

Participatory assessment, monitoring and evaluation of biodiversity

Summary of the ETFRN internet discussion 7-25 January 2002

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<u>INTRODUCTION</u>	1
<u>REASONS FOR PARTICIPATORY APPROACHES</u>	2
<u>Objectives</u>	2
<u>The nature of ‘participation’</u>	3
<u>INFORMATION NEEDS OF DIFFERENT STAKEHOLDERS</u>	4
<u>ASSESSMENT IS VALUE-LADEN</u>	5
<u>METHODS, TOOLS AND PROCESSES</u>	7
<u>The process: recognising culture and power differences</u>	7
<u>The process as a sequence of steps</u>	8
<u>Building on the participatory research tradition</u>	9
<u>Indicators</u>	9
<u>Combining quantitative and qualitative approaches</u>	10
<u>Challenges of quantification</u>	11
<u>Monitoring at levels other than species diversity</u>	11
<u>Reliability and generalising</u>	12
<u>Analysis, documentation and dissemination</u>	12
<u>WORKING TOWARDS SYNERGY</u>	13
<u>POLICY AND INSTITUTIONAL FACTORS FOR AN ENABLING ENVIRONMENT</u> ...	15
<u>Policy changes</u>	15
<u>Tenure</u>	16
<u>Institutional strengthening</u>	16
<u>Training and education</u>	16
<u>CONCLUSIONS</u>	17
<u>ACKNOWLEDGEMENTS</u>	18

INTRODUCTION

Participatory monitoring and evaluation (PM&E) is a powerful approach that can empower local people, enhance equity of benefit distribution, and strengthen organisational capacity, as well as improve effectiveness of information gathering, transparency of decision-making and implementation of policy¹. It is an approach that is increasingly being used to support biodiversity conservation and management for a wide range of objectives. Increasingly it is hoped that participatory approaches to biodiversity assessment will ease the task of national reporting to the CBD Secretariat², while at a smaller scale tools are being developed to support communities in natural resource management.

¹ This document summarises the web discussion which took place during the ETFRN E-workshop on Participatory Monitoring and Evaluation of Biodiversity, 7-25 January 2002. Case studies which link in to the discussion can be found at www.etfrn.org/etfrn/workshop/biodiversity/index.html. Comments to the author at Environmental Change Institute, University of Oxford, 5 South Parks Rd, Oxford, OX1 3UB, UK; anna.lawrence@eci.ox.ac.uk. Report finalised 12 June 2002.

In January 2002, ETFRN hosted a web-based workshop on participatory monitoring and evaluation of biodiversity. The aim was to make sense of accumulated experience, by sharing ideas and results among researchers and practitioners, which will help to identify research priorities and formulate recommendations for decision-makers.

The 270 registered participants, based in 55 countries, provided a strong basis for bringing together experience. They included development practitioners and project managers working with rural communities; local and national planners, particularly those preparing Biodiversity Action Plans; national and international advisers and policy-makers, including international NGOs, donors and members of the Convention on Biological Diversity (CBD) Secretariat; researchers; the conservation lobby; representatives from the private sector, who are conducting environmental impact assessments; and representatives from voluntary agencies. Appendix 1 gives some examples of the wide range of backgrounds of these participants.

Discussion was structured around six themes:

1. objectives
2. values affecting biodiversity assessments
3. methods
4. information needs
5. potential for synergy between different stakeholders
6. institutional and policy enabling factors

This report summarises the discussion, following these six themes but placing information needs immediately after objectives, as they are closely related.

REASONS FOR PARTICIPATORY APPROACHES

The workshop sought to address all cases where information about biodiversity is collected, and therefore included examples which might be described as ‘assessment’, and others which fall into the category of ‘monitoring’. Without spending too much time on separating the two, and also from evaluation, we might find it more useful to talk about ‘participatory assessment, monitoring and evaluation of biodiversity’ or PAMEB.

The discussion around theme 1 focused on two ideas – why conduct the biodiversity assessment in the first place, and what does it mean to take a participatory approach?

Objectives

Three principle objectives of PAMEB are:

- to undertake a full quantitative inventory (or ‘assessment’)
- to indicate change (or ‘monitoring’)
- to allocate values or priorities to different components of biodiversity (or ‘evaluation’)
- to improve communication between stakeholders; build confidence and capacity; and / or enhance transparency of decision-making³.

While the first three of these objectives may be said to relate to the substance of the PAMEB, the latter group of objectives is more related to the process. In fact both process and product combine to improve resource management because decisions are made by stakeholders who are both :

- a) better motivated (through the participatory *process*)

b) better informed (by more relevant and meaningful *data*).

These benefits of both the process and substance of PAMEB are implicit in the objectives mentioned by contributors, which included:

- contribute to national reporting requirements under the CBD⁴;
- fulfil inventory requirement by government agency to approve management plan; and / or secure tenure;⁵
- demonstrate to outsiders, the extent of local knowledge about and value for biodiversity in ways which can be understood by those outsiders⁶;
- improve management of protected areas;
- achieve certification through the Forest Stewardship Council;⁷
- enhance sustainability of the monitoring process;⁸
- strengthen organisations⁹;
- enhance likelihood of assessment leading to action.¹⁰

One contributor summed up by saying, ‘[the aim of] a real participatory assessment is not just to produce a list of species, but to change relationships between humans and the environment’¹¹. Some contributors explicitly contrasted such objectives with a more traditional interpretation of PAMEB where local people are contracted as labour, or to point out locations of interesting species.

To understand how such a range of approaches can be included under the same heading, we must look more closely at meanings of the word ‘participation’.

“We need to move beyond seeing local communities as sources of information to partners in the production of knowledge about biodiversity.”

Iain Davidson-Hunt, 14.01.02.

The nature of ‘participation’

‘Participation’ can be interpreted on a spectrum from functional (i.e. improving the efficiency of a PAMEB, by gathering more data more quickly) to empowering (i.e. improving the ability of certain stakeholders to contribute to decisions about biodiversity on the basis of the PAMEB).

In this workshop we adopted a broad understanding of ‘participation’ in a PAMEB (see box 1). Many contributors focused on PAMEBs conducted by or with local communities, and the majority were speaking on behalf of communities in tropical / developing countries, although there were also a range of contributors from temperate countries.

Box 1. Definition of PAMEB used in the e-conference

PAMEB involves non-scientists in observing, measuring or assessing biodiversity or its components. It is often understood to mean assessment by rural communities, but can also involve other stake-holders. It can refer to scientists and local people working *together* to assess bio-diversity, so that they understand each other’s perspectives better; so that local people contribute to national biodiversity monitoring processes; or so that scientists support local people in managing biodiversity.

Contributors noted that participatory work is often externally initiated and runs the risk of being extractive (i.e. results are used by outsiders but not by the people providing the original information). These observations led to concern that participation is merely used to ‘endorse the ideas of academics, planners and bureaucrats’,¹² highlighting the need to examine local benefits; and recognised the abuse of approaches that ‘pay lip-service to the participatory ethic, whilst operating in highly extractive ways.’¹³ Some felt that because biodiversity is not a local or

‘southern’ concept, but a scientific and international one, it is not possible to be truly participatory because it is not a local priority. Others however felt that biodiversity has its place among local priorities, and that ‘while biodiversity issues are involved [in resource management], they generally do not occur in isolation, but are part of larger participatory processes.’¹⁴

There was also discussion of the perceptions of outsiders towards ‘local people’s’ views of biodiversity. There was some criticism of the (often implicit) assumption that indigenous or local people have an innate conservation ethic; some contributors felt that communities they work with see nature as an ‘unlimited resource’¹⁵ which does not need to be formally monitored or protected¹⁶. Others recognise that customary laws and beliefs tend to contribute to conservation of, for example, sacred groves and conservation of traditional crop varieties, but may be interrupted by western legal systems and notions of development¹⁷.

INFORMATION NEEDS OF DIFFERENT STAKEHOLDERS

While many different stakeholders want to collect, analysis or use information about biodiversity, each has different requirements. Furthermore, many stakeholders have problems in understanding the kinds of information generated or communicated by other stakeholders¹⁸; this applies as much to communication between social and natural scientists as between them and local people.

Different stakeholders are interested in different species, varieties, habitats or functions of biodiversity. Perhaps because of this, some contributors felt that local biodiversity assessments were not really looking at biodiversity, but at a subset of biodiversity¹⁹. However, because of both the logistical challenges of including all species, varieties and habitats, and because of the subjective nature of any observation, *all* biodiversity assessment, by scientists or any other stakeholders, include only some subset of all biodiversity. The challenge is to find ways to relate the different observations of the various stakeholders.

Two particular challenges relate to generalising or scaling-up, from information collected by or with local participants who have detailed but localised knowledge; and combining different types of information in a usable way.

One of the ways in which some of these objectives need to be combined, is when forests are to be certified ‘sustainable’. Legally, there may be certain obligations to know about the occurrence of rare or protected species; and to achieve certification through the Forest Stewardship Council [same in Spanish] they must protect / enhance High Conservation Value species, ecosystems and cultural features, so these too must be monitored²⁰. In such cases, local biodiversity data is useful for making management decisions, but unless it can be interpreted according to external standards certification is not possible.

With the move to include smaller landowners and community forests in certification schemes, heterogeneity of data is particularly challenging²¹.

At the wider scale, this can lead to complex sets of data from different sources and in different formats. This may not be at all what planners hoped for. Some wrote of the need for standardisation to a common currency.²² Clear simple data make decisions easier, but may not be so relevant to, respected by, or likely to be implemented by local stakeholders.

For example, one contributor felt there is a tendency to make biodiversity assessments too complicated, and that combining values in maps which simply show important areas for different stakeholders, would be a useful way forward²³. But some stakeholders need *broader* information,

“Many decision-making bodies (e.g. state apparatus) encourage simplicity and are poor at eliciting or engaging with the complex needs of individual communities.”

Doug Sheil, 17.01.02.

because simple data on species distribution is not sufficient to develop a management plan²⁴; values, access, changing availability may also be important.

Finally it is important to note that where people's information needs include information acquired *from other people*, there can be sensitive issues at stake. Not only is there heightened interest in intellectual property rights, and the treatment of ethnobiological data collection as infringing those rights, but also the act of collecting information can alienate local people, thereby undermining its original objective. Local people may have good reasons for their unwillingness to share information^{25, 26}, so it is important to consider whether it is really necessary.

One alternative is to seek less sensitive kinds of information locally. Because of the complexity, cost and subjectivity of data gathering, it may be more useful to know *why* biodiversity is changing, than to spend scarce resources on detailing exactly *what* is changing. As one contributor pointed out, we do not need a scientific survey to recognise that a forest is being degraded²⁷. Participatory approaches can be particularly useful, in providing insights into the explanations for observations.²⁸

ASSESSMENT IS VALUE-LADEN

The call for participatory approaches is intimately connected with the question 'Is it possible (for anyone - scientist, forest user or whoever) to be objective in conducting a biodiversity assessment? If not, is it possible for different stakeholders to understand and use each others' assessments?' This links in with the question of defining standards of measurement, and clarifying correspondence between the measurements made by different stakeholders.

The introduction to the theme, from a team of UK-based academic researchers, highlighted the need to be able to communicate about different values associated with different components of biodiversity. They challenged recommendations made by earlier participants that measurements should be standardised, as this would lose the diversity and relevance of local measurements.

While recognising that values held by scientists are not necessarily explicit or universal,²⁹ contributors felt that it is precisely because we aim to be participatory that the values question arise. The differences between assessments made by different stakeholders is attributed to values formed by preferences and knowledge³⁰, which affect the components of biodiversity that people 'see' when assessing. For example, because scientists tend to look in the wild places they neglect the potential of agricultural biodiversity³¹.

In contrast, it has been widely asserted that local people value the components of biodiversity which they *use*. However, research in Cameroon shows that local people hold non-utilitarian values for biodiversity at species, habitat and landscape level³² and research in the Philippines shows that the non-material values for biodiversity may be more important than the material³³. Indicator (signifier) value, existence value and service value are other categories reported, which economists would recognise but are seldom looked for at local level³⁴.

“Simple approaches to according relative value to different areas might ... have a lot of merit. A map indicating areas of high, moderate and low value to different stakeholders could be generated on the basis of participatory assessments, then related to the potential for land use options available for different sites.”

Adrian Newton, 10.01.02.

Some contributors felt that this discussion of values might be of only intellectual interest, because when it comes to local livelihoods, it is material values which affect people's interest³⁵. But even among use values it is sometimes difficult to know how culture affects use and thence inclusion in biodiversity assessments. Species which are 'unique' or unsubstitutable for a ritual use

presented particular problems³⁶. Clearly, further work is needed on whether spiritual values are ‘the most important motivational factors determining people’s management and conservation of biodiversity’³⁷, or whether when it comes to making hard decisions, economic factors win the day.

Despite decision-makers’ desire for simplicity, it seems difficult to attribute a single value for a particular unit of biodiversity by a particular group of stakeholders, for at least two reasons: that values are composite and not comparable with each other; and that they are location specific. These findings do not necessarily make decision-makers’ lives more complicated however.

Dealing first with the multi-component nature of biodiversity values, several researchers have come to the conclusion that it is not possible to come up with a single index of local biodiversity value because of the impossibility of comparing, for example, use values with beauty values; and that it is more useful to tease out the *range* of values as a basis for communication and joint decision-making.³⁸

One such example is the case of negative values associated with certain components of biodiversity. Nuisance animals e.g. those that raid crops, or threaten human life³⁹, may be valued in a way which directly contrasts with that of outsiders. It is impossible to quantify such values in a way which makes it possible to incorporate them into a single index which offsets positive values against negative ones. Clear separation of the *kinds* of values held locally can help in discussions of the costs and benefits of biodiversity conservation.

Turning to the second point, many described the complexity of relationships between local people and their environment and emphasised the *location-specificity* of value⁴⁰. In particular, access or ‘belongingness’ as one contributor put it (both physical and social) affects values⁴¹, and complicates interpretation of potential value to the community.

“The knowledge system itself moves away from generalizing and universalising concepts and categories toward embedding knowledge into specific places and people.”

Iain Davidson-Hunt. 20.01.02.

For these reasons, many contributors emphasised the importance of validating interpretations with the community. This can have several effects. First, it provides a means of checking whether outsiders’ interpretations have resonance with local communities. Secondly, it can stimulate discussions about values, and lead to changed perspectives. For example, in Indonesia results from externally-led research made local people say that ‘implicit value has become more explicit to them’⁴². And thirdly, it may provide a means of conveying scientific values to local people.

This last argument ties in to discussions around the impact of communicating scientific knowledge to other stakeholders. Such communication can make local people view their resources differently. One contributor asked: ‘how do we make local communities realise values of such components of biodiversity?’ implying perhaps that biologists’, or global, values represented the ‘real’ values; but others did not agree, feeling that local people had as much right for components which they value to be included in the PAMEB. For example one contributor proposed that local or cultural importance should be included as the basis for an index in the red list.⁴³ While the IUCN list relates specifically to international priorities, it might be possible to develop a parallel list.

Finally, it is evident that research which draws out values for biodiversity is a political process. On the one hand, making values explicit can lead to conflict⁴⁴, but without bringing such tensions into the open it would be difficult to work towards a solution which accommodates different interests. Recognition of the validity of different stakeholders’ values is challenging particularly

for more powerful stakeholders because it implies trade-offs. On the other hand, values can change through participation in a PAMEB, and through increased understanding of other stakeholders' values.

METHODS, TOOLS AND PROCESSES

The methods used, and the ways in which they are linked through a process, will depend on the objective of the PAMEB. As we have seen, there is a wide range of possible objectives for, and partners in, a PAMEB and it is not possible to be prescriptive about how it should be conducted. Instead, several contributors emphasised the need to be participatory in the development of the methods themselves. Nevertheless there clearly is a wide range of methods which have been developed and some general points can be made. In the following section, we draw out these points in relation to the achievement of a participatory *process* and / or *product*; and consider ways in which methods need to respond to the different values and information requirements of different stakeholders.

This theme drew many case studies, which are available on the workshop website. These case studies illustrate specific methods which have been developed, building on both participatory appraisal and scientific assessment methodologies. In this document we focus more on the ways in which these methods are used in relation to the objectives.

The process: recognising culture and power differences

The participation of 'non-conventional' stakeholders (e.g. local communities, the public, etc.) in biodiversity assessment, presents a challenge which must be overcome before the PAMEB is going to produce useful results. This relates to the different cultures, knowledge systems and power relations⁴⁵ of the different stakeholder groups. Groups which are used to being seen as irrelevant, inferior or ignorant are unlikely to contribute to a useful process.

In contrast to the ethnobotanical / ethnobiological approach, contributors emphasised the importance of recognising that *all* stakeholders operate within their own value systems: '... by recognizing that different cultures are coming into contact we put much more emphasis on how

"This whole participatory process of methodology development revealed very interesting and valuable discussion between the villagers and staff, which had not really happened before."

Jeannette van Rijsoort, 15.01.02.

the actors of these different cultures are going to communicate and move toward mutual learning about specific problems in specific places.'⁴⁶ This experience related not only to indigenous people, or developing countries; a contribution from Scotland suggested that 'differences in outlook and values between locals and conservationists have more to do with tensions between scientific culture and local cultures than the relative economic status of the various players'.⁴⁷

Addressing these tensions is obviously important where the *process* of involving different stakeholders in the PAMEB is a key objective. Involvement in the assessment creates stronger conscious links between people and biodiversity, *or* helps them to learn about it and value it more, *or* helps scientists and local people to value each other's knowledge more.

But these tensions cannot be ignored even where the PAMEB has a more pragmatic purpose, such as the production of more data more quickly or more accurately, because again motivation will be affected by people's perceived status and by their attitude to the resource which they are assessing. The consensus of contributors was that time and activities need to be explicitly programmed in, to attempt to overcome these differences.

In addition, several contributions highlighted differences of power and knowledge among *local* stakeholders, particularly in rural communities. Some of these issues arose during a discussion about sampling people, when studying values.⁴⁸ Although this might seem academic, some practitioners agreed that we ‘first need to know heterogeneity within the village, before you can choose the proper monitoring partners’.⁴⁹ Others disagreed, pointing out that it is more appropriate to work with those selected by the community: ‘All indigenous communities I have worked with have always directed me to work with specific people.’⁵⁰ Care is needed in this regard, because in communities which are less heterogeneous or harmonious there are certainly ethical issues associated with the selection of individuals to contribute to decisions which make be taken as representative of the whole community.

The process as a sequence of steps

Clearly these issues of culture knowledge and power imply more complexity than scientists are used to dealing with established biodiversity inventory procedures. What does this complexity mean for institutions who want set methods and procedures to follow?

Contributions showed that a wide range of methods exist, and that in fact it is possible to adapt scientific approaches to local needs, through training or consultation. What needs particular attention however is the process in which these methods are embedded. It may be impossible to cross the culture gap between different stakeholders, but contributors have demonstrated that it is possible to develop steps in a process which brings stakeholders closer together in producing mutually useful information. The CIFOR Multiple Landscape Assessment methodology is one such approach, seeking ‘to provide a comprehensible summary of what actually matters locally, to determine what is important, to whom, how much and why, and a means to make these local values and preferences more legible and relevant to the decision making process.’⁵¹

The two introductions to this theme concurred in emphasising the following steps⁵²:

1. start with positive policy and official attitude [helping to establish respect between cultures and knowledges as discussed above];
2. clarify perceptions of benefits and obstacles; define terms and objectives;
3. select monitoring partners [see discussion below on sampling];
4. involve villagers in developing methodology; start simple and grow; use both scientific and participatory tools;
5. set indicators or define targets, which are relevant to stakeholders’ livelihoods;
6. integrate recording of indicators into daily life;
7. make sure that villagers take part in analysis and decision-making, or agree on methods of analysis.

In fact this process probably represents the most complex and challenging form of PAMEB. Whilst the steps outlined above relate to biodiversity monitoring with rural communities, our area of interest is broader than that. Other PAMEB approaches (involving, for example, volunteer enthusiasts in monitoring bird populations in the UK) require fewer steps, and less attention to establishing mutual understanding at the beginning of the process.

In each case, process and methods must be adapted to the objectives and stakeholders, based on an assessment of differences between stakeholders, and the need for results to be used by different stakeholders. For example, work in British Columbia, Canada, which brought together scientists, indigenous land managers and other stakeholders in a series of adaptive management workshops, showed that workshop size has to be limited to ensure everyone could interact. Some

participants were not comfortable in that setting and an alternative had to be found – through virtual workshops.⁵³

Building on the participatory research tradition

Several of the PAMEB approaches which seemed most successful in empowering local people to manage biodiversity resources, were based on the tradition of participatory research, i.e. using information-collection as a way of answering questions defined by *the participants* about the extent and function of natural resources. Key aspects of this approach include: involving local people in developing the methodology⁵⁴, iterative modification of the methodology⁵⁵, and decision-making or campaigning based on the results.

“Action learning approaches and participatory processes can be used at field and national level to overcome information barriers. You can get various stakeholders to work together”
Joost Foppes, 16.01.02.

Tropenbos-Colombia has pioneered this approach by supporting indigenous people in choosing research topics; gathering and analysing data and formulating natural resource management plans.⁵⁶ In the Philippines too, community research sought to understand and strengthen existing biodiversity relationships, and the method illustrates a process whereby forest-dwelling communities changed their resource-use practices through interpreting their own resource-monitoring results⁵⁷.

While some argue that truly participatory processes must start with the local community, a strict interpretation of this criterion would exclude much valuable work. Several contributors recognise that they initiate the process but must be extremely conscious of the power issues involved, and of the time needed to build trust, overcome inhibitions⁵⁸ and establish common objectives.

Key to success: linking biodiversity assessment into a participatory research process. Miriam van Heist summarises her view of work by Patricia Shanley:

*I think crucial elements were:*⁵⁹

- + *resources that were surveyed were selected by communities themselves, because of their economic potential. That way, people's interest is secured from the start.*
- + *Patricia lived for several years with the communities and thus learned to understand their outlook on life, what was important to them and 'their kind of communication'*
- + *methods to monitor the resources production were developed together with communities from the start and kept simple, but robust*
- + *presentation of (intermediate) results was totally adapted to education/ understanding level of audience and because people saw data presented in an early stage, they realised what they could do with the data and became much more aware of resource consumption levels (both subsistence and market oriented) and its value to them*
- + *results proved immediately relevant and useful for actual choices: people could now compare costs and benefits between 'selling trees out to a logging company' and 'saving them for long term fruit production'.*

See: Shanley, P. (1999) Extending Ecological Research To Meet Local Needs: A Case From Brazil. FAO website.

Indicators

It is impossible to assess the whole of biodiversity, and decisions must be made about *which* components are to be measured and what they tell us about the whole (or the part that we are interested in). This observable subset of biodiversity components is usually termed ‘indicators’, and they are particularly useful in monitoring *changes* in biodiversity. Even among different

scientific fields the choice of indicators is a contested issue⁶⁰ and PAMEB adds a further dimension to the debate, in that the choice of indicators must be made by, or interesting to, the local stakeholders, but must also have a clear relationship to the whole. For example, members of a Community Forest User Group in Nepal chose to include the presence of less common timber species, to monitor habitat recovery;⁶¹ bird conservation organisations in the UK invite members of the public to monitor birds they may see in their gardens; WWF-UK works with communities to identify and monitor *vulnerable* species, as do NGOs in the Philippines.⁶²

One point in particular needs further discussion. Some contributors expressed concern that PAMEB did not really relate to biodiversity because local people are unlikely to monitor the whole of biodiversity. However that seems to be the case with *all* indicators; we need to understand the relationship between the indicators and the whole, and in many cases we do not know enough about the whole (of biodiversity) to be sure of this relationship. Local choice of indicators is likely to be based on species of local importance, but not necessarily on useful species. The work on values is useful here, because indicating which species or habitats may be selected. One clear recommendation is that if indicators are to be used, they must be selected on the basis of explicit communication about their purpose, and informed choice about why they have been selected. This self-aware and participatory process is more likely to lead to indicators which are useful to and communicable between a range of stakeholders.⁶³

In any case the choice of indicators is clearly a time-consuming activity which deserves attention if it is to be meaningful. Under some circumstances, e.g. where new methods are being tried out or the data is mainly for the benefit of outsiders, it may be more appropriate to use more structured methods which although they take up more of the outsider's time, use less local time *per individual*, such as for example structured questionnaires. The use of these was illustrated from Canada⁶⁴, along with 'virtual workshops' which allow 'spreading participation over time and space in a manner that permits extension staff to interact 1-on-1 with the holders of traditional knowledge, and elicit the knowledge in a structured manner that permits its subsequent incorporation into decision systems and processes. The key here is the integration of software development with new roles and responsibilities of extension staff. The process leads to development of indicators for subsequent monitoring.'

Combining quantitative and qualitative approaches

One difficulty which scientists have with local indicators is that they may be expressed qualitatively. Such indicators may be powerful, because more meaningful locally. For example, one contribution from the UK emphasised the value of assessing biodiversity through emotional expression and art. 'Methods using the arts, sport, entertainment may engage people emotionally with local nature and help them build it back into their culture.'⁶⁵ But others expressed scepticism; for example the qualitative and evolving nature of local values may make 'measurement' impossible in participatory processes⁶⁶. Nevertheless many of the contributions show indirectly that the values and priorities of *all* stakeholders are liable to change through a participatory process, so this is a challenge which must be addressed.

Qualitative approaches not only express attributes which cannot be quantified, they can also help to *explain* changing phenomena. Several contributions highlighted this advantage of PAMEBs: it can be important to know what local people perceive to be the causes of (changes in) biodiversity, and in many cases this will provide insights which scientists and planners would not have otherwise had access to⁶⁷. This is why it is important to treat participatory tools as accessories rather than objectives in themselves;⁶⁸ they provide a means to discover local perceptions rather than simply produce data.⁶⁹

Clearly, the qualitative explanation of change may be based on quantitative observations, and may blend methods, for example through comparative ranking and spatial analysis⁷⁰. Because different approaches (qualitative and quantitative) have different strengths, the methods must be chosen to suit the objectives, and can often be fruitfully combined. A range of case studies illustrated ways in which this can be done⁷¹. This fits in with the concept of participation held by the workshop organisers – i.e. that it is not just ‘working with local communities’ or helping the communities to carry out their own assessments, but involves stakeholders working together and in parallel, using their own methods and communicating results to useful ends.⁷² Rather than a set procedure or ‘recipe’ for PAMEB, a tool box is needed which links methods to objectives for different stakeholders.

In particular, maps were frequently mentioned as a way of combining species and landscape values and providing a means of linking knowledge with place.⁷³ There is often strong correlation between detail on maps and scientific corroboration – even in distant sites visited infrequently by local informants.⁷⁴

Challenges of quantification

Nevertheless, while qualitative measures may be closely linked to empowerment objectives of PAMEB, e.g. for documenting knowledge⁷⁵, quantitative measures of change are often more meaningful at the wider scale, and for planning (as discussed above). This does not preclude participation: scientific methods also have a role in participatory approaches, and we should not underestimate the abilities of local people to record detailed and complex data⁷⁶ but note that analysis and generation of useful results can require much external support.⁷⁷

While traditional foresters emphasised the value of tried and tested forest inventory methods⁷⁸, others contributed experience on the modification of such scientific methods to suit other stakeholders.⁷⁹ Although ‘standard biological survey methods ... are not well designed to ‘capture’ the local and environmental values of a forest in a way that is useful for decision makers’⁸⁰, appropriate sampling procedures can help to overcome this.⁸¹ A discussion of sampling highlighted the different approaches required, depending on whether the objective of PM&E is to:

- Make management decisions
- Share and adjust values
- Obtain wider scale and comparable data

There was concern that scientific goals of objectivity⁸² might be thwarted if local priorities allow monitoring only of, for example, non-timber forest products (NTFPs) (but see discussion of indicators above), or monitor each type of habitat at only one or two sample points. Recent work in participatory research with farmers however indicates that an explicit discussion of sampling procedures and the rationale for replication, can lead to local adoption of methods which are more amenable to scientific interpretation;⁸³ furthermore, potential advantages need to be offset against the time involved, and the advantages of highly selective sampling which increases the *range* of habitats included.⁸⁴

PAMEB at levels other than species diversity

Biodiversity is a construct which encourages assessment at various levels – most often at the level of species diversity or richness, but also at habitat or ecosystem level.

In participatory approaches it may be most constructive to assess biodiversity at the landscape level, as did the CIFOR Multidisciplinary Landscape Assessment, ‘because effective land use

planning requires looking at a forest and its resources as part of a broader agro-ecosystem that provides a variety of community needs’⁸⁵

Two contributions emphasised the importance of exploring different stakeholders’ perceptions of diversity at habitat level⁸⁶. In both cases it was hard for local people to generalise about the vegetation *type* (in the way that scientists would) rather than discuss the value of a particular *place*. This links back to the connection between *value* and *place* discussed above.

Furthermore, the action learning⁸⁷ approach has been shown to give results comparable to principles of the ecosystems approach. The ways in which local people value the ecological *processes* of biodiversity (and hence maintenance of ecosystem stability) deserves further exploration.

Reliability and generalising

Contributors emphasised that we still face the challenge of communication between different monitoring systems.⁸⁸ Difficulties in communication and mutual understanding of world views, as well as motives for revealing or hiding information, give rise to questions about the reliability of data collected by ‘non-conventional’ stakeholders. These concerns are legitimate if the information will not infringe the rights of some stakeholders (see section on information needs above). Nevertheless, by imposing external (e.g. scientific) standards of reliability or generalisation, we may be acting against local ethic criteria (e.g. by requiring people to monitor or measure on land which is not theirs; or by interviewing people who are not considered experts on the subject locally).

One response is to triangulate, i.e. to use different stakeholders and different methods, and then discuss among them the reasons for perceived differences. For example, one case study from Yunnan which drew particular interest from other contributors, described the use of three parallel monitoring systems, in recognition that different stakeholders have different objectives for involvement in a PAMEB.

Where validation is conducted, by cross checking between different sources of data, it often demonstrates correlations between community estimates (e.g. of relative quality / quantity shown on maps) and more scientific survey methods.⁸⁹ If further studies support this trend, it may be possible to rely more directly on community information sources without such detailed scientific checking.

Different stakeholders require information at different scales, and ‘there is a strong urge inherent in us ‘scientific types’ to generalise our results but the details can matter’.⁹⁰ This is where validation through feeding back to local communities is particularly important. It also comes back to the sampling issues discussed above. And because analysis may often have to be done by outsiders it is essential to refer back to the communities to see if the results reflect reality for them.⁹¹

Analysis, documentation and dissemination

It was often emphasised that local participants must be involved in analysis of data, and decision-making. The exact nature of the work done by local people can be negotiated; for example, if they do not feel comfortable filling in forms, or using computers, these roles can be allocated to other stakeholders, but the data must be accessible to them afterwards.

Where the PAMEB involves local communities, more work is needed on methods for presenting results back, and analysing with the community.⁹² Contributions from SE Asia highlighted the need for continuing support in decision-making and analysis, since a PAMEB is not a one-off event; such support can be provided among the communities themselves, for example through local knowledge networks.⁹³

Organisations which use PAMEB in developed countries to monitor animal and plant populations through volunteers, have more experience in this regard, as much of the motivation for volunteers comes from seeing the results on the internet, or hearing analysis of changing bird or plant populations on the radio.⁹⁴

Another important aspect of dissemination relates to documentation of the methodology, which enables the process to be replicated by other communities. Examples of monitoring manuals produced by participants include two cases in India and one in Indonesia.⁹⁵

WORKING TOWARDS SYNERGY

The idea behind synergy is that the ‘whole is great than the sum of the parts’, with benefits for all parties concerned. This would be an ideal outcome of a participatory approach, but other combinations of costs and benefits are more common.

Much of the discussion focused on ways in which local knowledge can enhance scientific assessments. Local knowledge can demonstrably provide far more, and more useful, information than scientific surveys which would be unaffordable (e.g. by highlighting ‘special sites’ which added more species to a survey than those in randomly sampled sites).⁹⁶

Furthermore, combining different sources of data obviously provides a basis for validation, and for scaling up. As one contributor noted, ‘there is lots of potential for these types of synergies. Scientific inventories allow for efficient methodologies to make predictions for large swathes of land. Local knowledge often provides a scale of detail which sometimes calibrates the inventory, points out habitats that aren't picked up because of the scale of the inventory, points out places / habitats that are rarely found and therefore missed.’⁹⁷

A key debate emerged about the issues around relating information gathered at different scales, which is partly summarised in the methods section above. Much data collected by different stakeholders is not only applicable to different scales, but also of different kinds (because qualitative, or because different indicators have been chosen).⁹⁸ As indicated above, it is not an easy task to combine information from different stakeholders because of the different knowledge cultures within which it is created.⁹⁹ As ‘outsiders’ we not only fail to understand local value systems, but we often fail to understand and make explicit our own values.¹⁰⁰

Nevertheless, some contributors felt that the problem is not one of merging different scales, but rather the interface between cultures.¹⁰¹ It seems that the possibilities for combining information, and for deriving synergy in this way, will depend strongly on the process through which indicators have been chosen in the first place, and the mutual understanding that stakeholders have of the relationship between each others’ areas of interest. One step which at least enhances communication was emphasised by some who called for more identification tools,¹⁰² and clarity in linking local and scientific names¹⁰³

Clearly, if local knowledge is highly place-specific it will be hard to generalise to a wider scale, and some investment will be needed in training to enable local people to gather information of comparable quality. This is the case for example in the training of parataxonomists described from Papua New Guinea.¹⁰⁴ In such cases where the priority is to obtain wide-scale information for regional planning or reporting purposes, the benefits of PAMEB will be largely seen by the scientific and policy stakeholders

If in a particular PAMEB exercise it is recognised that local knowledge contributes to wider information needs, should we be paying local people for participation in PAMEB activities? Contributors held differing views on this. At one extreme, the parataxonomists trained in Papua New Guinea contributed effectively to scientific assessments¹⁰⁵ while at the same time earning significant income. But even where the PAMEB is expected to be useful to local people, as in Yunnan, the novelty of the exercise, and the time investment needed to develop methods, may make it advisable to offer cash incentives.¹⁰⁶ Others felt that if payment was expected, the work was not truly participatory because payment implied that the process was not relevant to local people.¹⁰⁷

But what is in it for local stakeholders? Although it was pointed out that ‘the needs of wider-scale assessment should not dictate methods’,¹⁰⁸ synergy may result even where the benefits initially appear to be mostly for outsiders. In some cases there is a direct economic incentive. In one village in northern Lao PDR, improvements to marketing of bamboo-shoots led to increased income, and greater incentive to monitor and manage the bamboo forests.¹⁰⁹

Several contributors emphasised the interest of local people in learning about scientific approaches,¹¹⁰ and hearing about the basis for scientific or global values applied to their local resources¹¹¹. Communication must be two-way for effectiveness in participation – as one contributor put it, ‘We do not know what [local] people would think when they know what we know.’¹¹² Even where the PAMEB is quite extractive, if sensitively conducted it can lead to changes in perception of the value of knowledge. In Cameroon the process of conducting externally-initiated research into local biodiversity values led to a request from village chiefs to help with the documentation of local species names and uses.¹¹³

“I have not worked in any community to date, from Mexico to Canada, where local peoples do not want their young people to learn ‘scientific’ approaches to data collection. ... at times they will incorporate some of this information into their own system of knowledge although we may not recognize the source of that knowledge once it has been incorporated.”

Iain Davidson-Hunt, 14.01.02.

There may be other unforeseen benefits arising from local people’s participation. As discussed above, the *process* of communicating results, perceptions, analysis and decisions can contribute to local people’s empowerment, as well as provide improved understanding which leads to clarification of rights, resource management decisions etc. This aspect is closely linked to the institutional factors discussed in the next section – because it is unlikely to take place unless the groundwork has been done in establishing a common interest and ‘goodwill’ among the different participants in the process,¹¹⁴ sometimes through a *prior* process of empowerment.¹¹⁵ Similarly, participatory research processes are much more likely to lead to action, particularly if attention is paid to joint analysis and decision-making.^{116,117}

There are other ways in which local people may feel motivated to take part in a PAMEB. Several contributors pointed out that if we inquire about local values, perceptions and priorities for biodiversity, we also need to respond to those priorities for management even if they are not international priorities.¹¹⁸ This may mean, for example, providing access to scientific information

which helps local people to manage species or habitats of importance to them, or supporting conflict management processes which help to control the negative impact of animals which destroy crops but are of high international conservation priority.

To achieve real synergy which provides benefits for all parties, we may need not so much new tools, but intermediaries who are able to communicate between the different approaches, and provide a 'voice' for local people to make their perspective more explicit and comprehensible to outsiders.¹¹⁹ In the end, of course, it is better if local people do this themselves, and this brings us to the need for institutional change. Communication amongst *local* stakeholders can be just as important as between local and scientific or institutional stakeholders. For example, a facilitated participatory exercise led women and men to learn from each other about changing species availability.¹²⁰

“Mutual learning is key as many local peoples with whom we work insist that research interpretation and management decisions be reached through a process of negotiation and consensus.”

Iain Davidson-Hunt, 14.01.02.

Finally, there may be respectable reasons to protect local knowledge and restrict outsiders' access to information.¹²¹ It may be valuable to seek methods which do not require *exchange* or *extraction* of information but instead help people to make decisions based on their own information gathering. For example, 'While it may not be necessary to extricate local knowledge for use in higher scales of decision-making, it is very important that place-based peoples are provided with contemporary opportunities to keep their knowledge of biodiversity in the bush and not in the museums.'¹²²

POLICY AND INSTITUTIONAL FACTORS FOR AN ENABLING ENVIRONMENT

Much of the experience reported came from individual projects, but contributors emphasised that institutional structures, policy and legislation need to change to make participatory approaches more feasible and rewarding. At the very least, local stakeholders must be empowered with knowledge of legal and economic aspects of biodiversity,¹²³ and with the means to 'assess how their traditional knowledge is to be used'.¹²⁴

Contributors also emphasised that there is much that can be done locally, through institutional change, for example the creation of 'permanent working groups'¹²⁵ involving a range of stakeholders. To some extent, enlightened outsiders can catalyse much change. 'Both local peoples and biodiversity will benefit from committed scientists, local peoples and the potential synergy of their knowledge. However, place-specific and equitable research partnerships and decision-making institutions will need to be invented if this is to occur.'

Policy changes

Change often develops from improved relationships and communication between *specific* communities and officials; but will not *spread* where policies inhibit such methods. Much of the discussion sought to take the focus off local people, and emphasised that in order to empower local people it is people in power who need to make change happen, and learn from local people.¹²⁶ For this to happen, the policy framework must at the very least:¹²⁷

- acknowledge the rights of local people or the public to participate in natural resource management;¹²⁸
- seek to implement the CBD and COP decisions;
- recognise and protect the rights of knowledge-holders;
- provide budgetary support.

This will only happen on a wider scale if we develop a common framework of understanding – definitions, key issues and processes (because participatory approaches cannot be applied in a prescriptive way).¹²⁹

At the international level, formal recognition of the value of participatory approaches is necessary. Progress has been made in this regard particularly with respect to article 8(j) of the CBD. The second meeting of the Ad hoc Open-ended Inter-sessional Working Group on Article 8(j) prepared guidelines for conducting cultural, environmental and social impact assessments on territory occupied or used by local communities, and brought together participatory mechanisms for involving indigenous and local communities in policy planning and implementation.¹³⁰

In addition, however, policy makers need to come to terms with the lack of a ‘recipe for success’ in such approaches. In many ways, actors in international institutions will best understand and appreciate the value of participatory approaches if they link in with action-research projects, and follow them closely, experiencing key communication moments with the local stakeholders.¹³¹

Tenure

One very real change in the effectiveness of PAMEB is instigated by changes in ownership, access and use rights. The effects of more secure resource tenure can be both practical and psychological. If local people do not have access to the land then they are unable to assess local biodiversity. In Colombia the broad recognition of indigenous rights has been an important stimulant to the ‘investigación propia’ (‘own research’) supported by Tropenbos; but in turn such local research is necessary in many cases to establish rights to the land.¹³² In addition, a sense of ‘belonging’ enhances the value of biodiversity, and motivation to be involved.¹³³

Institutional strengthening

The ways that institutions *function* affects their ability to adopt and integrate participatory approaches – both by addressing individual attitudes (towards the value of others’ knowledge and priorities)¹³⁴ and bureaucratic inflexibility¹³⁵. The two are closely linked, and while some described the success of participatory research or experiential learning in changing the negative attitude of officials,¹³⁶ this is still a sticking point in many cases¹³⁷. Such processes can threaten the professional security and self-image of officials, scientists or other outsiders who are used to experiencing higher status than communities. With sensitive facilitation such experiential learning can help outsiders to identify ways in which they can improve their own knowledge to respond to local needs. For example, foresters in Yunnan felt a need to acquire further ecological training before they could support communities in managing their forests.¹³⁸

At the institutional level, a few contributors mentioned the obstacle of corruption.¹³⁹ Participatory M&E itself provides a means to enhance transparency of decision-making (although of course that may be an incentive to block it at institutional level).

Finally, there is an issue of governance. While devolution or decentralisation of institutions may bring officials into closer contact with communities, there is also a need for local communities need to be formally involved in decision-making bodies,¹⁴⁰ if they are to see real rewards for participation in a PAMEB.

Training and education

Many contributors felt that capacity-building the key to successful participatory approaches.¹⁴¹ Training is needed for both professional and local stakeholders. At the professional level,

researchers need training in use of both ITK and scientific knowledge.¹⁴² Sharing between disciplines is as important as sharing between stakeholders.¹⁴³ Scientists are increasingly interested in participatory approaches but are perceived as having been slow to learn from social scientists; and in particular have been slow to acknowledge the validity of local knowledge¹⁴⁴ within its cultural context.

Among local stakeholders, training in species identification may be necessary, especially where the objectives are to collect data over a large area for planning purposes. This applies to all local stakeholders, whether forest communities or amateur ornithologists. But methodological capacity building may be much more significant, in the sense of building up local confidence to plan, conduct and interpret a PAMEB. Training may be required for some components, such as data analysis, and often contributes to local confidence. But more open approaches, based on experiential learning (i.e. where participants try out an approach, reflect on the success or otherwise, and plan an improved approach based on their experience) will be more sustainable and gives local people scope to make their own decisions. These may eventually empower local people to be prepared for negotiations with outsiders, based on their own assessment of resources.¹⁴⁵

There were lively contributions on the subject of integration with education¹⁴⁶. This can also help to make education (e.g. for tribal children in India) more relevant, and reduce school dropout rates¹⁴⁷. One contributor proposed a workshop resolution on including biodiversity studies in the school curriculum,¹⁴⁸ while another showed how local biodiversity assessments were included in primary school books produced in the local language.¹⁴⁹ Others warned against traditionally 'patronising' approaches to environmental education and emphasised the need for mechanisms whereby outsiders learn from and value local knowledge.¹⁵⁰

CONCLUSIONS

The internet workshop was convened to explore ways in which PAMEB can reconcile local and national information needs in biodiversity management. It provided a wealth of evidence that, in a wide range of contexts, PAMEB provides scope for improved resource management through empowerment and provision of relevant valid information.

"The issues that are coming up are quite familiar in Scotland. The points I might have made have usually been made by someone from the Pacific or Africa."

Brian Spoor, 23.01.02.

In documenting methods, the main debate was between those who sought local knowledge to develop wider-scale quantitative measures of change, and those who emphasised the importance of strengthening community capacity to make decisions about resource management, which in turn enhances their motivation to conserve. It appears that methods *linking* local and scientific assessments or values are scarce, and more work still needs to be

done on the analysis and communication of results.

Assessment is affected by value judgements, regardless of who is conducting the assessment. It is often assumed that local people value only useful species; but research reveals spiritual, cultural and ethical values; and that species or habitats with non-material values may be at least as important as those with uses. Furthermore, values are location-specific, and in particular are affected by access.

The potential for real synergy between different actors depends not only on good communication, but also on realistic understanding of the costs and benefits of involving different actors in such assessments, and above all ensuring that local people can take part in analysis and decision-making. The *process* of negotiating, observing and analysing indicators may bring about more change than the data gathered itself, and in particular can enhance benefit-sharing, as well as be

more sustainable than externally led processes. However to achieve this, changes in education, training of scientists, and institutional networking are needed.

Despite this, it is not yet clear that the *kinds* of information produced through a PAMEB process will be convincing to national decision makers, who expect mechanisms to aggregate quantitative spatially-comparable data on the local scale to provide information at the national scale, for example in reporting to the CBD. Participatory processes may not supply this so readily (or efforts to quantify may distort local perceptions and values) but may provide qualitative information of different and complementary value.

In considering the implications of this, the internet workshop demonstrates the importance of matching objectives with methods and stakeholders, rather than applying a blanket set of recommendations to all situations which appear to need a participatory approach. If biodiversity management is to be inclusive, and to benefit from the commitment, knowledge and values of local stakeholders, it may be that *national* monitoring, assessment and reporting processes need to adapt to the reality of *location-specific* values, by adopting mechanisms to accept and integrate qualitative, spatially-diverse information relevant to the differentiated needs of the people living within those national boundaries.

“Monitoring assessment and reporting is not an end in itself. ... the primary goal of forest-related monitoring, assessment and reporting is to facilitate informed decision-making on forest policy and management at all levels (i.e. sub-national, national, regional and global.”
UN Economic and Social Council (2001) Report to the Secretary General on Monitoring Assessment and Reporting. 20 Dec 2001.
http://www.un.org/esa/sustdev/unffdocs/unff_ss2-mar.pdf

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Appendix 1. Sample of experience and expectations of the workshop

ROLE, COUNTRY	Experience (<i>expectations in italics</i>)
Professor, Centre for Ecological Sciences, Bangalore, India	Involving biology students and teaching in monitoring BD; People's Biodiversity Registers
National LBAP ¹⁵¹ coordinator, Scotland	Developing diverse set of LBAPs, how local plans mesh with national level plans; problems of exchanging information between levels <i>Feed key points to government and NGO overseer</i>
Director, Forest Stewardship Council (international)	Developing toolkits for identifying and managing High Conservation Value forests, based on assessments by different stakeholders
FSC certification, Papua New Guinea	Monitoring biodiversity with local landowners for forest certification <i>Hearing about similar experience</i>
NGO, Poland [CEED]	Integrating the Aarhus Convention ¹⁵² into biodiversity protection and management
Academic, Tribhuvan University, Nepal	Involving local people in biodiversity research can be cheaper, faster and more informative. <i>Learning more about participatory approaches practiced by other people.</i>
NGO, Montana, USA [Northwest Connections]	Involving rural residents in long term monitoring projects in our ecosystem <i>Overcome isolation – hear from others doing participatory monitoring</i>
Science adviser, biodiversity: Canadian Forest Service	Evaluating the potential of participatory monitoring / citizen science to contribute to assessment of forest health and integrity. <i>Validate the link between professional and citizen science, obtain good examples of extent of reliability of this type of information / potential applications.</i>
Programme Officer for National Reporting, CBD Secretariat (international)	<i>Recommendations for improving information gathering and exchange and how to help the Parties [to the CBD] fulfil their reporting obligations</i>
Manager, Qomolangma (Mount Everest) Nature Reserve, Tibet, China	<i>Learning more about participatory methods for M&E</i>
IUCN NTFP project, Lao PDR / UNDP consultant writing Lao PDR country biodiversity status report	Writing chapter on local knowledge, participatory monitoring techniques and training needs <i>Keep abreast with latest international developments in this field</i>
Social Development Commission, Jamaica	Creation, participatory framework to enable more stakeholder involvement in governance
NGO examining tourism in development, India (Equations) and South Co-Chair in the	<i>Implications of tourism for biodiversity and indigenous people, including ecotourism</i>
Researcher, Cameroon	Impact of village hunting on wildlife populations
University of Manitoba,	Incorporating indigenous values into forest management

Canada	including protected areas planning; obtaining community-held Sustainable Forest Licences <i>Interested in how others are thinking about indigenous people and forest biodiversity, especially perceptions and values in relation to biodiversity.</i>
Writing LBAP for Guernsey	<i>Learning from experience of others.</i>
The Mountain Institute, Nepal	Working with Nepal Government to establish / management protected areas <i>Help in demonstrating changes in biodiversity use and conditions within national park</i>
International NGO, Ghana (Concern Universal)	Agriculture and natural resource management
Academic, Tamil Nadu, India	Fair trade and accountability of NTFP trade
National Biodiversity Data Bank, Uganda	Document biodiversity of Uganda; local people involved in establishing presence of useful species

Endnotes:

¹ E.g. Estrella M., J. Blauert, D. Campilan, J. Gaventa, Julian Gonsalves, Irene Guijt, Deb Johnson and Roger Ricafort (eds) Learning from Change: Issues and Challenges in Participatory Monitoring and Evaluation. Intermediate Technology Publications, London. ISBN 1 85339 469 6

² e.g. meeting of the UK Tropical Forest Forum Policy Working Group, 12 December 2000; UK stakeholder meeting pre-SBSTTA 7, DEFRA, 06.11.01.; side event organised by Tropenbos at COP6, the Hague, 12.04.01.

³ Jeannette van Rijsoort, 15.01.02.

⁴ Cai Lijie, 08.01.02.

⁵ Karen Lawrence, 18.01.02.; Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.

⁶ e.g. Karen Lawrence, 18.01.02; Kate Schreckenber, 23.01.02.

⁷ Tim Synnott, 19.01.02.

⁸ Kyamiza Leonard, 10.01.02.

⁹ Karen Lawrence, 18.01.02.

¹⁰ Virinder Sharma, 22.01.02.

¹¹ e.g. Karen Lawrence, 13.01.02.

¹² Teeka Bhattarai, 8.01.02.

¹³ Izabella Koziell, 21.01.02.

¹⁴ Alan Thomson, 16.1.02.

¹⁵ Winfred Thomas, 08.01.02.

¹⁶ Truong Quang Tam, 09.01.02.

¹⁷ e.g. Michel Takam, 08.01.02.

¹⁸ Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.

¹⁹ e.g. Jenny Wong, 21.01.02.

²⁰ Tim Synnott, 19.01.02.

²¹ e.g. Peter Dam, 8.01.02.

²² Keith Rennolls 7.01.02.

²³ Adrian Newton, 10.01.02.

²⁴ e.g. Tim Synnott, 19.01.02.

²⁵ Kyamiza Leonard, 09.01.02

²⁶ Winfred Thomas, 20.01.02.

²⁷ Karen Lawrence, 13.01.02.

²⁸ Doug Sheil, 18.01.02.

²⁹ Jenny Wong, 21.01.02.

³⁰ Bianca Ambrose-Oji, 22.01.02.

³¹ Teeka Bhattarai, 08.01.02.

³² Bianca Ambrose, 08.01.02.

³³ Karen Lawrence, 08.01.02.

³⁴ Doug Sheil, 18.01.02.

³⁵ Teeka Bhattarai, 21.01.02.

³⁶ Doug Sheil, 18.01.02., Jenny Wong, 21.01.02.

³⁷ Healey, Wong and Phillips 09.01.02.

³⁸ Jenny Wong, 21.01.02.

³⁹ Herbert Tushabe, 12.01.02.; Forest Action, 13.01.02., Genevieve Patenaude, 25.01.02.; Herbert Tushabe, 12.01.02.7

⁴⁰ Doug Sheil, Jenny Wong, Karen Lawrence; various contributions.

⁴¹ Doug Sheil, 18.01.02., Winfred Thomas, 11.01.02.

⁴² Miriam van Heist, 21.01.02.

⁴³ Genevieve Patenaude, 25.01.02.

⁴⁴ e.g. Jeannette van Rijsoort, 15.01.02.

⁴⁵ Kate Schreckenber, 23.01.02.

⁴⁶ Iain Davidson-Hunt, 14.01.02.

⁴⁷ Brian Spoor, 23.01.02.

⁴⁸ Jenny Wong, 15.01.02.

⁴⁹ Jeannette van Rijsoort, 15.01.02.

⁵⁰ Iain Davidson-Hunt, 20.01.02.

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- ⁵¹ Doug Sheil, 17.01.02.
- ⁵² Jeannette van Rijsoort, 15.01.02.; Teeka Bhattarai, 15.01.02.
- ⁵³ Alan Thomson, 16.01.02.
- ⁵⁴ Jeannette van R. 15.01.02.
- ⁵⁵ Craig Turner, 28.01.02.
- ⁵⁶ Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.
- ⁵⁷ Karen Lawrence, 18.01.02.
- ⁵⁸ Teeka Bhattarai, 08.01.02.
- ⁵⁹ Miriam van Heist, 22.01.02.
- ⁶⁰ see e.g. Conclusions from the Conference on cost-effective biodiversity indicators to assess biological diversity in the framework of the Convention on Biological Diversity: www.gencat.es/mediamb/bioassess/
- ⁶¹ Anna Lawrence *et al.*, case study, on workshop website.
- ⁶² Karen Lawrence, 15.01.02.
- ⁶³ Virinder Sharma, 22.01.02.
- ⁶⁴ Alan Thomson, 16.01.02.
- ⁶⁵ Brian Spoor, 23.01.02.
- ⁶⁶ Keith Rennolls, 07.01.02.
- ⁶⁷ for example, the effect of policy encouraging loggers to slash undergrowth, is perceived to cause the loss of key food species in Indonesia – Doug Sheil, 17.01.02.
- ⁶⁸ Iain Davidson-Hunt, 05.02.02.
- ⁶⁹ Bianca Ambrose-Oji, 23.01.02.
- ⁷⁰ e.g. Karen Lawrence, 13.01.02.
- ⁷¹ e.g. Sheil, case studies; van Rijsoort, case study; on workshop website.
- ⁷² E.g. Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.
- ⁷³ Karen Lawrence, 18.01.02; Syaifuddin Kiahmad, 22.01.02; Jenny Wong, 23.01.02.
- ⁷⁴ Doug Sheil, 21.01.02.
- ⁷⁵ Michael Keefer, 18.01.02.
- ⁷⁶ e.g. Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.
- ⁷⁷ e.g. Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.
- ⁷⁸ Richard Lowe, 18.01.02.
- ⁷⁹ Karen Lawrence; Craig Turner;
- ⁸⁰ Doug Sheil, 17.01.02.
- ⁸¹ Jenny Wong, 15.01.02.
- ⁸² Jenny Wong, 15.01.02.
- ⁸³ Pratap Shrestha, pers. comm. based on observations in Nepal; author, own data.
- ⁸⁴ Doug Sheil, 21.01.02.
- ⁸⁵ Doug Sheil, 17.01.02.
- ⁸⁶ case studies by Ambrose *et al.*, and Wong *et al.*; and Iain Davidson-Hunt 20.01.02.
- ⁸⁷ Joost Foppes, 16.01.02.
- ⁸⁸ Jeannette van Rijsoort, 15.01.02.
- ⁸⁹ Karen Lawrence, 18.01.02; and published sources outside this workshop (see e.g. Carter J (ed) Recent approaches to participatory forest resource assessment. Rural Development Forestry Study Guide 2, ODI, London. ISBN 0 85003 232 6.)
- ⁹⁰ Doug Sheil, 17.01.02.
- ⁹¹ Miriam van Heist, 22.01.02.
- ⁹² Miriam van Heist, 21.01.02.
- ⁹³ Joost Foppes – see case studies on workshop website.
- ⁹⁴ e.g. the RSPB's Garden Birds Survey, results of which were broadcast on the UK's Radio 4 and attracted many more participants in subsequent years.
- ⁹⁵ e.g. Virinder Sharma, 22.01.02; case studies by Madhav Gadgil; manual published post-workshop by CIFOR: 'Exploring biological diversity, environment and local people's perspectives in forest landscapes' which can be downloaded from <http://www.cifor.cgiar.org/publications/>
- ⁹⁶ Doug Sheil, 21.01.02.
- ⁹⁷ Iain Davidson-Hunt, 23.01.02.
- ⁹⁸ Izabella Koziell, 21.01.02.

⁹⁹ Izabella Koziell, 21.01.02.
¹⁰⁰ e.g. Jenny Wong, 23.01.02.
¹⁰¹ Iain Davidson-Hunt, 14.01.02, Brian Spoor, 23.01.02.
¹⁰² Joost Foppes, pers. comm.
¹⁰³ Eric Boa, 22.01.02.
¹⁰⁴ V. Novotny, case study; on workshop website.
¹⁰⁵ V. Novotny case study; on workshop website.
¹⁰⁶ Jeannette van Rijsoort, 15.01.02.
¹⁰⁷ Karen Lawrence, 18.01.02.
¹⁰⁸ Kate Schreckenber, 23.01.02.
¹⁰⁹ Joost Foppes reports on a case by Viloune Soydara and Sounthone Ketphanh
¹¹⁰ Iain Davidson-Hunt, 14.01.02.; Alan Thomson, 16.01.02.
¹¹¹ e.g. Jenny Wong, 22.01.02.
¹¹² Teeka Bhattarai, 21.01.02.
¹¹³ Jenny Wong, 21.01.02.
¹¹⁴ e.g. Izabella Koziell, 21.01.02., Imam Basuki, 22.01.02.
¹¹⁵ Imam Basuki, 23.01.02.
¹¹⁶ Virinder Sharma, 22.01.02.
¹¹⁷ Jenny Wong, 22.01.02.
¹¹⁸ Jenny Wong, 14.01.02., Virinder Sharma, 22.01.02., Genevieve Patenaude, 25.01.02.
¹¹⁹ Izabella Koziell, 21.01.02., Miriam van Heist, 22.01.02.
¹²⁰ Jenny Wong, 23.01.02.
¹²¹ Karen Lawrence, 09.01.02.
¹²² Iain Davidson-Hunt, 14.01.02.
¹²³ Winfred Thomas, 20.01.02.
¹²⁴ Kate Schreckenber, 23.01.02.
¹²⁵ Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.
¹²⁶ Irene Guijt, 23.01.02., Bianca Ambrose-Oji, 23.01.02.; Jeannette van Rijsoort, 23.01.02.
¹²⁷ Kate Schreckenber, 23.01.02.
¹²⁸ Madhav Gadgil, 23.01.02.
¹²⁹ e.g. Kate Schreckenber, 23.01.02.
¹³⁰ See www.biodiv.org/programmes/socio-eco/traditional/wg8j-02.asp
¹³¹ e.g. Joost Foppes 16.01.02.
¹³² Carlos Rodriguez and Maria Clara van der Hammen, 17.01.02.
¹³³ Winfred Thomas, 09.01.02.
¹³⁴ Madhav Gadgil, 23.01.02.
¹³⁵ Kate Schreckenber, 23.01.02.
¹³⁶ Jeannette van Rijsoort, 23.01.02.
¹³⁷ Madhav Gadgil, 23.01.02.
¹³⁸ Jeannette van Rijsoort, 23.01.02.
¹³⁹ Imam Basuki, 23.01.02., Rishi Aggarwal, 08.02.02.
¹⁴⁰ Kate Schreckenber, 23.01.02.
¹⁴¹ Alan Thomson, 16.01.02.
¹⁴² Virinder Sharma, 22.01.02.
¹⁴³ Teeka Bhattarai, 15.01.02., Kate Schreckenber, 23.01.02.
¹⁴⁴ Madhav Gadgil, 23.01.02.
¹⁴⁵ Miriam van Heist, 21.01.02.
¹⁴⁶ Madhav Gadgil, 23.01.02.
¹⁴⁷ e.g. Winfred Thomas, 09.01.02.
¹⁴⁸ Kyamiza Leonard, 10.01.02.
¹⁴⁹ Karen Lawrence
¹⁵⁰ Kate Schreckenber, 23.01.02.
¹⁵¹ Local Biodiversity Action Plan
¹⁵² Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters