



Strategies and action plans to conserve biological diversity: a cultural and scientific challenge

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Abstract

Ratification of the Convention on Biological Diversity obliges the contracting parties to implement general measures to ensure the development of national strategies, plans or programmes for the conservation and sustainable use of biological diversity as set out in Article Six.

A decade after the 1992 Rio Conference — through a critical review of the path certain African countries have taken in the process of developing biodiversity strategies, actions plans or programmes — the authors propose the main areas of focus that should govern biodiversity conservation planning.

After briefly reviewing the origins of the biodiversity conservation concept, the authors deal with the issue of ambiguity linked to the current use of certain terms such as conservation, preservation and protection. In this section, the debate revolves around the meaning of this biodiversity conservation concept, whose origins can be found in the cultural and economic domains. The rest of the article covers the different approaches used in processes designed to develop biodiversity strategies and action plans. Each of these approaches presents certain strengths and weaknesses. An approach is also proposed that would allow effective participation by all concerned stakeholders and shows how taking account of traditional ecological knowledge (TEK) is a prerequisite for a real participation of peasants in Africa.

Introduction

In the wake of initial efforts undertaken by stakeholders involved in biological diversity conservation, particularly in formulating international biological diversity strategies and action plans, there is a need to critically review progress made since the 1992 Rio Conference and to suggest broad policy guidelines for biodiversity conservation planning.

In recent years, biodiversity conservation practitioners and aid agencies have exhibited a certain amount of enthusiasm in support of the protection of our natural heritage. This enthusiasm has been expressed in the ratification of treaties and the implementation of recommendations made under the Rio Declaration, Montreal Protocol, RAMSAR (a convention on wetlands), CITES (on endangered species), the Convention to Combat Desertification, and a host of other agreements. These commitments provide hopeful signs that ratifying countries are committed to conserving the living resources of the planet.

With specific reference to biological resources, most countries have ratified the Convention on Biological Diversity, thereby acknowledging the

importance and inestimable value of biodiversity for current and future generations. By ratifying the Convention, countries have initiated the actions required to safeguard and protect the diversity of the genetic material, species, habitats and ecosystems that comprise the living resources of the planet. As the terms of the Convention take precedence over national legislation, the laws and regulations of the signature countries must be amended in accordance with the Convention's provisions (UNEP/CBD 1994).

It has proven difficult, however, to achieve the objectives of the Convention driving the efforts and commitments agreed to by most stakeholders as long as the concept of biodiversity conservation varies according to the different meanings it is given within different language groups and different cultural settings.

Ambiguities stemming from different meanings attributed to conservation and to preservation, to say nothing of the concept of sustainable development, are deeply rooted in their cultural settings. Successful strategies and action plans in support of biological diversity will depend, therefore, on our ability to integrate cultural and scientific paradigms.

Historical overview

The concept of biological diversity conservation has evolved in three general stages. The first coincides with the launch of the World Conservation Strategy (WCS) that is based on three general objectives in support of the conservation of living resources. These are:

- maintaining essential ecological processes and life-support systems;
- preserving genetic diversity; and
- ensuring the sustainable utilisation of species and ecosystems.

The World Conservation Strategy formulated by IUCN, UNEP and WWF (1980), attempted to establish a broadly based philosophical definition of conservation as a concept. The word 'conservation' is defined in the document as 'the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining this potential to meet the needs and aspirations of future generations'. Conservation is conceived in positive terms, embracing preservation, maintenance, sustainable utilisation, restoration, and enhancement of the natural environment.' (IUCN, UNEP and WWF 1980). Thus stated, the concept clearly indicates that conservation and development are not mutually exclusive, but rather, closely related. The Strategy quickly became an important reference document with respect to biological resource management issues.

Although the World Conservation Strategy articulated three essential objectives and an initial vision of sustainable development, the perceived need to simplify the message and even the rationale behind the document encountered criticism. Issues related to rapid population increases in some of the world's regions, economic disparities and urbanisation as well as the urgent need for full gender integration in the natural resource protection and utilisation process were not adequately addressed. The scientific method is presented in a dominant light, and the issue of local knowledge and value systems related to the idea and importance of nature is largely absent.

The second stage developed the links between major social and economic issues as they relate to environmental management, while maintaining strong support for the principles stated in the World Conservation Strategy. This point was introduced in a report submitted to The Special Joint Committee on the Patriation of the Canadian Constitution (Jacobs 1981). One of the paragraphs states:

... we have spent the past 300 years mining rather than husbanding our resources. The wise management and prudent use of our natural resources is critical to the delivery of social and economic justice to Canadians of the current and future generations.

During this stage, heavy emphasis was placed on the economic value of natural resources and on trade relations between states. In this respect, the issue of equitable distribution of risks and benefits derived from economic activity becomes a critical component of the sustainable development process (Jacobs and Munro 1986). Although it was acknowledged that economic imperatives were not the only reasons for preserving species, culture was not given much weight.

The 1987 Brundtland Report addressed issues related to urbanization, military investments in arms, poverty, and a number of other issues that had not been discussed in the World Conservation Strategy. Although the report provided substantial analytical depth, and explored the synergy between various areas and sectors that impact on environmental management, it failed to address, let alone embrace, culture as a driving force in achieving sustainable development (Jacobs and Sadler 1995).

The third and final stage, was initiated by the 1992 Earth Summit held in Rio de Janeiro that led to the Convention on Biological Diversity. The Biodiversity Convention is also based on three general objectives. The first two focus on the conservation of biological diversity and the sustainable use of its components consistent with the three World Conservation Strategy objectives. The introduction of a third objective, the fair and equitable sharing of benefits arising out of the utilisation of genetic resources, was a critical addition, requiring that the relationships between the various parties involved in managing biological resources be re-adjusted. These relationships exist at all levels, whether between individuals, groups of individuals, interest groups, corporations or nations, etc., and the Convention stipulates how these relationships might be re-adjusted in terms of the three main objectives of the Convention (Pimbert 1997).

The 1992 Rio Conference acknowledged the aspirations and opinions of indigenous people, civil society and NGOs (Pimbert 1997). Yet, the role played by value systems and differing perceptions in the biological resource conservation process, and the conflict or even complementarity between traditional and local knowledge and standard scientific knowledge, has not yet been adequately

addressed. The same is true of the need to harmonise relationships between global and local perceptions, which raises the issue of intellectual property, effectively involving all stakeholders in biological resource management processes and national sovereignty. Paradoxically, however, the process of approaching biodiversity conservation holistically, and the major issues considered from such a perspective, actually reduced discussion of the role and importance of local values and concerns. Traditional knowledge based on collective memory received little or no attention, even though the past influences present and future attitudes, strategies and actions.

It is against this backdrop that the implementation of the biodiversity convention must be examined.

Conservation or preservation: a question of semantics and of culture?

The meaning ascribed to conservation in the World Conservation Strategy has been adopted by many authors when discussing natural resource management issues (Jacobs 1981; Jacobs and Munro 1986; Saunier and Meganck 1995; McNeelly et al. 1990). Planning practitioners were also quick to appropriate this concept when identifying and conducting natural resource management activities.

Not surprisingly, however, the original English concept was interpreted in several French-speaking African countries in a way that distorts its intended meaning, so much so that these interpretations carry with them potentially disastrous and unpredictable impacts on the very future of biodiversity. 'Strict biodiversity conservation', a term dear to wildlife management officers, is bandied about at biodiversity conservation strategy and action plan workshops, where conservation and protection are used interchangeably. When legal documents, such as national biodiversity strategies or action plans, confuse these two concepts, the status of some species, habitats and ecosystems also becomes unclear, particularly when the socio-economic stakes are high. The potential to choose one or other of these words may depend on the economic situation or self-interest, with plenty of leeway to interpret existing or proposed regulations and laws that intended to govern biological diversity.

Chauvet and Olivier (1993) raise the question of the exact meaning of biodiversity conservation, protection or preservation, and the different perceptions of natural resource management models expressed in English or Romance languages. The issue is more than one of outward form. These

apparently synonymous words give rise to very different management strategies depending on the language, country or group that uses them. They are value-laden concepts, each with its own history. Chauvet and Olivier (1993) suggest that the French definition of the biodiversity conservation concept offered by IUCN, UNEP and WWF in 1980, is a literal rendering of the English and that French speakers are bewildered by the notion of *amélioration* (used to translate enhancement) and wonder about the relevance of the term *utilisation*, however sustainable. When an area is designated for conservation, it is implied that production is ruled out. Thus, the French version of the World Biodiversity Strategy (1994) suggests that it remain a matter of opinion as to where sustainable development is situated on the spectrum between conservation and preservation.

Perhaps by implicit omission, conservation, and hence conservation requirements, have not been defined at the outset in the Convention on Biological Diversity. It is inherently difficult to determine precise requirements for a vague concept. Even Article 2 of the Convention, which deals with the definition and use of terms, is silent on the word conservation. To make matters worse, only *ex-situ* and *in situ* conservation are defined while, 'Conservation is... the conservation of ecosystems'. Surely it would have been preferable to clearly explain conservation rather than providing a definition by tautology.

Confusion is not only limited to the French language community. In the United States, the word preservation is synonymous with outright protection. Conservation, however, refers to the sustainable use of biological resources (Chauvet and Olivier, 1993). This raises the question of what exactly ecosystem conservation is, if it is to include both the full protection of ecosystems and their sustainable use. And for most French-speaking Africans, conservation is synonymous with protection as borne out by the planning workshops held in several French-speaking African countries (Kasisi 1998, 1999, 1999, 2000).

Some countries are even reluctant to use the word protection. This is emphasised in a publication by Gome (1999) on the Côte d'Ivoire, which states the following:

... the term protection has highly pejorative overtones, particularly in our country where reserved forests and other protected areas were set up by the colonisers who, in their efforts to 'protect' biodiversity, marginalized indigenous people by using often inhumane methods, which have left

an indelible scar on the local population's collective memory.

The worldwide aspiration to 'preserve' and 'conserve' natural resources, and thereby guarantee their sustainable use, was translated into action with the Convention on Biodiversity produced at the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil in 1992 (SEPA 1999).

The Convention's objectives, as stated in its first article, are: 1) biodiversity conservation; 2) sustainable use of the latter; and 3) fair and equitable distribution of the benefits arising out of the utilisation of genetic resource use. The semantic ambiguity connected with the very concept of conservation, as discussed above, deviates markedly from the original definition of conservation (IUCN, UNEP and WWF 1980) by differentiating between conservation and sustainable use. Article 1 of the Convention appears to 'suggest' that conservation is synonymous with protection and preservation.

It may well be asked, moreover, whether biodiversity, as used in the Convention, is something to be conserved or a process to be managed depending on the culture concerned, and whether it is a scientific issue or a cultural challenge or perhaps an amalgam of both? There is little doubt that biodiversity conservation raises a challenge in terms of the convergence of science and culture. A science based approach often leads to responses designed to provide technical solutions to problems identified in biological resource management within an empirical analytical framework. Culture, on the other hand, adopts a more flexible view of conservation and development.

Sacred forests, for example, are regarded as a vital ecological heritage in the Côte d'Ivoire and their survival is justified in large part by the fact that they are landmarks that contribute to social stability (harmony with the local gods and spirits, land dispute settlement, consolidating political power at the grassroots level and harmony with deceased ancestors who watch over the living, according to black African cosmogony) (Gome 1999).

Yet, in the vast majority of Africa's French-speaking communities, including Côte d'Ivoire, Gabon, Guinea, Mali and Chad, biodiversity strategies and action plans were developed during national and regional workshops using planning techniques based exclusively on empirical methods. If the scientific approach is granted exclusive domain in the formulation of strategies and plans, then grassroots communities cannot be expected

to become involved. In the first case the management of wild natural resources is organized with respect to a logic of empirical and deductive reasoning, whereas traditional or local knowledge is derived from accumulated experience acquired over centuries and is heavily charged with legend and emotion. How can local communities, particularly in Africa, become fully involved unless traditional or local knowledge is appreciated and valued as an important source of knowledge?

Recognising this complementary frame of reference for natural resource management is critical if grassroots communities are to be mobilised in support of the objectives of the Convention on Biological Conservation.

Developing biodiversity conservation strategies and action plans: a participatory minefield

The countries that have signed the Convention on Biological Diversity are known as 'contracting parties'. Each contracting party is required, in accordance with its particular conditions and capabilities, to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes. The countries are also required, as far as possible, to integrate the conservation and sustainable use of biological diversity into sectoral plans, programmes and policies.

Three biodiversity-planning mechanisms have been developed and are defined in the Convention's glossary of terms and practices and related resolutions. The mechanisms must be used in a participatory, adaptive and cyclical manner (IUCN, UNEP and WRI 1995).

National surveys are assessments designed for gathering information on the status and trends of countries' species, genetic resources, habitats and landscapes as well as on existing conservation and utilisation mechanisms and financial and non-financial costs and benefits (IUCN, UNEP and WRI 1995).

National strategies analyse data and descriptive information contained in national surveys and set potential goals and objectives. They determine any gaps between reality and aspirations as expressed in the objectives, difficulties and options in achieving objectives, the various alternatives' impacts on the environment and the effects on the countries' human, institutional and financial resources and their infrastructure in terms of international cooperation (IUCN, UNEP and WRI 1995).

Action plans are tables defining the public and private organisations and groups that will implement the activities stated in the strategies, the locations or areas in which they will be implemented and the means and resources (labour, institutions, facilities and funding) that will be used. They also establish a timetable (IUCN, UNEP and WRI 1995).

Involving the general public or 'ordinary citizens' in decisions that affect them has become an integral part of the planning process at both international and national levels. The World Environment and Development Commission, or more commonly, the Brundtland Commission, states 'that it is important to have greater public involvement in decisions that could have an impact on the environment and that, in order to achieve this, local democracy needs to be strengthened (Vincent 1994). The Biodiversity Convention also emphasises the need to adopt a participatory approach at each stage of biodiversity management'. This applies to the planning stages as well.

Yet, the participatory process during the biodiversity action plan and strategy planning stages in most French-speaking African countries has been little more than a myth, falling far short of the goals for participation contained in the Convention. At the national survey stage in the Côte d'Ivoire, Gabon, Guinea, Mali and Chad, all data on biodiversity was gathered by scientific researchers, and initial draft strategies were developed exclusively on the basis of this data. It is easy to see why peasant farmers and other citizen groups have shown little interest in the process insofar as their knowledge base and framework of use has not been accessed nor even invited.

Furthermore, it is increasingly unacceptable to describe the environment and analyse the changes it has undergone while ignoring local knowledge. Such knowledge may be general or sometimes very specific, ordered according to different principles, based on several decades and sometimes centuries of observation, and verified through years of trial and error.

Western science and its practitioners often ignore these findings, obtained through other cognitive styles. Happily, however, some scientists, are beginning to show interest in these 'traditional' knowledge systems given the rich data inherent local cultural practices and traditions and a growing awareness of the limits of the scientific method (Mailhot 1993). Traditional local knowledge often provides the best indications of the real biodiversity situation in the field. As well as yielding relevant information on the ecological, economic,

social and cultural aspects of biodiversity, this type of knowledge also provides information of an intrinsic nature. In traditional knowledge, an object has several facets. It simultaneously embodies a material value, symbolic value (totem), cultural value (work of art), economic value and ecological value (role in the ecological pyramid). If such knowledge is ignored from the outset of national surveys, those surveys are impoverished as are the strategies and action plans that result from them.

At the strategy development stage, various measures and forms of investment that address biodiversity objectives are ranked in order of priority. Once again, if the data and information provided by scientific experts are analysed while local and traditional knowledge is ignored, and when any shortcomings are determined only on the basis of such data, the resulting policy decisions are at best partial and in some cases simply inaccurate. Local and traditional knowledge may be taken into account in public awareness campaigns to remind the population, rather quaintly and somewhat paternally, that their ancestors 'cared about' the environment. It is only within this context, that the need for grassroots societies to hold on to their traditional knowledge is considered important. Equally critical, marginalisation earlier in the process is forgotten when it is realised that the intellectual property issues are enormous and the mechanisms for safeguarding the rights to such property are inadequate or non-existent in developing countries.

In addition, data obtained from the participant lists of the various biodiversity strategy planning workshops and planning committee reports held in French-speaking African countries indicate that women never make up more than 20 per cent of participants, yet women perform virtually 90 per cent of all natural resource management-related activities in rural areas. It is unreasonable, moreover, to speak of a fully participatory process, when in most planning workshops, most stakeholders have not been involved at each stage in the process, i.e. from organisation through to report writing.

As the formulation of action plans depends on the previous stages of biodiversity evaluation and strategy, it is extremely difficult to avoid falling into the trap of marginalizing the grassroots stakeholders at this point. And, insofar as the action plan drives the budgeting and scheduling exercise, involving intense negotiations between the key stakeholders and donors, it can hardly be claimed, under the current process, that all stakeholders participate effectively.

A pragmatic framework for local participation to develop strategy and action plans

Most biodiversity action plan and strategy planning exercises in French speaking Africa were conducted using the Logical Framework (log frame) approach (known as *Planification des Projets par Objectifs [PPO]* or *Cadre Logique* in French and *Zielorientierte Projektplanung [ZOPP]* in German). This method is considered to be a good way of organising the planning process in a systematic manner that meets reporting requirements established by funding agencies (EEC 1993).

The log frame approach is a method that can be used to analyse biodiversity-related problems on the basis of a site inventory and biodiversity survey. It can also be used to develop and analyse the objectives set for biodiversity-related action in terms of the problems analysed. It comprises two phases that provide an operational and tabular description of the most important aspects of a particular course of action.

The first phase consists of a situation analysis that includes an assessment of the problems, objectives and strategies. Problem analysis consists of establishing cause-and-effect links between the negative aspects of an existing situation that is presented as a diagram with the effects of a given problem indicated above and the causes below. During the analysis of the objectives, the negative positions in the problem diagram are converted into achieved positive positions. All the positive positions are then indicated in the objective diagram, in which the means-ends ranking is represented. Finally, in the objective diagram, the various 'sets' of similar objectives are grouped as strategies. A number of criteria are used to select the most relevant and suitable strategy.

The second log frame concerns planning. The aim of the exercise is to use a logical framework to design the content of an action plan by systematically and logically presenting its objectives, results and activities plus the causal links between them (vertical logic). This can only be achieved once the available data, i.e. problems, objectives and possible solutions, has been thoroughly analysed (EEC 1993).

Although using a log frame to indicate problems and establish the causal links between negative factors has the advantage of presenting the overall situation that needs to be addressed in tabular form, the various elements are necessarily presented in a linear structure. This provides the impression that biodiversity management issues can be

considered as a string of minor interconnected problems. It is clear, however, that these problems are dependent on social, political and economic forces beyond the local context (e.g. globalised markets, cultural adaptation), but which are, nevertheless, not independent from it. In order to carry the problem analysis to greater depths, therefore, an ever increasing number of external variables need to be taken into account. This extends the analytical capacity of the log frame model beyond its theoretical limits.

Other approaches exist that could fully involve the rural population. An example is the Accelerated Participatory Research Method (APRM), which is used to obtain information on rural and, more recently, urban situations. This method recognises and respects local knowledge and integrates modern knowledge. Information collected through APRM is used as a guide for action based on a community approach to problem solving. It is easier to validate the information collected this way, as the beneficiaries/partners understand and appreciate the project and are therefore prepared to participate in all aspects of the process.

The triangulation principle used by APRM also ensures that a problem cannot be approached from only one angle. When conducting research, APRM views a given phenomenon from at least three perspectives: representative team membership; stratification of the observation units; and varied methods and techniques so as to minimise bias (Gueye and Freudemberger 1991). The advantage of APRM over the log frame approach is that the stakeholders can effectively take part in the planning process. This can lead to positive results in terms of detail, the finer aspects of the situation, and even information on the local population's viewpoints on matters relating to biological resources.

Still, both approaches are limited in that they cannot be effectively used to analyse highly complex systems with multidimensional components. The log frame approach provides linear analyses. Its scope is spatially limited, in so much as it can only be used to analyse problems involving a community, area or country, but seldom a sub-region or region. The external factors that could influence the action are only stated as major considerations, but not analysed (see Figure 1 on next page). Although APRM has a number of advantages as far as understanding the local population's perceptions and aspirations is concerned, its analytical scope is also limited in spatial terms.

Today's analyst is faced with complex phenomena that have multiple causes linked to changing eco-

conomic and social structures. Some theoretical models are known to represent interactive theories that attempt to reflect the relationships between nature, society and technology (triads). Such models can be applied to many varied analytical methods and used to make sense of the profuse multi-causal relationships between the natural world and that shaped by human beings (Thom 1980).

Problems attributed to linear causality, as appears to be the case with logframe problem analysis, give rise to systemic difficulties. Environmental problems that can be ascribed to quite easily identifiable agents give way to complex combinations of economic and social difficulties which are essentially political in nature and are in turn related to the world economy. For example, major issues triggered by globalisation become difficult to identify in analyses conducted within narrow frameworks such as log frames and APRM. As a result, it is essential that a systemic approach be adopted rather than concentrating on isolated elements of causal relationships, as is the case with log frames, or of concentrating on internal group dynamics and their immediate relationship with the external environment, as with APRM.

Conclusion

Twenty years after the World Conservation Strategy (IUCN, UNEP and WWF 1980) was published, an assessment of the sustainable biodiversity management process's effectiveness indicates that the Convention on Biological Diversity ratified by most of the planet's countries has served as a major international legal instrument. As the

Convention is legally binding on an international scale, it is based on an integrated rather than sectoral approach to conservation and sustainable biodiversity utilisation. As the terms of the Convention take precedence over countries' national legislation, laws and regulations have been amended in accordance with the Convention's provisions (UNEP/CBD 1994). In practical terms, this has meant that the new requirements resulting from ratification by most countries have led to several different types of problem.

Most importantly, more attention needs to be given to value systems and to incorporating differences of perception within the biodiversity conservation process. The apparent semantic ambiguity arising from the use of the words 'biodiversity protection', 'conservation' and 'preservation', as discussed, could have disastrous consequences on the way biological resources are managed. One of the sources of this ambiguity is the dual perception of natural resource management depending on whether it is based on an English or Romance-language model.

Understanding and taking into account the various perceptions that lie behind approaches to biodiversity conservation planning, the sustainable use of such biodiversity and the fair and equitable sharing of the benefits derived from it could increase our understanding of the rational bases of such perceptions. It is on such bases that communities determine how they are going to utilise the environment and its resources. It is possible to gain an understanding of their perceptions through their symbolism, literature (e.g. stories, proverbs, sayings, novels) and art. Cultural aware-

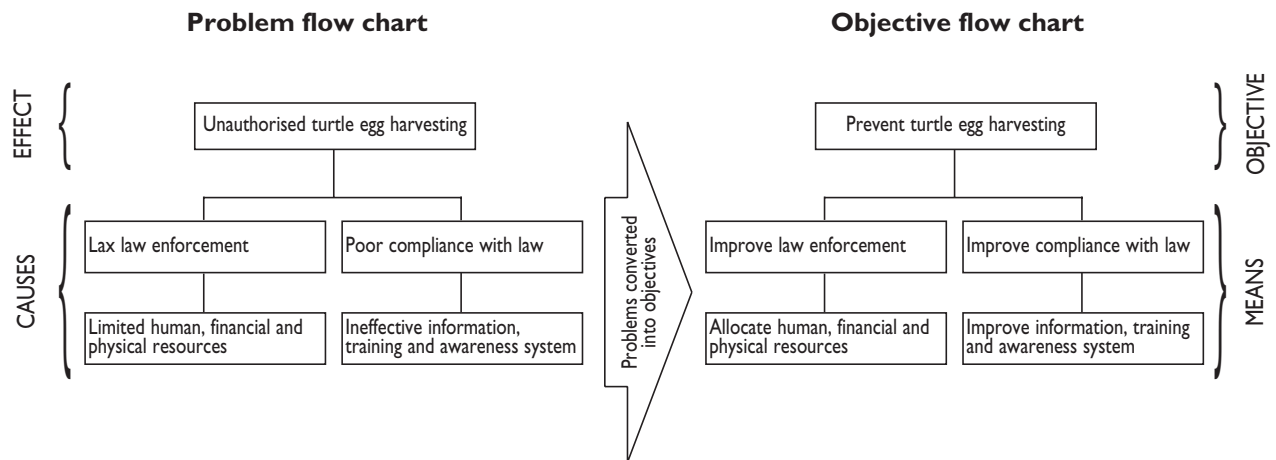


Figure 1. Converting problems into objectives using the logframe approach (Kasisi 2001)

ness can also contribute to obtaining a clearer appreciation of how the mechanisms governing all areas of a community's life interact, so that biodiversity conservation requirements can be better integrated and adjusted to it (Kasisi 1989).

With regard to the issue of traditional and local knowledge versus scientific knowledge, the implementation and success of new practices as a result of applying the Convention on Biological Diversity are limited owing to the costs associated with acquiring the high-quality scientific data required both for formulating most biodiversity conservation strategies and action plans and for providing monitoring programmes. The cost and difficulty of providing effective biodiversity monitoring and management in protected and unprotected areas using standard criteria often prove to be prohibitive. In many cases, a whole host of ecological information on biodiversity already exists in a local population's repository of knowledge. What is more, the local population often conducts management and monitoring programmes or similar activities as part of traditional management systems (Hamilton and Walter 2000).

It is a generally accepted fact, moreover, that cultural information, better known as traditional ecological knowledge (TEK), can be useful to researchers and managers, particularly when used in conjunction with standard scientific data. Strong advocates of field research involving grassroots communities believe that traditional knowledge together with foreign or national researchers' specialist knowledge are more useful than either type of knowledge considered separately when it comes to understanding reality (Christie and White 1997).

Two basic problems can arise when using TEK. The first is due to the fact that TEK and other types of traditional knowledge are integral parts of complex cultural systems and anthropological methods are needed to usefully describe and interpret such information. Acquiring such knowledge is usually difficult. It is time-consuming and requires skills not generally taught to most ecologists, biodiversity strategy planners or biodiversity project managers. The second problem is closely linked to the first and stems from the fact that when researchers have tried to integrate traditional knowledge into their research, the result has been naively reported data obtained from interviews or observations and taken outside their cultural or historical context. The resultant conclusions are often false or misleading (Ruddle et al. 1992).

It is all too often imagined that, in order to take both types of knowledge into account, all that is

required is to collect the information stored in the population's memory and add or compare it to data supplied by Western science. Such data is inserted into conceptual frameworks, regardless of whether it originates in science or traditional knowledge, and is interpreted using highly cultural representation systems. Overlooking such conceptual frameworks renders the information they contain meaningless and, in a sense, neutralises it.

The idea that all data obtained from traditional knowledge can be incorporated into Western science is tantamount to imposing science as a yardstick and forgetting that it is a representation system that is itself the product of a specific cultural tradition. It would be equally misleading to attempt to introduce data generated by Western science into other cultures' conceptual frameworks without taking prior precautions. Once the traditional ecological knowledge concept, if accepted, has been effectively taken into consideration and all the implications understood, it will lead to far-reaching changes in basic research, as other knowledge systems will suddenly appear side-by-side with science and enjoy similar recognition. Because such systems sometimes overlap with science, sometimes contradict it and at other times deal with totally different issues, the traditional ecological knowledge concept would tend to radically broaden our perception of the environment (Mailhot 1993).

Finally, effective involvement of all stakeholders in decisions relating to biodiversity conservation issues is the weak spot in the biodiversity conservation strategy planning process and in the achievement of sustainable biodiversity management.

Such involvement must occur at all stages, particularly the planning, decision-making and management phases. It is an invaluable means of testing and combining economic, social and ecological objectives. Involvement is also a way of avoiding rash decisions and an educational tool for raising public awareness of the importance of conservation and associated problems as well as for alerting planners and leaders to the concerns of the wider public.

Participation is particularly important in rural areas, because little will be achieved unless the rural population is actively involved and understands the issues and solutions (UNEP, IUCN and WWF 1980). The two main approaches used in translating the spirit of the Convention on Biological Diversity into practical action, i.e. log frames and APRM, both have undeniable methodological advantages. It would, nevertheless, be more efficient to subordinate APRM to the log

frame approach by introducing the former when consulting the rural population. The log frame assessment would then integrate the APRM findings during workshops attended by the scientific, technical and political *élite* and rural community representatives. Two birds would thus be killed with one stone, as the general versus local issue would be partly resolved, while at the same time satisfying the requirement to adopt a bottom-up approach. With regard to addressing issues relating to the complex nature of the systems to be analysed for better planning purposes, this would be achieved when additional surveys are conducted during the assessment phase in synergy with baseline TEK data and other standard scientific information. Starting the whole biodiversity planning process again with a view to integrating the concerns raised by this article is not necessary after all, as the three tools, ie the national surveys, strategy and action plan should, in principle, be formulated in a participatory, cyclical and adaptive manner.

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