AN INTRODUCTION TO PARTICIPATORY BIODIVERSITY ASSESSMENT, MONITORING AND EVALUATION

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What is a participatory approach?

Participatory assessment, monitoring and evaluation of biodiversity (PAMEB) involves non-scientists in observing, measuring or assessing biodiversity or its components. 'Participatory' is a word which has gained much currency in the last 15 years, so much so that it can mean all things to all people. It is often understood to mean assessment by rural communities, but can also involve other stakeholders such as students, policy makers, conservationists or volunteers. 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. Participatory monitoring is a powerful approach that can improve effectiveness of information gathering, transparency of decision-making and implementation of policy, as well as achieve some human development objectives. It is an approach that is increasingly being used to support biodiversity conservation and management. This chapter draws on shared experience from an internet conference (Lawrence 2002) and published case studies. It is a new field, and much of the experience is from developing countries, where a participatory approach is particularly appropriate, but the processes would be similar in other contexts.

Participation ranges from passive participation, where people are only told what is going to happen and their responses are not taken into account, to self-mobilisation, where people take initiatives independent of external institutions (Pretty 1994). To date, most examples of participatory biodiversity assessment and monitoring reach only the halfway point in this range: people participate by providing labour so that data can be gathered more quickly and cheaply. Interactive participation where people contribute to decisions in biodiversity management or self-mobilisation where they have the full rights and responsibilities in biodiversity management are still very rare. This chapter highlights the possible steps in participatory biodiversity monitoring at this interactive part of the spectrum, where we take local communities, protected area (PA) staff and policy makers as the main stakeholders and hence participants.

Process versus product approach

Despite its popularity, participation is not an end in itself, but a route to *either* more efficient biodiversity monitoring, *or* empowerment of local communities – or both. To choose the approach it is important to decide on the objectives, and to negotiate those objectives with the participants before proceeding. Practitioners of participatory approaches talk about the importance of *process* and *product.* Without due attention to process (*how* the work is conducted), the product (*what* is achieved) will be meaningless because it will have been produced by people without understanding or motivation to contribute. This is a particular challenge in participatory approaches, not only because different stakeholders have different livelihood goals and education levels, but also because of different knowledge systems, culture, worldviews, values and beliefs.

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*).

Therefore, the process approach becomes more important towards the active end of the participation scale, i.e. in interactive participation and self-mobilisation.

Why conduct a participatory biodiversity assessment?

Local people are valuable actors in assessing and monitoring biodiversity, because:

1. They have knowledge about wildlife, plants and resources derived from generations of use. s
2. Most monitoring systems within, and many outside, protected areas (PAs) focus on protected species of wildlife and plants. Monitoring local resource use is a neglected but crucial dimension in planning sustainable harvesting by local people.
3. It is internationally acknowledged that involving local people in the planning and management of biodiversity and resources will increase their awareness and motivation for conservation. It will enhance an exchange of local and outside perceptions on the relationship between biodiversity and use patterns, leading to feedback on how to change unsustainable resource use practices.
4. Decisions on biodiversity management, especially in protected areas, are often non-transparent for local communities depending on those resources. The involvement of local people in the gathering and analysis of biodiversity data will enhance the transparency of management decision-making.
5. Communication among stakeholders is often limited, as is the recognition by management staff that local people can be valuable partners in such management activities. Interactive participation by various partners, including nearby communities and PA staff can to improve relations (Fabricius and Burger 1997; Van Rijsoort and Zhang 2002), and resolve conflict (Bliss et al. 2001). An interesting illustration of the role of PAMEB in conflict management is provided by Steinmetz (2000). Officials in Southern Laos declared an area to be a core zone, because of the presence of mineral licks, an important source of salt for protected wildlife like elephant and gaur. Through a PAMEB, the local people showed that the large mammals concentrate their use of the salt licks in the rainy season, thereby resolving questions of resource conflict with intensive human use of the area, which is mainly in the dry season. Establishment of an all-year round core zone would have ignored the seasonal movements of the protected wildlife.
6. Particularly in developing countries, resources for biodiversity assessment are limited - human capacity, money and time are all scarce (Danielsen et al. 2000). A monitoring and management system for biodiversity and resources should be based on locally available capacity and resources to be sustainable.

Finally, local perspectives can be an invaluable contribution to the scarce evidence for or against success of Integrated Conservation and Development Projects (ICDPs) (Kremen et al. 1994; Salafsky and Margoluis 1999).

STEPS IN THE PROCESS

One important difference from conventional procedures for biodiversity assessment, is the diversity of stakeholders, objectives and information needs that form the starting point for the process. Another is that these stakeholders are also involved in

the selection of targets, developing methodology, and data analysis. The steps of the process are as follows (see also figure 1):

1. Who are the stakeholders?
2. What are their objectives?
3. Therefore what are the information needs of each stakeholder?
4. Are the information needs of different stakeholder groups compatible?
5. Which representatives of each stakeholder group will take part in the monitoring?
6. What is our budget?
7. What are the benefits and obstacles to participate in monitoring?
8. Which targets to monitor?
9. Which indicators and methods to use?
10. How to analyse, validate and use the results?
11. How to document and disseminate the results?
12. How to use experiences to improve the participatory system?
13. Is all of this feasible within the budget? If not, revise steps 7 to 12.

Before you start

As with any biodiversity assessment, the process should begin with a compilation of secondary information – maps, reports, aerial photographs etc. which will help in planning and stakeholder selection. Successful case studies also point to the need to recognise any existing monitoring systems (which may be informal and not named as such) in order to build on established practice (Danielsen et al. 2000; Van Rijsoort and Zhang 2002).

Facilitating a participatory process

The *time* needed to facilitate a participatory process in biodiversity monitoring must not be underestimated. The process may take much longer than a non-participatory approach, but this is essential for mutual understanding and therefore useful data and / or local empowerment. It is also important that the facilitator recognises his or her privileged position as a stakeholder who, despite striving to leave bias and subjectivity on one side, will nevertheless have personal objectives and motives for becoming involved. This will help the facilitator to be more self-aware and protect against undue bias.

Before entering into a participatory process of biodiversity monitoring, an enabling environment is needed – i.e., favourable policy and institutional factors. In cases where PAs are strictly protected, the possibilities for interactive participation by surrounding communities may be limited, since the benefits perceived by these communities may not be high. In cases where the rules and regulations of the PA enable sustainable use of resources and even joint management of (parts of) the PA, incentives for local communities to participate in biodiversity and resources monitoring will be higher. Furthermore, in most developing countries, the forestry sector has a history of top-down management. When there is no room or even positive attitude towards decentralised management and involvement of local communities, PAMEB in the most participatory sense will be difficult. This move from a teaching to a learning style, where the focus is less on *what* we learn, and more on *how* we learn and *with whom,* has profound implications for conservation institutions. (Pimbert and Pretty 1995).

The facilitator will also need to be aware of any obstacles perceived by stakeholders before entering into the process, in order to address misunderstandings or justified

fears. For example, in Yunnan, China, villagers were initially reluctant to join in, fearing that the monitoring process would lead to further restrictions in their resource use. This fear appeared to be justified during the analysis phase, when most of the proposed solutions involved banning resource use. More constructive solutions which provided benefits for all stakeholders had to be thought of, including sustainable resource use and enrichment planting (Van Rijsoort and Zhang 2002).

Stakeholders

A whole range of people is involved in PAMEB. In the context of protected areas, these are likely to include: local communities, protected area staff, government staff as policy makers, NGO staff, and biologists. A useful participatory process cannot begin until the stakeholders understand and respect each others' objectives and values. Usually a facilitator will be needed to help begin this process.

Objectives

Each of these stakeholders has a distinctive perception of whether and why the area should be managed. For some, maintenance of livelihood will be most important, for others, protection of culturally or spiritually important places, while others are motivated by a concern to protect rare species for all humanity. As indicated above, the purpose of participatory monitoring may involve:

a. Conservation of biodiversity
b. Protection of cultural/spiritual places
c. Sustainable use of resources
d. Capacity building among stakeholders in conducting monitoring and analysing reasons of change
e. Planning for local resource management and monitoring its success
f. Awareness building towards conservation and sustainable use
g. Empowerment / mobilisation of local communities through taking management decisions
h. Enhanced communication / mutual understanding between stakeholders
i. Enhanced efficiency and sustainability of monitoring by using local capacity
j. Assessing and monitoring national biodiversity (CBD reporting)
k. Other objectives to be defined with stakeholders

It is important that all stakeholders remain aware about each others' monitoring and management goals, and that they are given feedback and adjusted if necessary throughout the PAMEB process.

Information needs

Each stakeholder works with a set of assumptions, or values, about what is important, and it is these that influence both decisions about what to monitor and evaluations of whether management has been successful or not. Different value-laden needs can also exist *within* stakeholder groups, including conservationists (Callicott et al. 1999) and local communities (Salim et al. 2001). Facilitators need to recognise what is important to each stakeholder, to help them define their information needs. Ways in which information needs can vary are:

a. Content: species, subspecies, habitats, land use, wildlife damage
b. Quantity: population sizes, abundance, stock volume, basal area, uses
c. Quality: importance, trends in uses, trends in abundance
d. Location: distribution; relationship between place and cultural value

e. Value: economic, conservation, aesthetic etc.

If information needs of different stakeholder groups are compatible, stakeholders can work as a multi-disciplinary team. It they are not, it is advisable to either:

- Develop parallel systems, and share findings, or
- Encourage those stakeholders with information needs to pay other stakeholders who are able to obtain the information.

One approach to resolving these differences in objectives and information needs, and at the same time creating opportunities for stakeholders to learn from each other, is illustrated by Van Rijsoort and Zhang (2002). Working with staff of a nature reserve, and neighbouring communities in Yunnan, China, they supported the development of three *parallel* monitoring systems. The scientists conducted a detailed biological inventory and used permanent sample plots to explore changes in the ecosystem; park wardens recorded observations of priority wildlife on their routine patrolling routes through the park, and communities monitored land use, wildlife damaging their crops and selected resources through indicators such as 'effort required to collect them'. The project facilitates exchange of results between the different monitoring systems. Different groups of stakeholders changed their own perceptions of resource abundance and ecological health as a result. This also prompted park staff to seek further training in ecology, in order to be able to answer community members' questions.

Selection of monitoring partners

Even within each stakeholder group, biodiversity is valued differently. For example, within a local community different people have different interests in and knowledge about resources and biodiversity. Ideally, such heterogeneity should be understood before selecting a team of appropriate monitoring partners.

Resource user groups may be taken as a basis for selecting partners (for example, farmers, herbalists and hunters may form different stakeholder groups); alternatively more natural groups may form according to age, gender and income. The team should include representatives of the selected groups, as well as recognised local experts in plant or animal identification, any local relevant local officials such as forest guards, and perhaps someone who is good at motivating the rest of the village.

Drafting a preliminary budget

PAMEB cannot be done without a budget. Although participatory biodiversity monitoring *can* be cheaper than more conventional scientific monitoring, this is not always so, and in any case funds should be carefully defined and secured. A preliminary budget should be defined at this stage of the process since there is no point in involving people in a complicated process without the funds to implement it. The items of the budget should at least include costs for organising discussion and analysis meetings, transportation costs, stationery, and other operational costs. Funds for publicity and dissemination are important as well. Training may be needed in specimen preparation and storage, data analysis and photography by villagers, depending on which methods are defined.

The budget may need to include payment to participating stakeholders, particularly villagers. For local communities, especially in the case of poor farmers, being involved in biodiversity monitoring is extra work which takes time and money. It is fair to offer a fee to take account of these costs borne by local people, keeping in mind that this will be temporary.

After developing the rest of the methodology, i.e. after determining how many targets to monitor, which methods to use, and how to document and disseminate, the budget should be finalised.

Monitoring targets

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). Different stakeholders will have different views on and monitoring targets should be selected on the basis of stakeholders' interests. For example, scientists might be most interested in (globally) rare and endangered species or habitats, PA staff in protected species and vegetation, and local communities in resources for trade or domestic use. Additionally, in Yunnan, villagers chose to monitor wildlife damaging their crops, wild animals they consider as having an important function in the ecosystem, and some land uses.

Choosing indicators

Targets are measured using indicators. The use of indicators is a concept which has been introduced from project management frameworks, and one which is not easily grasped by local communities (Lawrence et al. 2003). The purpose of each indicator must be very clear to all participants, and linked to the targets already defined. Ideally, indicators of trends in biodiversity and resource use should be (Danielsen et al. 2000):

- Easy and cost-effective to collect, analyse and report
- Meaningful to local people
- Indicate as directly as possible changes in biodiversity and resource use
- Provide a continuous assessment over a wide range of stress (threats)
- Differentiate between natural cycles or trends (weather, climate etc.)
- Relate to human-induced stress
- Relatively independent of sample size
- Sufficiently sensitive to provide an early warning of change
- Applicable over a range of ecosystems.

For species indicators it is often important to determine the scientific name in order to ensure all stakeholders are referring to the same species. This may require training and preparation of identification guides.

Choosing methods

For many the big question is whether to use quantitative or qualitative methods (Fuller 1998; Lawrence et al. 2000; Sheil et al. 2002). Because both have their strengths, they can often be fruitfully combined. On the one hand, quantitative measures of change are often more meaningful at the wider scale, and for planning. Biologists can contribute rigour to monitoring by introducing concepts of sampling and establishing plots. 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 data but note that analysis and generation of useful results can require much external support. However, the sustainability of highly technical methods based on detailed measurements of all species within quadrats is highly doubtful. Simplified methods may be more appropriate, such as the triangular plots used by the indigenous hunters of Finland, who regularly record observations of game along the three sides of triangular plots,

enabling data to be linked to habitat (Linden *et al.,* 1996). Other simple quantitative methods were used in the Yunnan case, for monitoring resource use, wildlife damage and land use. Market surveys and interviews with co-villagers are used to assess the amount of resources collected and marketed, and the market price. For timber, the number of houses built per year is used as well, and for fuel wood the number of households using alternative energy systems (Van Rijsoort and Zhang 2002).

Qualitative methods may however be sufficiently useful in those protected area management contexts where time, resources and capacities are limited and threats to biodiversity are high. Instead of spending the scarce resources on detailing exactly what is changing, in these contexts it may be sufficient to know the trends of change, and why biodiversity is changing and what are the local perceptions of change in order to formulate management decisions. Moreover, in those areas where participatory monitoring is a new concept and involvement of villagers is based on their interests and capacities, it may be wise to start simple and grow slowly. In Yunnan where poor farmers and (hunter/)gatherers are the main monitoring, partners, qualitative methods use forest walks and interviews with co-villagers to assess simple indicators such as 'easy or hard to see', 'quality' (of e.g. habitat, fruits or plantation condition).

Maps are a valuable start to combining species and landscape values, linking knowledge with place and quantitative data with qualitative information. There is often a strong correlation between detail on locally made maps and scientific data – even in distant sites visited infrequently by local informants (Obura 2001; Sheil et al. 2002; Stockdale and Ambrose 1996).

Data analysis, validation and use of results

Collection and analysis of the data is related to the objectives of the participants; these objectives also define the users of the results. So analysis and presentation of results must be considered with these end-users in mind. Ideally, in a participatory process, the results are to be used by those who provided and analysed the data.

Local people, if given the opportunity to discuss findings, often provide interpretations and insights that otherwise may have been missed were the results interpreted solely by staff and advisors (Steinmetz 2000). Moreover, the drafted solutions emerging from participatory data analysis will be more practical and adjusted to the local conditions.

The results can be validated through feedback from more scientific monitoring systems, or even through a kind of triangulation with two complementary systems as in the Yunnan case. Biologists and conservationists are often concerned about the reliability and generalisability of local environmental assessments. They wonder how objective or rigorous data gathered by villagers are. The question however is not the extent to which participatory monitoring can fit into scientifically based (and therefore assumed reliable) formats, but, again, what you want to do with it (objectives, see above) (Abbot and Guijt 1998).

Follow up

Continuing support in analysis and decision-making is important. If PAMEBs are funded as a one-off event by a particular project, they are of little use in management unless they become integrated into regular decision-making activities.

The impact of PAMEB is greater if the result and methods are documented and disseminated. There are various ways to do this; the choice again depends on the objectives. Appropriate methods to disseminate at village level are through schools, village meetings, festivals, market days, local radio programs, etc. The media can also be valuable at national level: the People's Biodiversity Registers in India have gained attention in the national press (Gadgil 1998), and raised awareness of the existence, but erosion, of practical ecological knowledge.

Finally, in product as well as process approaches, the monitoring and evaluation of the process and the results are very important. PAMEB is often a new concept, which needs continuous feedback to optimise and adjust the methodology to local conditions. Increased attention to documenting the *impact* of PAMEB will help scientist and decision-makers to see the possibilities, and particularly to see where they can contribute and benefit from such an approach.

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REFERENCES

Abbot J. and Guijt I. 1998. Changing views on change: participatory approaches to monitoring the environment. IIED,

Bliss J., Aplet G., Hartzell C., Harwood P., Jahnige P., Kittredge D., Lewandowski S., Soscia M. L., Gray G. J. e., Enzer M. J. e. and Kusel J. 2001. Community-based ecosystem monitoring. Journal-of-Sustainable-Forestry. 12: 143-167.

Callicott J. B., Crowder L. B. and Mumford K. 1999. Current normative concepts in conservation. Conservation Biology. 13: 22-35.

Danielsen F., Balette D. S., Poulson M. K., Enghoff M., Nozawa C. M. and Jensen A. E. 2000. A simple system for monitoring biodiversity in protected areas of a developing country. Biodiversity and Conservation. 9: 1671-1705.

Fabricius C. and Burger M. 1997. Comparison between a nature reserve and adjacent communal land in Xeric Succulent Thicket: An indigenous plant user's perspective. South African Journal of Science. 93: 259-262.

Fuller J. 1998. Participatory Monitorng of Forest Resources: Current Methodologies being developed in Thailand. Rural Development Forestry Network Paper 23e. ODI, London.

Gadgil M. 1998. Conservation: Where are the people? The Hindu: Survey of the Environment, '98. 102-137.

Kremen C., Merenlender A. M. and Murphy D. D. 1994. Ecological monitoring: a vital need for integrated conservation and development programs in the tropics. Conservation Biology. 8: 388-397.

Lawrence A. 2002. Participatory assessment, monitoring and evaluation of biodiversity: Summary of the ETFRN internet discussion 7-25 January 2002. Website: http://www.etfrn.org/etfrn/workshop/biodiversity/index.html.

Lawrence A., Ambrose-Oji B., Lysinge R. and Tako C. 2000. Exploring local values for forest biodiversity on Mount Cameroon. Mountain Research & Development. 20: 112-115.

Lawrence A., Malla Y. B., Paudel K. C. and Barnes R. 2003. Why biodiversity? A holistic approach to participatory monitoring of community

forestry in Nepal. In: (ed) Proceedings of International conference on Himalayan Biodiversity, pp Kathmandu, Nepal.

Linden, H., Helle, E., Helle, P. and Wikman, M. 1996. Wildlife triangle scheme in Finland: methods and aims for monitoring wildlife populations. *Finnish Game Research* 49 4-11.

Obura D. O. 2001. Participatory monitoring of shallow tropical marine fisheries by artisanal fishers in Diani, Kenya. Bulletin of Marine Science. 69: 777-791.

Pimbert M. P. and Pretty J. N. 1995. Parks, people and professionals: putting 'participation' into protected area management. Discussion Paper 57 UNRISD / IIED / WWF,

Pretty J. N. 1994. Alternative systems of inquiry for sustainable agriculture. IDS Bulletin. 25: 37-48.

Salafsky N. and Margoluis R. 1999. Threat reduction assessment: a practical and cost-effective approach to evaluating conservation and development projects. Conservation Biology. 13: 830-841.

Salim A., Brocklesby M. A., Tiani A. M., Tchikangwa B., Sardjono M. A., Porro R., Woefel J. and Pierce Colfer C. J. 2001. In search of a conservation ethic. In: Pierce Colfer C.J. and Byron Y. (Ed) People Managing Forests: The links between human well-being and sustainability, pp. 155-170. Resources for the Future, Washington.

Sheil D., Rajindra P. K., Basuki I., Van Heist M., Syaefuddin, Rukmiyati, Sardjono M. A., Samsoedin I., Sidiyasa K., Chrisandini, Permana E., Angi E. M., Gatzweiler F., Johnson B. and Akhmad. 2002. Exploring biological diversity, environment and local people's perspectives in forest landscapes:

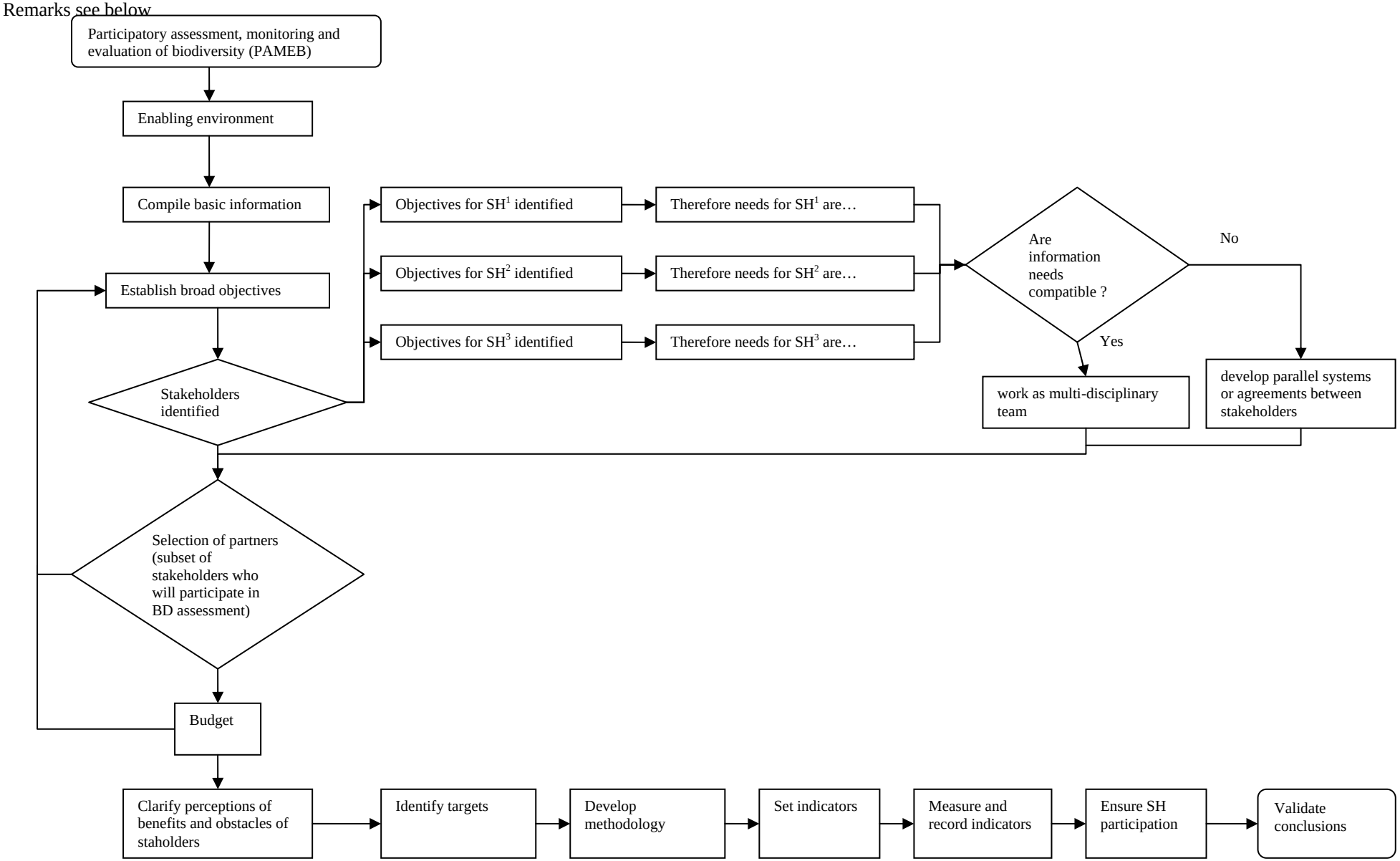
Methods for a multidisciplinary landscape assessment. Centre for International Forestry Research, Jakarta.

Steinmetz R. 2000. Ecological surveys, monitoring and the involvement of local people in protected areas of Lao P.D.R. Evaluating Eden Series, Discussion Paper 13. WWF Thailand Programme Office, Bangkok, Thailand.

Stockdale M. C. and Ambrose B. 1996. Mapping and NTFP inventory: participatory assessment methods for forest-dwelling communities in East Kalimantan, Indonesia. In: Carter J. (Ed) Recent approaches to participatory forest resource assessment, pp. 170-211. Overseas Development Institute, London.

Van Rijsoort J. and Zhang J. F. 2002. Developing of Participatory Resources Monitoring in two Nature Reserves in Yunnan, P.R. China. Website:

Remarks see below



- Budget should be: preliminary budget
- benefits and obstacles ‘of stakeholders’
- ensure SH participation should be parallel to targets – analysis, and even dissemination, so parallel line with input to each of these steps
- indicators BEFORE methods, and more practical to take together: ‘develop indicators and methods’
- then ‘determine final budget’ before actual implementation
- After ‘measure and record’ ‘data analysis’ (instead of SH participation).
- After ‘validate’ ‘use the results’- possibly with arrows to ‘set priority conservation area’, ‘zoning of ‘PA’, ‘sustainable resource use’, ‘awareness building’ etc.
- Then documentation and dissemination
- The MandE with feedback loop to objectives