

Forum

Biodiversity monitoring in developing countries: what are we trying to achieve?

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In a stimulating review of biodiversity monitoring programmes, Yoccoz *et al.* (2001) recently concluded that many existing programmes suffer from two major design deficiencies: a lack of well-articulated objectives, and a neglect of different sources of error in the estimation of biological diversity. The paper was primarily devoted to the sources of data uncertainty. While we agree with the conclusion that substantial thought should be given to the question of design, and to 'how', 'what' and 'why' to monitor, it is worth considering what we want to achieve by monitoring and, considering the socio-economic context, what is practically feasible. Design deficiencies that apply in developed countries may be irrelevant in some developing countries where the *de facto* day-to-day management of biological resources is largely in the hands of poor rural people (Getz *et al.*, 1999), and local authorities have virtually no operational funding.

Our main aim here is to highlight the fact that, in many parts of the world, the context is different from the baseline of Yoccoz *et al.* (2001). More importantly (and not discussed by Yoccoz *et al.*, who primarily reviewed initiatives in the USA), most biodiversity monitoring programmes in less wealthy countries suffer from being unrealistically large, complicated and impossible to sustain with the locally available funds and human resources (Danida, 2000). Many programmes collapse almost immediately when the donor funding stops because they are designed at a cost-level that will never be sustained. In addition, most programmes are unable to contribute to biodiversity conservation because they

are ineffective in integrating information into decision-making. These constraints are particularly acute at a time when there is an urgent need to increase the effectiveness of conservation efforts in the tropics (Achard *et al.*, 2002).

One could argue that these constraints are unrelated to biodiversity monitoring and should be addressed by strengthening the government institutions responsible and providing additional training and funds (Bawa & Menon, 1997). However, whether we like it or not, we are not likely to see significantly improved environmental departments in developing countries for some time. By neglecting these constraints and emphasizing the need for more standardized approaches, the recommendations of Yoccoz *et al.* (2001) may lead to repeated attempts to develop unrealistic programmes that only divert scarce funds from fundamental management priorities (e.g. Sheil, 2001). It is time to recognize the inherent tensions between data standardization, facility of collection and ease of making contributions to management. What really matters for management-oriented biodiversity monitoring in developing countries is that methods are very simple, cost-effective and possible to sustain with limited external support, and that the time from data sampling to management action is short (Danida, 2000). Recent advances in combining scientific and participatory methods may provide a solution (Margoluis & Salafsky, 1998; World Bank, 1998; Danielsen *et al.*, 2000; EFRN, 2002).

In the Philippines at least 156 management actions have been undertaken in eight protected areas over 2½ years on the basis of integrated scientific and participatory monitoring methods (Nordeco & DENR, 2002). In relation to the hunting of wildlife, actions included: the development of bylaws at tribal (*lapat*), village and municipal level, seasonal closures for hunting, banning of certain destructive hunting methods, the establishment of a system of fines for leaving snares unattended, awareness-raising about needs for hunting regulations among local people, strengthened enforcement of hunting regulations in certain areas, and pilot-testing of more sustainable hunting practices.

Similar initiatives that combine methods from the natural and social sciences have been developed in Laos (Ling, 2000; Steinmetz, 2000), Yunnan in China (Rijsoort & Jinfeng, 2002) and Tanzania (Danida, 2003).

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Received 6 August 2002. Revision requested 4 March 2003.

Accepted 18 June 2003.

Examples of methods are provided in Table 1. An added advantage, beyond the simplicity and low cost, is that the meaning of the monitoring can be grasped by local people who are in practice the custodians of the areas. In fact the methods are focused on authorities supporting local people in enhancement and formalization of the existing, informal monitoring already carried out.

Central to the success of integrated assessment methods in these initiatives are: (i) that representatives of local communities are involved in developing the local application of the methods, (ii) that already existing community-based monitoring systems are recognized and built upon, (iii) that focus is at the field/village level where management decisions are taken, (iv) that monitoring activities are kept simple and fitted into the day-to-day work of the local people, (v) that government staff are involved, and (vi) that there is mutual trust between local communities and government staff.

The strength of this approach does not lie in detecting trends with a statistically acceptable degree of confidence or in contributing to international publishing. It lies instead in proven efficiency, even in the short-term, in strengthening local management of the land and resources and dealing with threats to biodiversity (ETFRN, 2002; Nordeco & DENR, 2002). Moreover, it makes local stakeholders more motivated to agree on and participate in law enforcement, resource use regulation and reaction to encroachment by outsiders, increasing the likelihood of successful management. In addition, this approach improves communication between local stakeholders and authorities, increases transparency of decision-making and strengthens community-based resource management systems.

How general are these considerations? It seems that integrating scientific and participatory biodiversity monitoring techniques have particular potential in areas where (i) authorities embark on shared management of resources with local people, and authorities and locals

have common interest in the management objectives, (ii) rural people depend on the use of natural resources and have a relative strong societal coherence and long history of settlement, and (iii) the resources are not so valuable that they attract powerful outsiders against whom local people have no defence (Danielsen *et al.*, 2000; ETFRN, 2002). While this approach has thus far been used primarily in protected areas, it is likely to be equally effective in other places where the appropriate authorities have interests and staff.

The main drawback of this approach is that we do not yet know the extent to which the method is able to detect true trends. By its very nature, the integrated approach does not include all of the desirable elements to ensure that monitoring programs provide unequivocal answers (Margules *et al.*, 1998). In-depth monitoring of selected habitats and species are also vital. Most programmes integrating scientific and participatory biodiversity monitoring methods in developing countries are relatively young and untested. Although cost-effective, it remains to be seen whether they will be sustained in the long term. A key determinant is whether conservation professionals and scientists will accept that this approach has potential for improving resource management.

Many countries are moving towards decentralization of natural resource management. International policy agreements emphasize the need for increased public participation in environmental decision-making (e.g. the Aarhus Convention of 1998 (UNECE, 1998) on access to information, public participation in decision-making, and access to justice in environmental matters). Integrating participatory methods into biodiversity assessment can be a powerful tool for implementing these policies.

Countries party to the Convention on Biological Diversity are obliged to monitor biodiversity (Article 7.b) but many have yet to establish monitoring programmes (Global Forest Coalition/FERN, 2002). If significant financial support for monitoring is to be provided by

Table 1 Examples of field methods for monitoring biodiversity and resource use.

Type of method	Field method	Source
Conventional scientific methods	Permanent forest inventory plots	Alder & Synnott, 1992
	Territory mapping of birds	Bibby <i>et al.</i> , 2000
	Arthropod protocols	Coddington <i>et al.</i> , 1991
	Quantitative socio-economic survey with statistical analysis	Marsh, 1999
Integrated scientific and participatory methods	Focus group discussions between protected area staff and local volunteer members of 'community monitoring groups'	Danielsen <i>et al.</i> , 2000
	Routine observation of wildlife and resource use during regular patrols	Danielsen <i>et al.</i> , 2000
	Recording by community members of observations of key species and visits of outsiders in a village logbook	Steinmetz, 2000
		Ling, 2000

governments and development agencies it will be essential that the programmes make a real contribution to arresting the root causes of extinction. Otherwise, biodiversity monitoring programmes in developing countries are likely to remain no more than isolated academic exercises.

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