversity is mutually dependent in many of these regions."

The references to culture in COP Decisions/PoWs are referred in many meetings of the WG 8(j):

Draft Decision of the 5th meeting of the WG 8(j) concerns a code of conduct, with the following Preamble: "Mindful of the cultural diversity of indigenous and local communities, including those in voluntary isolation, and the role played by their knowledge, innovations and practices in the conservation and sustainable use of biological diversity," with the following action plan: 5/6 "Draft elements of a code of ethical conduct to [promote] [ensure] respect for the cultural and intellectual heritage indigenous and local communities relevant to the conservation and sustainable use o biological diversity." This code of conduct is expected to be adopted at COP10.

Decisions of COP VII/16 WG 8(j) concerns "Akwé: Kon Voluntary Guidelines for the conduct of Cultural, environmental and social impact assessment regarding developments proposed to take place on, or which are likely to impact on, sacred sites and on lands and waters traditionally occupied or used by indigenous and local communities." This code of conduct contributes to the maintenance of biological and cultural diversity. SCBD is conducting ongoing activities to promote the guidelines, such as capacity building workshops. The text of guidelines includes: 5. Respect for the need for cultural privacy.

33. Proponents of development and personnel associated with the development should respect the cultural sensitivities and needs of indigenous and local communities for privacy, especially with regard to important rituals and ceremonies such as those associated with rites-of-passage and death, and also ensure their activities do not interfere with the daily routines and other activities of such communities.

And

65. Training workshops on cultural, social and biodiversity related aspects of environmental impact/strategic assessment and on economic valuation of cultural social and biodiversity resources for both assessment practitioners and representatives of indigenous and local communities would facilitate the emergence of a cross-cultural understanding of the issues.

Decision VII/16 I

4. Further requests the Executive Secretary to consult and coordinate with the Secretariat of the Forum and to collaborate with United Nations agencies and relevant international organizations with a view to organizing a workshop on cultural, environmental and social impact assessments based on the Akwé: Kon Voluntary Guidelines and aimed at the further strengthening of the understanding of the link between environment and cultural diversity, with the participation of representatives of indigenous and local communities, and urges Parties and Governments to provide financial resources in support of the organization of the workshop;

This was done: panel at World Expo in Tokyo.

COP 6 Decision VI/10 WG 8(j)

Decision VI/10 D

Recommendations for the conduct of cultural, environmental and social impact assessment regarding developments proposed to take place on, or which are likely to impact on, sacred sites and on lands and waters traditionally occupied or used by indigenous and local communities

26. Also requests the Executive Secretary to communicate with the Permanent Forum on Indigenous Issues, established as a subsidiary organ of the United Nations Economic and Social Council, and other relevant bodies such as the World Intellectual Property Organization, the United Nations Conference on Trade and Development and the United Nations Educational, Scientific and Cultural Organization, in order to explore possibilities of coordination and collaboration on matters of mutual concern;

The CBD collaborates on the Inter-agency Support Group on Indigenous Peoples' Issues (IASG) with UNESCO, etc. (across the UN).

Decision VI/10 F

33. Also invites Parties and Governments, with the approval and involvement of indigenous and local communities representatives, to develop and implement strategies to protect traditional knowledge, innovations and practices based on a combination of appropriate approaches, respecting customary laws and practices, including the use of existing intellectual property mechanisms, sui generis systems, customary law, the use of contractual arrangements, registers of traditional knowledge, and guidelines and codes of practice, with the support of relevant intergovernmental organizations such as the Working Group on Indigenous Populations of the United Nations Commission on Human Rights, the Permanent Forum on Indigenous Issues established by the Economic and Social Council, the World Health Organization, the World Intellectual Property Organization, the United Nations Educational, Scientific and Cultural Organization, and the United Nations Conference on Trade and Development;

Completed for 5th Working Group on 8(j), Oct 2007.

UNESCO.

The link between biological and cultural diversity is enshrined in recent important texts adopted by UNESCO. In adopting the Universal Declaration on Cultural Diversity (2001), member countries reaffirmed their conviction that cultural diversity is one of the roots of development and that it is "as necessary to the human species as biodiversity is to nature". The liaison between economy and cultural aspects of development is one of the guiding principles of the Convention for the Safeguarding of the Intangible Cultural Heritage (2003). With the entry into force of this Convention in 2006, UNESCO has an international normative instrument allowing the safeguard of traditional knowledge. Principle 5 of this unique convention recognizes that "since culture is one of the mainsprings of development, the cultural aspects of development are as important as its economic aspects, which individuals and peoples have the fundamental right to participate in and enjoy". The principle of sustainable development is also a guiding principle of this convention, which recognizes that "Cultural diversity is a rich asset for individuals and societies. The protection, promotion and maintenance of cultural diversity are an essential requirement for sustainable development for the benefit of present and future generations". In adopting this convention, Member States have raised cultural diversity to the status of "common heritage of humanity", as in ratifying the Convention on Biological Diversity they have recognized that "the conservation of biological diversity is a common concern of humankind". Another important UNESCO instrument is the World Heritage Convention (1992) which includes Cultural landscapes in the World Heritage List as "combined work of nature and of man" and is illustrative of the evolution of human society and settlement over time. Cultural landscapes often reflect specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Since protection of

cultural landscape can contribute to modern techniques of sustainable land-use in maintaining or enhancing natural values in the landscape, the protection of traditional cultural landscape is considered as highly helpful in maintaining biological diversity.

Furthermore, the UNESCO Seville Strategy for Biosphere Reserves (1995), which resulted of the MAB International Conference on Biosphere Reserves (Seville, 1995), adopted a series of recommendations and identified the specific role of biosphere reserves in achieving a new vision of the relationship between conservation and development taking into account cultural and natural dimensions of both conservation and development. Goal 1 of the Strategy recommends the "use of Biosphere Reserves to conserve natural and cultural diversity", and Objective 1.1. of the Strategy is to: "improve the coverage of natural and cultural biodiversity by means of the World Network of Biosphere Reserves" and, more particularly, "Establish, strengthen and expand biosphere reserves to areas where traditional lifestyles and indigenous uses of biodiversity are practiced (including sacred sites), and/or where there are critical interactions between people and environment (e.g. peri-urban areas, degraded rural areas, coastal areas, freshwater environments and wetlands)."

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