Changing Views on Change

A Working Paper on Participatory Monitoring of the Environment

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Executive Summary

This Working Paper explores participatory approaches to monitoring the environment, drawing on published literature, interviews with practitioners and the practical experiences of an ODA-funded research project 'Participatory monitoring of sustainable agriculture in Brazil' (Project R6547). Participatory monitoring is an all-embracing term that can mean different things to different people. It is used here to describe monitoring approaches that develop partnerships of multiple stakeholders for efficient, effective and socially inclusive monitoring. However, in the literature the term is also used to describe monitoring that involves local field staff in designing or adapting a monitoring process, with little mention of the role of local people, except as data gatherers or providers of information.

Participatory monitoring is a growth topic and much is promised of it: from increasing accountability to enhancing participation, improving understanding, increasing local level capacity and sustaining partnerships between different stakeholders. While much is written about participatory monitoring and the many potential benefits of it described,

this review found that there are relatively few practical experiences that that can be drawn upon to support or refute these claims.

This Working Paper has focused on community monitoring of the environment, including project led approaches to monitoring and those conscious and unconscious approaches to noting, recording and monitoring change which are initiated within and by the members of the community. Local perceptions of monitoring seem to be highly variable and location specific but it is vital for the mutual understanding of all stakeholders that an appropriate local term is found and used. It is equally important that the objectives of the monitoring are clear, that the expectations and information needs of all stakeholders are understood and that the end users of the information are identified. The review highlights that the monitoring process must provide real benefits for all stakeholders, particularly for local people. Without their enthusiasm, their long term participation, which is central to the monitoring process, may not be assured or maintained.

Much emphasis seems to be placed on indicator definition, while the other stages of the monitoring process, particularly how the information will be used and by whom, may not be clearly defined. The paper suggests that the methods and indicators appropriate for meeting the needs of one stakeholder group are rarely those that are most suitable for another group. This highlights the need for negotiation between stakeholders to reach consensus on the objectives, methods, indicators and end-users of the monitoring process.

Trade offs are inevitable in a participatory monitoring process which tries to embrace multiple stakeholders and diverse expectations. Two trade offs that are central to participatory monitoring are discussed in some detail in this paper: that between scientific rigour and the maintenance of local participation, and the need to developing a locally meaningful approach while striving for comparative data that can be scaled up. Ultimately, the balance between the conflicting demands of the monitoring process will depend on the objectives: more conventional scientific approaches may be adopted where consistency and 'proof' of impact or change is required, but more flexible and 'user friendly' methods may be used where the learning of stakeholder is prioritised.

Greater documentation of the negotiations is required for us to understand both the monitoring process and where the trade offs lie. This should extend to the debates within and between stakeholder groups, particularly to explore the different priorities amongst local people, such as between women and men, poor and rich, young and old and residents and migrants. Few of the experiences reviewed discussed the social differentiation of priorities, methods or indicators within the monitoring process. Yet these are likely to differ according to the individual's degree of dependence on the natural resources being considered.

This review defined three categories of participatory monitoring: methods based on the visualisation techniques of Participatory Rural Appraisal, those that use oral testimony to uncover patterns of environmental and social change and those based on adapting methods of ecological assessment to make them more accessible to local people. While not mutually exclusive, these approaches have different origins and have evolved for different reasons. Within this broad classification, 10 tested approaches to participatory monitoring of the environment are described and compared in this review. All the approaches appear to be highly participatory in data collection, but few approaches involve all the stakeholders in the early stages (designing the monitoring process) and later stages (analysis and dissemination of monitoring findings). The review suggests that approaches that involve stakeholders in the complete monitoring process take longer to establish and implement than those that involve stakeholders only in data collection. However, the review also suggests that these approaches produce information that is more relevant and useful for the stakeholders than those in which local people act only as data gatherers.

The review identifies several challenges for future research and practice in participatory monitoring of the environment, including a need:

- for a more explicit debate on the trade offs inherent in participatory monitoring;
- to have greater discussion and documentation of the negotiations that occur within and between groups of stakeholders during the monitoring process;
- to explore the monitoring priorities of different sectors of the community;
- to develop mechanisms for promoting feedback between the monitoring and development processes, so that monitoring does not become an end in itself but a means to promoting more participatory development;
- to understand the real costs of participatory monitoring, financial and otherwise, for all stakeholders, but particularly for local communities; and
- to develop and adapt approaches to monitoring that maintain the long term interest of all stakeholders.

1. Format of the Working Paper

This paper discusses recent experiences with 'participatory monitoring', focusing on environmental changes and natural resource management interventions. The paper draws on a range of sources, including an extensive review of the literature, interviews with practitioners around the world and the first-hand experiences of one of the authors

(IG) in establishing a participatory approach to monitoring sustainable agriculture with rural organisations in Brazil.

The paper starts by describing conventional monitoring and data-related dilemmas. We then discuss the basis of participatory monitoring approaches, particularly their benefits, how they meet challenges of participation, and how indicators are perceived and generated. We examine also the trade-offs in meeting the conflicting needs for scientific rigour and enhanced participation in participatory monitoring processes.

The final section of the paper describes three categories of approaches to participatory monitoring that seem to have been successful at providing a basis for community involvement: methodologies developed from the use of participatory rural appraisal (PRA), those based on oral testimony, and those that adapt scientific approaches to ecological assessment. The paper concludes by comparing the different methodologies and identifying current gaps in our understanding of participatory environmental monitoring.

2. What is Monitoring?

Spellerberg (1991) defines monitoring as the systematic measurement of variables and processes over time. While the term monitoring often goes hand-in-hand with evaluation, they differ: monitoring is a periodic, rather than a one-off, reassessment of indicators chosen to determine the effects of certain interventions or policies, or change in general. By definition a monitoring programme must have objectives and therefore an identified end-user of the information. This may seem an obvious point but as noted by Roberts (1991), much field recording 'tells us only that lots of people are keeping lots of records: often for no good reason, using dubious methods, and producing vast quantities of un-analysed, and often unanalysable, data'.

Hellawell (1991) describes monitoring as a process not a result, a means to an end rather than an end in itself. Great diversity in 'ends', or objectives, are reflected in an equal diversity in approaches to monitoring. Nevertheless, most monitoring activities are based on the recognition of the potential for change. He identifies three categories of monitoring objectives:

- regulatory (performance or audit function, usually for supporting organisations);
- assessing the impact of policy, legislation or some other intervention;
- detecting incipient change ('early warning').

As a tool for understanding what works and how activities need to be adjusted, monitoring is basically an aid to help decision-making and planning. Central to these objectives is the provision of information to decision makers and policy makers. Thus the emphasis in monitoring, as conventionally perceived, is on output. The objectives, methods, indicators and analysis are defined to meet the criteria on the type and quality of information that is required policy makers. Yet these people are often remote from the situation that is being monitored.

Accountability has been the most common reason for monitoring of programmes and projects. In this context, indicators, methods, frequency of measurement, and reporting systems have usually defined by supporting agencies. Also very common, has been the monitoring of scientific quantities, such as the weather or pollution levels, using costly equipment and processes that are understandable to few people.

More recently, the value of the monitoring process for improved learning about changes occurring locally has challenged such approaches to monitoring This is leading to more community-based alternatives to monitoring. These aim to enhance the local capacity for recording and analysing change and improve community-based initiatives through a structured process that emphasises shared learning, and locally defined indicators and methods.

2.1 Monitoring in practice

Monitoring is commonly perceived as an objective process for obtaining unambiguous information to detect clear-cut change. However, Roberts (1991) notes the limitations of data collection and monitoring (see Box 1). He suggests that monitoring is not at all a 'scientific' process, as the objectives themselves, the methodology, the indicators, and the interpretation of data are all influenced by individual or collective world views.

Box 1

The truth, the whole truth and the limitations of data.

Why are data so often of minimal value? Monitoring everything is impossible. It is impossible in *theory* because we do not know enough about natural systems to know all the aspects we could record - and new techniques and approaches are being developed all the time. It is impossible in *practice* because there will never be enough resources - time, money, equipment, expertise, to record everything. Therefore, data selection is necessarily selective. This means that an assemblage of data is not objective fact: rather it is a particular view of objective fact; and viewpoints change with time as knowledge and theory progress - which is why past data is of dubious value in answering future questions.

Monitoring provides a *particular view* of reality. Yet some hold that it is a direct representation of reality, others that reality itself is a matter of perspective. These are not just philosophical irrelevancies but have direct implications for the findings of monitoring. Monitoring happens from different standpoints, with each standpoint affecting the results:

- Monitoring data as reality

  Some people argue that monitoring data are a direct representation of reality. This perspective holds that the monitoring data reflect objective science and can therefore be used as evidence that supports or dismisses a cause.

- Monitoring as politically expedient

  In contrast, other people may see reality as a matter of perspective, objectivity as impossible, and therefore monitoring data as manifestations of political ideology and propaganda. Based on this view, monitoring data can be moulded to support the cause being pursued (or data selected on the basis that it supports the cause).

Source: adapted from *Field Monitoring: confessions of an addict*, Roberts (1991)

Roberts' analysis is not unique. The 'objectivity of science' is increasingly questioned. Leach and Mearns (1996) explore the 'received wisdom' or popular myths about environmental change that are held to be 'correct' by social consensus. Their paper highlights the political nature of scientific investigation. This has important implications for designing and developing methodologies that are appropriate for detecting environmental change, which is the central concern of this paper. Can monitoring provide us with the data we need to detect environmental change? Which variables can we monitor? Whose reality do they represent? Can we use monitoring data to scale up from our monitoring sites to infer change at a landscape/national level and inform decision making processes? And will all this information be useful and actually improve a development intervention or research programme, and therefore increase the quality of human life?

We don't have answers to all the methodological challenges posed by a politically expedient interpretation of 'science'. Despite increased information about the natural environment, we realise, paradoxically, that little of this helps us understand how social and environmental processes influence each other. What we do know is that broad, research events repeated every few years will tell us little about local conditions and the process of change over time. We also appreciate that it is difficult to scale up any detailed understanding of local change, precisely because of the complexity of environmental processes and the dynamism and change inherent in these systems. The challenge of understanding, documenting and demonstrating impacts or change is described succinctly in the ILEIA Newsletter on 'Tracking change' (December 1996):

> *"Understanding" refers to perceiving a complex and changing environment, but different stakeholders perceive reality according to their own world view. Perception of environmental degradation may vary even between individuals within a given stakeholder group as a result of socio-economic, religious, gender or age group differences....Perception is also greatly influenced by the media used to capture and communicate it.*"

This leaves us with little choice but to know why we are seeking certain information, to do so with a clear focus on the end-users of information, and to understand where and how our own subjectivity is influencing the monitoring process. It is such needs, and the pragmatic reality of limited resources and capacities, that have fed a keen interest in and growing experimentation with alternative, more participatory, monitoring approaches.

3. Moving Towards Participatory Monitoring

Alternative approaches to monitoring that integrate the perspectives of multiple stakeholders and challenge the orthodoxies of environmental monitoring are being developed and used. These new approaches, collectively known as participatory approaches to monitoring or 'participatory monitoring', have multiple origins and objectives. While responding (and contributing) to the debate on the subjective and value-laden nature of data, these approaches also reflect a more pragmatic rationale: the limited availability of human and financial resources. Experience in Southern African countries suggests that routine environmental monitoring, based on technical data collected by government ministries and other agencies, is often 'poor' or 'inadequate' (SADC 1997). Major concerns include:

- limited scope of monitoring;
- limited scale of monitoring;
- incompatible data;
- inadequate testing facilities;
- inability to assess regional conditions and trends.

A common response to these problems is to attempt to standardise methodologies and guidelines. However, given the limitations to monitoring capacity, institutional facilities and financial resources that exist and will continue to exist in many countries, the SADC report stated that 'it is unrealistic to expect that such "formal" monitoring will be sufficient to generate enough data to evaluate trends adequately'. Recognising that the majority of poor people live in rural communities and depend on natural resources for their livelihoods, the report continued: 'The challenge is to develop the means to monitor environmental quality and land management practices that impact on poor people in rural areas'.

This is by no means a unique perspective, as this experience from Australia highlights:

> "*We had 30 years of monthly water quality records from the government, but we weren't getting the information we needed for catchment management until we got the farmers involved.*" (Morgan N., in WhiteT, 'Communities in Action - Waterwatch case studies', as cited in Alexander et al, 1996:17)

Participatory monitoring recognises the central role of local people in the environment and reflects a logical evolution of the participatory approaches to resource appraisal that have developed over the last two decades (see Chambers and Guijt 1995). Participatory monitoring shifts the emphasis away from externally-defined data-seeking programmes and stresses the importance of a locally-relevant process for gathering, analysing and using the information. Thus, monitoring moves away from being an activity undertaken for, and by, outsiders, to one that builds on local community activity and increases their capacity to record and analyse local conditions. This information then has a direct function of improving action, rather than the regulatory watch-dog function of most conventional monitoring programmes.

However, the practice of participatory monitoring of environmental change is not straightforward. Recent experiences suggest that four central questions and dilemmas need to be understood and confronted:

1. What are the perceived benefits for different stakeholders of participating in collaborative monitoring?
2. Assuming that everyone will benefit in some way, what is the degree of participation of each stakeholder group in different stages of the monitoring work?
3. Given different objectives and world views, how does one agree on indicators?
4. Given the methodological compromises that any partnership demands, how can one deal with the trade-off between 'scientific rigour' and 'participation'?

Each of these challenges is addressed in the four sections below.

3.1. The Benefits of Participatory Monitoring

A fundamental question of participatory monitoring is why anyone should bother recording change. For whom will the information, and the process of collecting it, bring benefits? Most project-initiated monitoring processes make the rather tenuous assumption that the monitoring process has value for local people. But this may not be the case. Box 2 describes a range of different objectives of monitoring from four project-led approaches including: accountability to donors, enhancing participation, increasing local level capacity, and improving the sustainability of project activities. Each partner in the collaborative monitoring process is likely to emphasise certain objectives more than others, which will have implications for how much time they are willing to invest in it and therefore the design and implementation of the approach (see Boxes 3 and 4).

While many studies suggest that monitoring can achieve some or all of these multiple objectives, few projects

assess the impact that monitoring has had in meeting these objectives. For example, Campilan (1997) notes that while a growing number of agricultural projects are adopting participatory monitoring, there is a need to determine whether participation contributes significantly to achieving more effective monitoring and evaluation. He warns that as participatory monitoring becomes a new buzz word in development, it should not become 'romanticised as the panacea for all the ills in project monitoring and evaluation'.

Box 2.

Why participatory monitoring might have value

Marshall Murphree (pers. com.), Centre for Applied Social Sciences, University of Zimbabwe:

Different agencies have different perspectives on and requirements from monitoring. Frequently, monitoring has been donor-led, enabling them to evaluate the impacts of the intervention. However, increasingly, monitoring is seen as an advocacy tool enabling implementing agencies to justify their approach to a wider audience. This often requires a broader approach to monitoring that includes a wider or different suite of monitoring variables than those required for donor agencies. Furthermore, a participatory monitoring process can be used to encourage a 'healthy competition' between different communities who are involved in a project. Participatory monitoring develops the monitoring skills of villagers and contributes to institutional capacity development at all levels, from the local to the implementing agencies.

Meera Kaul Shah (1995), AKRSP, NGO, India:

Very often people's monitoring indicators turn out to be rather different from those that are decided by outsider 'professionals'. Allowing the community to generate their own monitoring indicators makes it easy for them to keep track of the process and use the findings for day-to-day decision making.

Parmesh Shah (1993), AKRSP, NGO, India*:*

Participation is a familiar development theme but local involvement has tended to focus primarily on implementation aspects. Although this may produce short term results, it does not lead to a sustainable process where people upgrade and develop their capacity to think about their own priorities for development, take decisions affecting them and develop a long term perspective for change. Unless village communities participate actively in the appraisal, planning and evaluation processes, then development will not be sustainable. Also, rural people have a vast pool of indigenous knowledge and expertise which is generally neglected in planning and evaluation. Conversely, participatory monitoring is an important tool for outsiders to learn from the rural people.

Irene Guijt and Pablo Sidersky (1996), AS-PTA, Brazilian NGO:

The lack of data is clearly a problem for long term project planning and accountability to donors. Despite the intensity of NGO efforts in sustainable agriculture in Brazil, they have little systematic, documented evidence of the impact of their efforts. Unfortunately lack of proof is often interpreted by critics of sustainable agriculture or funding agencies as lack of success or an absence of evaluation. Through developing a participatory monitoring system, objectives and indicators that are meaningful to farmers and NGOs alike can be developed to allow the collection and processing of information with higher relevance and less effort.

Box 3.

Why Different People are Interested in Monitoring Change

Early on in developing participatory monitoring of sustainable agriculture in Brazil, the partners discussed what their interest was in monitoring.

Farmers

- to activate the interest of farmers not involved in the sustainable agriculture partnership;
- to ensure proper management of the farming enterprise;
- to be able to show the impact of their efforts to neighbours and others.

Rural Worker's Trade Union

- to avoid having to resort to opinions (e.g. 'I *think* our work is doing well') and to evaluate with more certainty;
- to convince other farmers with the proof that data provides that sustainable agriculture practices can also benefit them;
- to convince other organisations that the sustainable agriculture activities are worthwhile pursuing
- to be able to evaluate better the work of the trade union itself;
- to help with planning, knowing what works and what doesn't.

S-PTA (local NGO)

- to report to funding agencies the extent to which efforts are meeting the intended objectives;
- to help in planning and prioritising of activities;
- to have proof for advocacy purposes at the regional, state, and perhaps even national level;
- to enhance the capacity of farmers and trade unions for autonomous planning and implementation of sustainable agriculture activities;
- to strengthen the cohesion and interaction of newly forming farmer experimentation groups.

Source: Guijt et al 1996a

Monitoring the impact of participatory monitoring, as compared to conventional methodologies, would require a long term study. But it is important to know if participatory monitoring is worthwhile, considering that much time, money, and effort is invested by everyone involved. One rare insight into the benefits comes from an survey of over 200 Community Environmental Monitoring (CEM) experiences in Australia (Alexandra et al 1996). The authors asked five questions of the groups in a national survey and several workshops:

1. Does CEM improve environmental management?
2. Are standard CEM guidelines needed?
3. Is CEM relevant to State of the Environment Reporting?
4. Can CEM data be integrated to provide a systems view?
5. How can CEM be improved?

From the responses they have noted that CEM groups assess their own achievements very positively:

- at the very least, direct involvement in monitoring leads participants to develop a sense of responsibility for its continuing health;
- monitoring enables the direct translation of new insights and attitudes into action;
- monitoring increases the capacity to distinguish natural changes from those induced by management;
- local community groups are the greatest users of information, followed by state government, local government, universities, catchment groups, and federal government.

Box 4

Why Australian Citizens Monitor in Local Groups

"Community Environmental Monitoring (CEM) groups differ in what they hope to achieve. Just as

science can be pure or applied, and religion can be active or contemplative, some CEM groups simply want the intrinsic pleasure of understanding and appreciating the world around them. They have little interest in applying their understanding to management problems. Others are concerned with economic survival and farm productivity. Others are seeking insight into change processes in order to improve environmental decision making. But most are united by a common desire to see actual improvements in environmental conditions."

Source: *Alexandra et al, 1996.*

The Efficiency Argument

One popular reason for projects to include multiple perspectives is that it can enhance the efficacy of a monitoring programme. However, again, this is not a straightforward process and will require time to bring different world views and languages together. Ilarion (Larry) Merculieff recounted his experiences between Alaskan Natives and the Alaska Department of Fish and Game at the Sixth International Conference on Hunting and Gathering Societies (see Box 5). He showed the importance of considering the breadth and depth of local information in informing research on natural resources. An Aleut himself, Merculieff argues that the native Aleut understands that the environment is in constant flux, a process that scientists find hard to monitor, manage and model. The experience also shows that by integrating perspectives, an improved understanding of 'connectedness' and therefore what to monitor, could be achieved.

In another, more positive experience, scientists collaborated with Aboriginal traditional custodians of the land in Uluru National Park (commonly known as Ayers Rock) in central Australia. Reid et al (1993) describe the benefits of a joint fauna survey. The ecological survey was the start of a process of 'maximising the chances of maintaining all vertebrate species in the Park' and involved a review of traditional knowledge, alongside a more standard ecological survey. One way in which the collaboration proved helpful for the scientists was the advice the Anangu wildlife experts provided about where to find rare, threatened or cryptic species. In the case of the striated grasswren (*Amytornis striatus*), Reid et al describe:

> *"... an Anangu wildlife expert showed an ornithologist how to identify the grasswren's tracks in the sand and how to track the birds back to their nests in the spinifex clumps. These newly acquired skills helped the researcher to locate populations elsewhere in the Park and to find two active nests in a fraction of the time it would otherwise have taken*" (p.250).

Reid et al go on to say:

> "*Perhaps the most important conclusion for wildlife management was to recommend the establishment of integrated monitoring programs... It is clear that considerable efficiency can be achieved if Anangu participate in all future monitoring and research because of their outstanding wildlife skills*" (p250).

Julian Reid explains what has happened since (pers. com., 1997):

> "*In 1994/95, a repeat survey was conducted as a form of (fairly unstructured) ecological monitoring. In this step, Anangu involvement was in some ways less integrated than in the previous step, but also better due to a more flexible approach and more social interaction. Unfortunately, resources have not been dedicated to analysing and working up the materials provided by the Anangu, and little of the new and interesting information may see the light of day. It is incredibly time consuming and therefore costly* [requiring] *linguists, vetting sacred knowledge, corroborating or reconciling conflicting information and interpretations, payment of Anangu and other consultants, etc."*

The lesson is clear. Despite many potential benefits, if we are serious about an integrated participatory monitoring approach that bridges widely differing worlds, as between the Anangu and the westernised scientists, it needs commitment, careful design and substantial funding. It will not happen through good intentions alone.

Box 5.

Dialogue for the Sake of Survival

As an Aleut, one of the three distinct aboriginal races in Alaska, I am keenly aware of the depth of knowledge and experience about the environment inherent in my own cultural system. I realised there was a definite pattern in the breakdown of communication between aboriginal peoples and well-meaning individuals in Westernised institutions. I can best communicate this by recounting a meeting in a remote Alaskan village between scientists, resource managers, and tribal chiefs from villages highly dependent on hunting and trapping.

The theme of the meeting was subsistence. One of the state representatives presented the fieldwork that was planned to determine the health of the local moose population. The individual described the intended methodology, and indicated that this study was important because the moose population appeared to be at a critical threshold of sustainability.

The traditional governing group responded by saying that they had noticed a distinct drop in marshland water levels. This had adversely affected the marshland food sources for the moose. He asked if anyone from the state had counted the number of beaver in these areas or the number of dams these beavers had built, as at least 20 small tributaries to the Yukon river were dammed. He commented that the Alaska Department of Fish and Game might propose to cut the villagers' hunting of the moose as their answer to the problem without understanding beaver populations and their impact on the environment. The leader said, 'It seems to me that you should listen to us and find ways to work together'.

Both sides left the meeting feeling that they had never connected. The scientist's job was to collect limited data on moose only. The native groups provided information that went beyond the scope of the field assignment. They were never heard as the focus on scientific field data minimised the importance of what seemed to be anecdotal information.

These two world views could be described as linear and cyclical. The scientist is indoctrinated in the linear construct, as are most Westernised people. In science, linear progression is reflected in the continued refinement of scientific methodology from its origins of simple logic, common sense and visual observation. Contrast this way of life with those who live their lives by the seasons and in responses to their environment. Theirs is a world in which the interdependence of humans, animals, plants, water and earth - the total picture - is always immediate, always present. And the total picture - every day, every season, every year - is seen as a circle. Everything is connected: the marshlands to the beaver, the beaver dams to the altered conditions, the new conditions to the moose herd, the moose herd to the marshlands.

The chief had described a specific sequence of events that his people had observed that demonstrated their world view of connectedness. What is overlooked by dismissing such information is that the native comes from a community of people who have had sustained contact with their immediate environment for thousands of years, and who, through a cultural information system, have passed on their visual observations, knowledge and experience to each successive generation. In this context, native information is anything but anecdotal.

Source: Merculieff (1994)

3.2 Degrees of Participation in Monitoring

Most monitoring approaches exclude or ignore the conscious or unconscious monitoring which is undertaken by local people. Yet, as discussed in the previous section, environmental monitoring is key for those people whose livelihoods depend directly on the natural resource base. There are many examples of local indicators of change that enable people to capitalise on natural processes. For example, in Mare village, Papua New Guinea, village men highlighted that wild pigs are hunted when certain berries ripen. Amongst the Ngarinmand and Ngaliwurru people in the Northern Territory, Australia, the (unpleasant!) bites of March flies are a signal that it is time to go and look for crocodile eggs (Rose, 1988). Rose goes on to explain this and other similar use of environmental indicators:

> "*This system of information is based on messages sent out by different agents within the system, `telling' about the system. ... There is an immediately discernible pragmatism here: if human beings are to forage with greatest success and minimal outlay of energy, they must know what is happening at any given time. Beyond simple pragmatics, however, there are further questions... In order to act responsibly, humans and others must be constantly alert to the state of the systems of which they are a part.*" (Rose, 1988:382-383)

Although few people now live as foragers, there is much that others can learn from this type of interaction with the natural environment. The need to understand environmental change extends to other groups too, as expressed in the ILEIA Newsletter (1996), 'In order to survive farmers must be - and often are - experienced "trackers of change" who are open to learn, adapt and innovate'.

These are examples where communities or individual farmers are the only participants in monitoring processes that have direct benefits for them, in ways that suit their needs and operating constraints. But how representative is this type of monitoring compared to others that operate under the banner of participation? In her recent review of the participatory monitoring and evaluation literature, Mebrahtu (1997) suggests there are four common types:

1. participatory monitoring and evaluation of project implementation, focusing on the different stages of the project cycle;
2. self- or permanent-evaluation, which frequently occurs within organisational settings and seeks to develop project objectives consistent with the criteria of both communities and external agencies;
3. citizen monitoring, which encompasses communities assessing the work of government agencies or programmes;
4. community monitoring of the wider environment, a broad category where community members track local changes.

Despite an awareness of community-led approaches to monitoring, the vast majority of the development literature reviewed described project-led approaches to monitoring. Much of the literature focuses particularly on the first category, monitoring of activities within the project cycle. And it is for this category that participatory methodologies are currently most developed. In fact, all the first three categories centre on project- or outsider-led approaches to monitoring, and few examples exist of community monitoring as per the fourth category.

This paper focuses on experiences with the fourth type: community monitoring of the environment. But within this category, there are variations of the degree of participation of the different partners. Such monitoring processes may be initiated by an external agency or may occur independently. As most communities are linked in some form or other to external agencies (whether government departments, NGOs or the business sector), community monitoring increasingly occurs as a partnership between different groups, and not (only) as groups of foragers or farmers in isolation (see Box 6). The experience described in Box 7 occurred on the initiative of community members, and not project staff. It highlights the need for outsiders, firstly, to recognise, and secondly, to build on existing monitoring activities.

Box 6.

Vital Partnerships

In 1992, the then Prime Minister of Australia, Paul Keating, announced funding of Aus$2.9 million over 3.5 years for the establishment of the national Waterwatch programme. By encouraging community participation in monitoring water quality, the programme aimed to raise community awareness of the natural environment, instil the wise use of natural resources ethic in communities, and encourage appropriate activities in response.

In the initial stages, priority was given to funding infrastructural support in the form of state and catchment or regional facilitators. These people play an essential role in providing community groups with information, training and assistance in carrying out water quality monitoring activities. Without such support, community-based programmes, such as Waterwatch, will not succeed.

Source: *C. Mobbs (1996)*

In developing partnerships for monitoring, it is essential to build on local terms for 'monitoring' or noting and recording change. Local perceptions of 'monitoring' are likely to be highly variable and location specific, and getting the wording right is crucial for everyone to understand equally. In recent work in Brazil, the word 'monitoring' was rejected in one field site, in favour of the term 'accompanying change'. There, the term 'monitoring' has no local significance and is viewed very much as an academic, almost as a foreign, word. However, in another fieldsite in Brazil, the term 'accompanying change' was found to cause great confusion as it was already used to describe the existing extension activities. After explanations and clarifications, the word 'monitoring' is now common parlance, used by the farmers as easily as the academics in the collaborative work (Guijt, 1997b).

Box 7.

Monitoring, naturally

Natural resource management is the technical focus of a funding organisation in the Philippines. One of the technologies encouraged and supported amongst its partner NGOs and peasant CBOs in the upland development programme was SALT or 'sloping agricultural land technology'. However, despite several years of efforts, there did not appear to be any real 'success'. The technology was applied incorrectly and targets were not attained. The monitoring reports were pessimistic.

Suddenly, however, the funding organisation noticed that something was happening in a small village, home to one of the CBOs. A group of fourteen farmers, on their own initiative, had started terracing their land. Over a period of two years, they transformed a significant part of their land. The change was dramatic and other upland farmers who saw the change started their own terracing. The farmers started to receive visitors from other villages who were interested in their work.

These farmers had unwittingly undertaken a highly effective monitoring process, which had catalysed much interest. It was quite simple - they had left a badly eroded unterraced area next to the terraced land, providing a dramatic contrast. This was not a formal part of the 'monitoring concerns' of the peasant organisation. They did not see the importance of reporting this to the NGO as their way of 'monitoring'. Seeking evidence by providing a visual basis for comparison was how the farmers had chosen to monitor the success, or not, of their efforts. The question for the main NGO was it could now link into this local monitoring system.

Source: adapted from Roger E. Ricafort (1996)

Ricafort (1996) notes that most monitoring activities, even much that is supposedly participatory, start with outsider-derived indicators, formats or reporting systems. These external management systems are imposed on the community to encourage comparisons of change either over time or between communities, or to suit need for accountability from higher up in the organisational hierarchy. Ricafort suggests that this means that we immediately 'trade off some "participation" so that we can implement our neat frameworks'. He suggests an alternative approach which 'start(s) with the complexity and dynamics of the community and let those impose themselves on our own systems and ways of doing things. The challenge is how to capture the dynamics of the community as it monitors, reacts and copes with changes within it'.

This may be the ideal monitoring approach for those whose focus is on community empowerment. But in reality, the pace of development interventions may preclude the synchronising of approaches developed by communities and external agencies. What may be more important, and more achievable, however, is the development of an understanding of what local participation in different stages of the monitoring process actually involves.

Much of what passes as participatory monitoring often has a project or programme focus, with only a very narrowly defined role for local community members. In many documented examples, it is striking to see that the emphasis is on how to encourage participation of field staff in designing the monitoring programme, with them being the 'participants', rather than local people. Little systematic thought is given to the role of local women, men and children, other than as collectors of information.

Yet a monitoring process is much more than data collection and community members can, in theory, be involved in different ways in all aspects of the design and implementation (see Annex 1: Key Steps). As shown in Box 8, a comprehensive process requires that:

- issues and goals are clear to all involved, so that everyone knows what to monitor and why this is the case;
- monitoring methods are available or can be designed to assess and interpret outcomes;
- data is collected, compiled, analysed and used by those who are affected by the policies/interventions being implemented.

What is the role of local people in these different aspects and stages of monitoring? Diverse interpretations of these roles, together with multiple objectives, have led to many shades and forms of participatory monitoring, some of which are discussed below. In theory, it involves the users of an activity in the measuring, documentation,

collection, analysis and spreading of the information to help all those involved in the process of decision making: the project's personnel, local citizens, policy makers, etc (Mechellsen, 1995).

Box 8.

Participation in Stages

In recent monitoring work in Minas Gerais, Brazil, four stakeholder groups are collaborating to assess change induced by their collective activities in sustainable agriculture:

- farmers (male and female);
- representatives of the Rural Worker's Trade Union (who are often also farmers);
- staff of a local NGO, CTA-ZM;
- academics from the Department of Soils of a nearby university.

Over the past year they have all been involved, usually in mixed groups sometimes in homogenous groups on their own, in each stage of developing a monitoring methodology:

1. prioritising which of the 28 field activities of the partnership would be evaluated;
2. identifying objectives of each activity;
3. merging the objectives of four groups to create a common understanding of the partnership;
4. prioritising which objectives would be monitored;
5. identifying the indicators for each prioritised objective;
6. selecting a feasible, reliable method that could be managed by farmers and union representatives;
7. identifying when and how often measurements would take place;
8. identifying who would be involved in data collection, collation, and analysis;
9. clarifying with whom the final information would be shared and for what purpose.

The extent of their participation has been discussed collectively at each stage, with, for example, union representatives asking the NGO to help at particular moments, and farmers opting out of specific meetings due to urgent work in their fields.

An obvious implication of this is that much time is needed to develop a monitoring methodology, as timetables have to be set collectively. In addition, compromises have to be made in terms of the choice of indicators and methods. However, the participatory process also means that methods are feasible, indicators are understood, end-users of the information are known, and everyone is keen and able to implement the monitoring. It has, after all, taken on meaning for each partner.

Source: Guijt (1996d, 1997b)

Depending on the purpose of the monitoring, different groups of people will be involved to a greater or lesser extent. To achieve a monitoring process that aims to be participatory, it is essential to invest time in understanding the different views and intentions of each group in terms of monitoring. For example, is it necessary and appropriate for farmers to measure indicators that are of interest and relevant only to NGOs? As the previous section discussed, participation in various stages must be negotiated, and cannot be assumed to be of equal interest to everyone (see Box 9).

Box 9.

Who should participate and when?

To help assess who should, ideally, participate in which stage of the monitoring work, the following structure is now being tested in Paraiba, Brazil by AS-PTA. For each of the indicators developed, participation of the different possible stakeholder groups (farmers in general, members of farmer experimentation groups, trade union representatives, NGO staff, others) is assessed using the following questions to fill in the table:

- What is the relevance of participating for each group, or is it the process of collating/calculating the data that is important, or only the final information?
- Who is going to use the final information? (Those who are to use it should understand on what it is based, how it was calculated, etc.)
- How difficult are the calculations? (The more difficult, the more caution should be used in encouraging one or the other group to participate).

Based on a discussion of these questions, the rural workers' trade union representatives and NGO staff sort out roles and responsibilities, and identify who will be invited to participate in which step. Farmers have not been involved much in this stage yet but will increasingly do so as they take on more formal roles in the partnership with AS-PTA and the trade union.

Steps Who should participate? When will this happen?

1. Data collection
2. Collation/calculation
3. Analysis of findings
4. Devolution of information

Source: Guijt et al (1997a)

3.3. Indicators: negotiating the needs of different stakeholders

Together with many others, Guijt and Sidersky (1996) suggest that '*If monitoring is to be part of a sustained learning process it has to have local relevance and be feasible in the long run*'. They recognise that this takes time and involves compromise. Working with the Brazilian NGO, AS-PTA, this has meant moving away from a rigorous approach to monitoring that provides 'proof for hard headed scientists' towards identifying indicators that reflected farmers' perspectives on the changes they had experienced. However, Guijt and Sidersky highlight the importance of developing clear and specific monitoring objectives prior to developing indicators (see Box 10). This important step in the monitoring process (see Annex 1) is often missing from other descriptions of the monitoring approaches.

Box 10

Agreeing on objectives and indicators

A key lesson from participatory monitoring of sustainable agriculture in Northeast Brazil is 'spend sufficient time on the objectives'. If these are not clear, it is impossible to identify indicators to monitor them. During a workshop, the objectives of the NGO were analysed over a protracted period using a 'decision tree', to distinguish between, and prioritise, short-, middle- and long-term objectives.

Developing appropriate indicators depends on understanding the end use of the data. Initially, the focus was on the direct measurement of biophysical properties. Yet the project found that the degree of accuracy required by the monitoring exercise, particularly for general planning purposes or increasing awareness among farmers, is often less than assumed. For example, one of the main objectives of contour planting was 'soil and water conservation'. Indicators, such as soil retention, moisture retention, and organic matter content, were initially identified. However, the measurement of these indicators is impractical given the limited resources of the NGO. Furthermore, such precise data were deemed unnecessary when the audience and the purpose of the information was discussed. The information was to be used in farmer-to-farmer extension and donor reporting, both of which did not require scientific data. Instead, it was more important to understand and explore farmers' perspectives on perceived

changes in soil quality as a result of planting along contour lines. Thus, one indicator was developed: the frequency with which positive and negative changes were noted by farmers planting along contour lines.

Source: Guijt and Sidersky (1996)

Selecting indicators is one of the most difficult steps of setting up a participatory monitoring methodology. It is the stage which highlights, more than any other, the different information needs and expectations of monitoring of different stakeholders. It also reveals that what one group considers 'trustworthy' information, does not necessarily hold for another. Although the process described by Campilan (1997) does not include local people, he describes how the information needs of multiple stakeholders must be integrated into any participatory monitoring approach for it to be implemented and maintained (see Box 11).

From his experiences, Campilan writes:

> *'One of the most important lessons learned by researchers is that participatory monitoring and evaluation can work most effectively when dealing with data which are of mutual importance and usefulness to researchers and farmers'* (1996).

This might seem an obvious point. But few of the experiences of participatory monitoring that were reviewed seemed to invest sufficient time and effort in ensuring that these mutual benefits existed before embarking on indicator selection. This is supported by Ricafort (1996) who suggests that if we acknowledge multiple stakeholders and multiple views of reality, then the process of indicator selection must be re-examined. Pre-defined and 'objective' indicators must be replaced by 'negotiated' indicators that are 'channels for bridging realities and meanings'. The negotiation should be an on-going process and should result in indicators with an element of 'fudginess' if they are to be relevant and meaningful. Ricafort asserts that the main gap in participatory monitoring lies not in the actual use or development of methodologies, but rather in the 'facilitating of negotiations across organisations, social sectors, and within organisations'.

Box 11.

Participatory Monitoring for Whom?

An urban project in the Philippines brought together three different institutions: a research centre, public elementary schools and a local health agency, to pursue a common goal of promoting home and school gardens for enhancing food security. While the three institutions worked together in project implementation, the research centre took the lead in developing a monitoring and evaluation programme. Thus, the data requirements for monitoring largely corresponded with the information needs of the research centre. The staff of the health and education agencies could not see the relevance of certain indicators, such as crop yields, varietal mixtures and other technical parameters, to their work. Consequently, monitoring forms developed by the researchers were not completed by the health and education workers and the monitoring programme failed to be implemented.

From this initial experience, the researchers realised that to implement a monitoring programme and enhance participation, the information needs of all the project stakeholders needed to be addressed. A follow-up workshop brought the three project stakeholders together to reconcile their respective information needs. The data requirements were adapted to ensure that they all found the monitoring outputs useful for their work.

Source: Campilan (1997).

Another aspect of negotiating indicators is their social differentiation. Few of the papers reviewed address this issue. Yet extensive conventional and participatory research experience would suggest that it is important. Highly differentiated patterns of use of the natural environment are documented according to factors, such as the culture, wealth status, age, gender and length of residency, of the individual (cf. Sarin, Rocheleau et al, Kaul Shah, Vlaar

and Ahlers, forthcoming). It may therefore be expected that the different priorities of individuals would correspond with their different needs from a monitoring programme and different indicators. One, rare, example of the social differentiation of indicators supports this hypothesis. Roche (1993) describes differences between households in defining and measuring 'success' (see Box 12). This case study from Mali highlights that different indicators were defined according to age, occupation, gender and wealth status of participants.

Box 12.

Female-Male Grass Indicators in Mali

As an NGO working in Mali, ACORD was interested in promoting the regeneration of a riverine fodder crop (*Panicum bourgou*) along the Niger river. It had been assumed by most people (particularly the technical services working in the area and external aid agencies) that the primary reason that groups were interested in this activity was in order to ensure adequate fodder for their animals during the dray season. This was true for many individuals; men suggested that their evaluation indicator for measuring the success of the project would be their ability to offer ACORD staff a calabash of milk when they visited their site in March.

But discussions with women established that we could judge the success of this activity by asking the children, in the coming year, if they had drunk more *kundou* than usual (a sweet drink also made from grass). Further discussion revealed this criterion for success was a single indicator that allowed rapid appraisal of several aspects of the project: if the *kundou* had been made available to children it would indicate that there had been enough to satisfy the needs of animals.

This also indicated the different priorities between men and women, and between women who owned livestock and those who did not. A further lesson of the project was that very different intra-household relations existed, particularly between pastoral groups. These differences often depended on levels of sedentarisation of the group and the social origins of the household (i.e. noble, vassal or marabout). The replicability of the analyses of within-household relations and evaluation criteria needed to take account of such factors. One of the main differences was between female and male-headed households.

Source: Roche (1993)

Indicator development

There are many different definitions of 'indicators' (see Box 13). But if we are concerned with developing locally meaningful indicators, we must first find a term for the word 'indicator' itself that people recognise. In a research project in Uganda, the word 'signpost' was chosen (see Rennie and Singh 1996). Everybody recognised what it was and what it was not: a signpost points to something else, but is not in itself the thing it points too. Yet when this was tried in another (unrelated) monitoring project in Brazil, it drew blank stares. The farmers were not familiar with this metaphorical use of the word 'signpost'.

Box 13.

Indicator definitions

'Indicators are pieces of information that provide insight into matters of larger significance and make perceptible trends that are not immediately detectable'.

(Hammond et al 1995, in Somé and McSweeney 1995)

'Indicators help you understand where you are, which way you are going, and how far you are from where you want to be'.

(Hart 1995, cited in Somé and McSweeney 1996)

`Indicator is a measurement that reflects the status of a system, for example an oil pressure gauge on an engine or the number of owls in a forest'.

(Alexandra et al, 1996)

Identification of indicators that will work in practice is not as easy as it is sometimes suggested in the literature. Indicators have to be suggested, adapted, negotiated, and approved. One common tool to help in this process is using the acronym `SMART': Specific, Measurable, Action-oriented, Realistic, Time-framed to ensure the chosen indicator is likely to function well.

Another series of criteria that an indicator should fulfil could include: valid, measurable, verifiable, cost effective, timely, simple, relevant, sensitive and punctual (adapted from Rennie and Singh 1996). This may seem a demanding set of characteristics for any indicator but ensuring these are met will prevent much useless monitoring of imprecise or unnecessarily complicated information. Rennie and Singh give an example from Uganda of a community-derived indicator for hunger that meets many of these characteristics: eating beer bananas (see Box 14). Beer bananas are normally reserved for brewing, eating them as a staple food is a sign that a family has been reduced to poverty and hunger.

Box 14.

Evaluating indicators: eating beer bananas as a staple food

- **Valid?** Does it measure what we think it is measuring and not something else? When discussing indicators of hunger at community level in Uganda, increased domestic quarrelling and eating meals at other peoples' homes was first offered by local representatives. After discussion, it was realised that these would not be good indicators of hunger, as many other factors could also lead to the same result. Finally, it was agreed that eating beer bananas was a valid indicator, since nothing except hunger would lead to it.
- **Measurable?** Yes, we can count the number of households affected.
- **Verifiable?** Yes. Anybody can check. It is not difficult to know who is reduced to eating beer bananas: the fact is hard to hide. This contrasts with a household expenditure survey, where you have to hope people are telling you the truth about how much they spent, but have no way of checking.
- **Cost effective?** Yes, you just count. It doesn't take long, and doesn't require any special equipment or training. Even schoolchildren could help.
- **Timely?** Only somewhat. It depends on what you want to know. It is a trailing indicator i.e. it shows that people are already in a state of hunger and will not provide an 'early warning' of incipient hunger. On the other hand, you could get a picture of the situation quickly: just walk into a village and ask for the indicators, and people will get it within a day.
- **Simple?** Yes, it is simple to use, measure and interpret.
- **Relevant?** Everyone agrees it is. It is something they would be willing to monitor on their own, as it is relevant to their own problems. This is an essential point if the community is to help in monitoring the indicator - it must be something that they see as important as well as not burdensome.
- **Sensitive?** Only somewhat, an individual is either eating beer bananas or s/he is not. There are no other answers. Thus, the indicator will only tell you how many households are affected, but not how seriously. You would have to look at nutritional status of the children to determine acute or chronic malnutrition. This would require expert help, although at that level there are rapid survey methods available. The indicator would not be very useful if things get much worse, when everybody finds themselves in the same situation, or if things get so bad that even beer bananas are finished. We would need other indicators for severe, prolonged hunger like eating roots, or other emergency foods.

- **Punctual?** It can be measured at regular intervals, e.g. weekly or monthly

Source: adapted from Rennie and Singh (1996)

Indicators derived by individuals, households and communities are sometimes known as 'grassroots indicators' and have been advocated as a way of involving people who are most affected by the quality of the environment in assessing change. Hambly (1996) suggests that these indicators rarely exist independently but are based on 'accrued local knowledge of the environment'. In her article, Hambly documents how farmers in the communal lands of Zimbabwe identify over-grazing by examining forage and share reports of change in vegetation in order to devise indicators or drought warnings. For example, to predict the end of the dry season, the bark of indigenous trees is cut to observe the quantity and appearance of its milky sap. If the sap is quick moving and plentiful, this indicates the rains are coming. If not, farmers take heed and economise their food stocks and delay their planting. However, scaling up the data provided by grassroots indicators may not be an easy task as they are often derived from specific cultural, ecological and spiritual contexts.

Decision makers at every level and scale, from an individual within the household to national and international policy makers, will find very different kinds of indicators relevant to their decisions. Thus, GTZ (1997) suggest that indicators must be developed that integrate these different perspectives. In relation to soil-related monitoring, they suggest three types of indicators are included in any single monitoring process:

- **Indigenous** or **experiential indicators** (grassroots indicators) that are used by farmers and reflect experienced changes in environmental or socio-economic conditions. These are site-specific and incorporate the needs and expectations of the individual or community.

- **Scientific** or **technical indicators** are global, disciplinary and quantitative and promote comparability across time and between locations. These indicators are based on clear reference points.

- **Proxy** and **surrogate indicators** can help relate scientific methods to farmers' experiences. Proxy indicators can help represent change and thus assist in impact prediction. For example, percentage of soil cover lost during critical rainfall events can serve as a proxy indicator for erosion loss. Surrogate indicators represent processes that either have an indirect or no apparent relationship to the processes under assessment. Changes in crop species (e.g. from maize to cassava) or the increase time spent weeding may be a surrogate indicator for declining soil fertility.

The collaborative development of indicators requires the identification of methods that are intelligible to, and useful for, all stakeholders. Table 1 suggests that this process will be a difficult one. It adapts GTZ's (1997) assessment of the application of soil erosion assessments to different stakeholder groups. The table highlights that the methods that are most appropriate for one stakeholder group are rarely as meaningful to a different group.

Table 1. Appropriateness of soil erosion assessment methods to different stakeholder groups (in terms of the ability of the stakeholder to conduct each assessment, or, the usefulness of the method to the stakeholder conducting the assessment)

Assessment Method	Farmer	Researcher	Policy Maker	Funding Agency
Visual (rills, turbidity of run-off water, gullies, soil colour)	Excellent	Good	Poor	Poor
Stick in the ground	Good	Fair		
Total suspended solid	Fair	Excellent		
Run-off plots	Fair	Fair - Good		
Soil horizon	Poor			

Vegetation/ pedestal formation	Good			
Simulation/modelling	Poor	Excellent (?)	Good - Excellent	Good - Excellent
Remote sensing	Poor	Good - Excellent	Excellent	Excellent
Sediment deposition	Fair			

Source: adapted from GTZ (1997)

Doing away with indicators?

If indicators are so problematic, are there ways around them which still allow for successful monitoring? One fascinating approach from Bangladesh addresses this challenge and (almost) does away with indicators. The Christian Commission for Development in Bangladesh (CCDB) has experimented with a participatory approach to monitoring that involved the 'deliberate abandonment of the use of "indicators", a central concept in orthodox approaches to monitoring' (Davies 1996). The approach has sought to be flexible. It embraced the diversity of perspectives between stakeholders which can prevent consensus on indicators being reached. The approach to organisational learning for CCDB's main project 'Peoples' Participatory Development Programme' centred on monthly inquiry of three types of change:

- changes in people's lives;
- changes in people's participation;
- changes in the sustainability of people's institutions and their activities.

Additionally, people can report any 'other type of change' enabling field staff to report on other factors that they deemed important. For each type of change, a simple questions was constructed. For example: During the last month, in your opinion, what do you think was the most significant change that took place *in the lives of the people participating in the project*?'. The respondent is asked to give an answer in two parts: **descriptive**, describing what happened in sufficient detail such that an independent person could visit the area and verify that the event took place, and **explanatory**, the respondent must explain why they thought the change was the most significant out of all the changes that took place that month e.g. what difference has or will it make?.

Figure 1 shows how the monitoring project worked. Each Project Office designed its own methodology to discover 'significant change events'. The only criteria imposed by CCDB were that the process should be transparent and accountable to those reading the selected accounts. No restrictions were placed on who should be consulted to explore significant change events.

Deciding on the most significant events was meant to be a subjective expression of the values and concerns of the respondents. The explanation response to the questions provided a forum whereby these values could be brought into a wider debate and examined, compared and selected. The monitoring process was designed to highlight the significant change events that occur as a result of project activities. Thus, the approach did not provide mundane information on the day-to-day running of the project, but provided on-line information on extremes, be they positive or negative (but see below). This kind of information can be used directly by project staff: where negative changes were reported, the project would try to avoid this in future. Where positive changes were reported, these would try to be reinforced or replicated by the project.

A wide range of respondents' experiences were subject to 'an iterated process of analysis (choice-explanation-choice...) that eventually selected a small number of stories of high value'. The structure was designed to 'take the form of a slow but extensive dialogue up and down the CCDB hierarchy each month' (Davies 1996). The regular feedback between the Head Office and Project Offices (see Figure 1) enabled the decision-making criteria to be shared between the two levels. The purpose of this was for project staff, either to adapt their criteria to those of head office staff, or, actively seek different examples and think of better explanations for the significance of the types of changes that they thought were most significant.

During the first year of its operation, the monitoring approach evolved, with new categories added to the original three types of change that were identified (e.g. changes in project management) and development of a wider range of objectives for the monitoring system. The information generated was useful to a wide group of stakeholders, with

extensive use made of stories in CCDB publications, videos and educational materials.

About 90-95% of all the changes documented were positive changes. This may reflect project staff concerns about recording negative changes. Evolution of the project could include a specific question about negative change. Alternatively, feedback from the Head Office, through identifying a negative change as one of its key changes, could emphasise the importance of recording both negative and positive changes.

Davies (1996) compares this evolutionary approach to monitoring with more orthodox approaches which he describes as being 'heavily influenced by a planning ethos that places substantial emphasis on rationality, prediction and control' (see Table 2). He stresses the flexibility of the approach compared with more orthodox approaches and the participation of a range of stakeholders in data analysis and discussion.

CCDB had experimented on two previous occasions with monitoring methods but neither system was implemented. Although initially planned to operate for the 6 months until the Round Table Meeting of stakeholders, the monitoring system was continued on afterwards. The monitoring approach met CCDB's needs to assess the impact of its activities. It also provided a novel approach to analysing, prioritising and summarising qualitative data. The approach relied on the different perspectives of stakeholders and required them to prioritise change events and explicitly justify or defend their choice. The choice of significant change events provided an open forum for debate on the extent to which different stakeholders agree or disagree with the choice. Although not indicators in a conventional sense, the indicative change events serve to define organisational 'milestones'. They thus provide a flexible approach to monitoring impact.

However, this approach may not be appropriate in all situations. AS-PTA, a Brazilian NGO, discussed the potential of Davies' approach but rejected it. They need to convince policy makers and donors of their impact and felt they would not be convinced by the presentation of key experiences of 'significant change'. They are, however, going to test it in a small way for one part of their overall monitoring approach. While they have a strong indicator based approach for assessing the generation and diffusion of sustainable agriculture activities, they are aiming to simply discuss significant changes for a third area of their work: 'strengthening institutional relationships in support of sustainable agriculture'.

3.4 Trade offs between rigour and participation

Previous sections of this paper have highlighted different perspectives on the rationale for participatory monitoring and the trade-offs involved in developing indicators that are meaningful to all stakeholders. Given the range of compromises that are needed in participatory monitoring, is there not also a constant tug-of-war between 'being participatory' and 'doing rigorous monitoring' (as conventionally perceived)? The answer is, 'Of course!' but this issue has not been discussed much in the literature.

This prompts the questions: what is lost and what is gained when monitoring moves away from being a scientific approach and embraces participation? Guijt and Sidersky (1996) describe one example of having to move away from soil loss measurements to a more open-ended appraisal of changes in soil conditions (see Box 10). How can the very different information needs and expectations of multiple stakeholders be integrated in participatory monitoring? Campilan (1997) describes participatory monitoring as

> *'a double-edge sword. On one hand, it seeks to be participatory by*
>
> *involving local people in its various stages and activities. On the other hand, participatory monitoring and evaluation is expected to yield timely and reliable data for making valid conclusions and informed decisions.'*

Table 2. Comparing evolutionary and orthodox approaches to monitoring

Planning-based methods	**Evolutionary approach**
1. How does the monitoring approach deal with diverse perspectives?	
Important to develop a common understanding of indicators between different stakeholders, subjective perceptions on indicators need to be controlled or ignored. Confusion over the existence or meaning of indicators is seen as a threat to the systems' functioning.	Acknowledges that different sets of values and interpretations co-exist at different levels within an NGO, and between an NGO and donors. NGO staff collate a menu of possible world views within the 3 broad categories of change chosen by head office staff. Their immediate

	bosses select a sub-set of changes that are consistent with their world views. These are offered to head office staff for their selection. The identification of differences in interpretation provokes discussion which is central to the process.
2. What kinds of information are included?	
Primarily quantitative information is included which must be homogenised to be summarised. Unfortunately, this means that much of the richness of the information and its context is lost.	Qualitative experience is emphasised. These 'stories' or 'anecdotes' provide rich accounts of events, placed in their local context, with an outsiders' interpretation Information is summarised by selection rather than inclusion. Quantitative information can be included when an account of change is record. It can also be collected on the extent to which changes recorded in one location have also occurred within other locations.
3. When are indicators selected?	
Usually, indicators are established at the beginning of a project (although may be reviewed throughout) and data are gathered during the life of the project.	Instead of indicators, indicative events are selected from recent experience and the process of selection and criteria for selection are renewed with each new reporting period.
4. Who designs the monitoring system?	
Usually designed by people distant from those events which are to be monitored. Conventionally, indicators are identified by senior staff but may be identified by project beneficiaries. The challenge is to find ways of reconciling the indicators developed by different stakeholder groups.	Change events are identified by beneficiaries and field staff present their interpretation of these events to staff higher in the hierarchy. Diversity becomes an opportunity for discussion and explicit prioritisation.
5. Who analyses the information?	
Usually, the analysis is carried out on a centralised basis and by senior staff rather than field staff. Newer approaches may try to incorporate a wider group of stakeholders in the analysis.	Information is distributed throughout the organisation and analysed locally. Staff not only collect information about change events, but make their own evaluation of that information, according to their own (local) perspectives.
7. How flexible is the approach?	
Many monitoring systems are static. Indicators may not be adapted locally and surveys are repeated sequentially to record change. Methodological adaptation and local interpretation of data throughout the monitoring process is rarely possible.	Potentially dynamic and adaptive - but depends on the organisation's learning culture. Recorded change events reflect a changing world and a changing set of perceptions about what is important.

Source: adapted from Davies (1996)

Although not the best example of participatory monitoring, Box 15 highlights some of the trade-offs between scientific rigour and farmer participation based on experiences of implementing a participatory project in the Philippines.

Rennie and Singh (1996) note that community-based indicators should be selected for collection by the community, while also being upwardly compatible with higher level monitoring and evaluation concerns. They suggest that '*we have to find common ground between the statistician and the community, and a possible trade off between*

professional standards and practicality or realism from the community point of view'. Community-based monitoring will only work if it contributes to local understanding and empowerment, and not simply to the satisfaction of the researcher. The development of the monitoring process must ensure that all stakeholders are motivated and there is feedback into a local information system so that the process of indicator measurement is not purely extractive.

Box 15.

Participation and research

UPWARD researchers undertaking field projects on true potato seed technology with farmers experienced the dilemmas of trying to obtain rigorous data in a participatory way. The project devised a participatory monitoring tool in the form of colour-coded and pre-formatted monitoring cards. Researchers asked the participating farmers to record production and economic-related data from farm trials on the cards. The project research assistant visited farmers regularly to collect the completed cards so that the data could be analysed and fed back to them.

The first few months of piloting the approach in the field revealed that farmers found the task too cumbersome for few benefits. They did not follow regular record keeping procedures to provide the project with data to fill information gaps acknowledged by the project. To correct the situation, the research assistant decided to fill out the cards during an interview with farmers during routine, regular visits. This arrangement has significantly improved the process of data collection, allowing more sophisticated analysis. However, it highlights the trade-offs involved between farmer participation and the need to meet the research data requirements of the project.

Source: Campilan (1997)

As one Australian research scientist put it pragmatically, *"Community monitoring does not... have to stand up in court... What the community needs are methods which give direction... at the small subcatchment or property level*." (Rob Tanner, as cited in Alexandra, et al 1996).

Yet when data needs extend to higher levels, beyond the catchment or village, the question of reliability of information becomes more pressing. Interestingly, the survey of CEM in Australia by Alexandra et al (1996) revealed that most groups were keen to work toward standard national procedures for monitoring and data-handling. Many groups already follow best current scientific practice, train and supervise their members, and ask for external assessments of their data. However, these groups operate in a high technology society, have easy access to information, are mainly from westernised backgrounds, and are often linked into partnerships with natural scientists. In the many contexts where this is not the case, solutions for dealing with aggregation of data at higher levels are not so forthcoming.

In Brazil, this issue has come up repeatedly due to the many and diverse expectations of the monitoring partnerships (see Box 3). A scientist would say that rigour has been compromised on several occasions in exchange for more equal partnership and more locally meaningful results (see for example Box 16). This brings us to two central questions in the discussion of rigour *versus* participation. Who defines what rigour is? And how do 'rigorous' approaches deal with changes over time, such as fluctuating community interest in monitoring, of objectives, of indicators etc.)?

Box 16.

Querying Quadrants and Comparing Cows

In a recent workshop in Brazil, the farmers, NGO staff, trade union representatives, and university academics were deciding upon a method to assess 'the percentage of vegetation cover' (one of the

chosen indicators for monitoring the agroforestry activity). In addition to the use of a wooden frame (with 4 quadrants about $1m^2$ in total, to be placed on the ground in several sites within the agroforestry plot and estimate visually the surface area covered by vegetation), the academics suggested a form to fill in the percentages. While the wooden frame was acceptable, the farmers thought the form would be too complicated. The academics then suggested a form with pre-drawn quadrants which the farmer could shade to depict the area under vegetation. Again, it was rejected as too alien to the farmers' way of registering, as they have great reluctance to use pen and paper. Finally, they all agreed on the use of a wooden ruler, on which the farmer would scratch a mark to indicate the estimated percentage of vegetation cover in terms of a certain segment of the ruler. Each farmer would get the same length stick each time. The farmers involved in agroforestry would bring their rulers to a meeting, register them on paper, and discuss the findings and their significance for their plots.

The rigour of a scratch mark on a wooden stick compared with written percentages on a piece of paper, might well be debated. However, if the paper-based method had been imposed, the reliability of the information would probably have been low because of the reluctance of the farmers to use this approach. In this case, participation probably ensured a more realistic version of 'rigorous' data collection.

In the same workshop, discussion moved on to the viability of comparative studies in participatory monitoring which everyone agreed would allow for more reliable analysis of impacts. The academics and some of the NGO staff wanted to compare the milk production of cows with and without a locally produced mineral salt in their feed. The difficulty was that all farmers who feed the salt to their cows are convinced of its merits. For a comparative study, farmers who were not involved nor interested in the mineral salt would have to be included. The farmers at the workshop, who would be doing the data collection, collation and analysis, were reluctant to include such farmers. They said it would be too difficult socially to discuss the non-use of salt with their neighbours. Without the comparison, the indicator 'milk production' was no longer felt to be useful and another indicator and method were selected. Once again, while not enhancing the rigour, participation ensured the implementation of a realistic monitoring approach.

Source: Guijt et al (1997b)

The perceived 'trustworthiness' of information is intimately related to the source of the information. For example, in connection with the example discussed in Box 10, the farmers and NGO staff alike felt that other farmers would not be motivated to take up contour planting on the basis of evidence such as the 'increased percentage of soil moisture'. Yet if confronted by statements such as '18 of the 24 farmers noted a significant increase in soil moisture in critical periods' this would be more than enough to galvanise them into action. Hearing testimony from peers, be they farmers or scientists, is perhaps the most important factor in accepting data as 'trustworthy'. In a participatory process, this calls for more negotiation about what each stakeholder group considers 'rigour' to be. It also requires greater acceptance of different information sources and the use of alternative methods for assessing reliability, other than through scientific measurement.

A related issue is a possible paradox in participatory monitoring. Monitoring often assesses the impact of activities and thus requires several moments of data collection over a reasonable time period to be able to assess trends. The activities to be monitored will have certain defined objectives which are used as a basis for defining the best indicator(s). Suppose then, that the first monitoring results reveal that the objectives have been achieved or that the assumptions are incorrect so irrelevant indicators were selected. (This happened in Brazil so is not as outlandish as it may seem.) This means that new objectives and indicators must be selected, and it thus becomes impossible to develop a time series of data.

For example, in Paraiba, one of the partnership activities is training farmers in contour planting as part of the overall aim to regenerate the soils. They had therefore chosen to monitor as one of their indicators, the number of farmers planting along the contours or 'atravessado' (a less exact version of contour planting). At the end of the first monitoring period, the data surprisingly revealed that almost all farmers were planting 'atravessado'. They knew that this was not due to their own efforts and suddenly doubted whether they were justified in focusing so much on basic training. The need to count farmers planting along contours was no longer as relevant as they initially thought. The trade union and NGO are now seeking additional information about what farmers mean by 'atravessado' (see Box 22), to see if they need to focus on other soil regeneration activities, objectives and indicators, or whether they simply need to reframe the question.

One way to avoid this problems is to assess indicators related to long-term objectives, yet what if these are not prioritised by the partners involved? Also, who is to say that community interest and funding will sustain monitoring over the time period required (Irons and Walker 1996)? And thirdly, the more long term the monitoring, the more

difficult it is to establish cause-effect relationships as other factors will also influence what you are monitoring. What do you do - impose your objectives and indicators to ensure you will have the required time series to make a sound judgement based on rigorous data? How can a participatory process deal with the ever-changing nature of objectives and the need for long term data, to ensure rigorous information?

In practice, the balance between scientific rigour and community participation will depend greatly on the objectives of the monitoring process. If monitoring is less about proof and more about improving learning and planning, then participation of stakeholders should be the priority. If local proof of impact is needed, then use can be made of local indicators of change and local norms for 'trustworthiness'. Yet if proof is needed for scientific and/or policy audiences, then more 'scientific' approaches must be used to demonstrate changes in ways that are compatible to these groups. This might mean that the external agency will have to conduct parallel monitoring exercises, in non-participatory ways, alongside exercises that have greater local significance.

4. Different Approaches to Participatory Monitoring

The strenuous debate about the search for approaches to monitoring also represents an aspect of the 'rigour *versus* participation' debate. Murphy (1993) suggests that the key to success is to choose a combination of methods appropriate to the task, within the given constraints of time and human and financial resources. The aim should be to provide information that is 'good enough and soon enough'. Good enough for the type of decisions which will be made on that basis and not more precise or detailed than necessary and soon enough for the analysed results to be presented before decisions have to be made. Several papers endorse the 'optimal ignorance' approach (Chambers 1994, ILEIA Newsletter December 1996) which is adopted from Participatory Rural Appraisal and requires the collecting of appropriate amounts of useful information for the task at hand. However, the central question remains one of who decides what is 'good enough' or 'optimal', and what are their norms? This has many implications for funding agencies who not only demand certain types of information but also are pushing for it to be collected through 'participatory' monitoring process.

Participatory monitoring is a growing topic and numerous approaches have been developed. As this paper is concerned with community monitoring of environmental change, we have selected three different types of participatory monitoring that seem to be relatively more successful than others that focus on monitoring project interventions. Many interesting examples are based on applying the methods associated with Participatory Rural Appraisal (PRA) to the monitoring programme. Other indigenous approaches to monitoring are recorded in the anthropological literature and are discovered through in-depth interviews with community members who have been resident for sufficient time to detect both environmental and social change. A third group of approaches are based on adapting ecological assessments to make them more accessible for use by local people. These three different approaches to participatory monitoring have different origins and have evolved for different reasons.

Over the last decade, the visualisation tools of Participatory Rural Appraisal (PRA) have been used extensively to facilitate a joint analysis of local socio-political, ecological and economic conditions that affect patterns of resource use. While this may produce short term participation, it has, in many cases, not led to positive and sustained change 'where people develop their capacity to think about their own priorities for development, take decisions affecting them and develop a long term perspective for change' (Shah 1993). This requires greater emphasis on the role of local people in planning development activities rather than just being involved in assessing their situation. To this end, PRA has been developed for use in monitoring to increase the decision-making capacity of local people and sustain their participation over a longer time period.

In parallel with the debate on participation, there has been a growing awareness of people's technical knowledge about the environment in which they live. Often referred to as Indigenous Technical Knowledge, this information can be used to make development activities more appropriate to the needs of people as well as development agencies accountable to the supposed beneficiaries of their activities. By 'listening to the people', relief and development work can be made more effective. Oral testimony has been used in monitoring to discover local perspectives on development interventions and document a project history or sequence of local events. Such an approach to monitoring values the information provided by those people whose livelihoods depend most on the local environment.

A third source of innovation has been the desire to include local people in ecological monitoring which has led to the adaptation of methods of ecological assessment. Conventional approaches with sophisticated sampling frames and statistical analyses have tended to exclude the role that local could play in ecological assessment, other than as 'data gatherers'. To make ecological methods more accessible to local people, much of the scientific rigour is replaced by the intricate local knowledge of plants, animals and their habitats and behaviours. While the statistical validity of the findings is reduced, defenders of this approach highlight the spin-off benefits for conservation by enabling people to monitor plant and animals and detect changes in their populations.

Discussing these approaches to participatory monitoring separately, as we do here, does not mean that they are

mutually exclusive. Increasingly, communities and scientists are realising the need for methodological complementarity (see *PLA Notes* 27, 1997) and many of the case studies use a range of methodologies. Often, creative combinations of methods are used to try and fulfil the multiple objectives of a monitoring programme: ensuring the participation of local people and providing the right kinds of information for policy makers and decision makers.

Table 1 shows the ten case studies that are included in this review. Approaches are included only if they have a natural resources focus, have been field tested (although some methods have only been piloted), and are described clearly. Each of the case studies is presented in a consistent way in Annex 2, such that comparisons between different approaches can be made. For each case study, information of the methods used, the monitoring process and the indicators developed is provided.

Table 3. Case studies in participatory monitoring

MONITORING APPROACH	CASE STUDIES
PRA-based	• Participatory monitoring of sustainable agriculture in Brazil. • Participatory monitoring of village level soil and water conservation programmes, India. • Towards more sustainable soil fertility management, southern Mali. • Participatory pest analysis in South East Asia. • Farmer participatory procedures for managing and monitoring sustainable farming systems in the Philippines.
Oral testimony	• Oral evidence in historical environmental impact assessment: soil conservation in Lesotho in the 1930s and 1940s. • Talking back: the role of oral testimony in participatory development, the Sahel.
Ecological approaches	• Community inventory of natural resources in East Kalimantan. • Engaging local hunters in wildlife surveys, Zambia. • Participatory methods for quota setting in CAMPFIRE areas, Zimbabwe.

4.1 PRA-based participatory monitoring

Many participatory monitoring methodologies use Participatory Rural Appraisal (PRA) techniques to explore changes in the local environment. This review includes five such case studies (see Case Studies 1 -5, Annex 2). These have a primarily agricultural focus (despite a wider review) and are all project-led approaches to monitoring.

PRA has been used extensively in enabling community members and outsiders to assess local conditions. Through PRA, the community can present an inventory of its resources and patterns of resource-use, together with problems and constraints. Techniques, such as mapping of natural resources and matrix ranking of preferred species are often used. Transect walks with older informants and key informant interviews with the traditional leadership provide an historical and land-use (and control) perspective.

This detailed analysis of the local situation prior to undertaking any planned activities provides a baseline dataset. Essentially, monitoring builds on an initial participatory appraisal by repeating similar exercises sequentially through time. This process enables changes to be documented. An advantage of the visualisation techniques associated with PRA is that the diagrams and maps help farmers to understand the impact of the monitoring process for them (Shah 1993). Kaul Shah (1995) notes that as the community carries out the appraisal itself, the language and media most familiar and appropriate to them are used. Thus, the results of the appraisal can be stored and retained by community and used by them when required. This is an essential part of the participatory monitoring process.

As ‘the community’ is not a homogeneous unit, PRA should be undertaken with a range of different groups, according to wealth or cultural status, gender, age etc. to examine the diversity of perspectives in the monitoring process (Kaul Shah 1995). A potential problem is the aggregation of perspectives where the analysis is undertaken at level of the community, village sub-group or household. Often, the discussions on how consensus was or wasn’t reached within these groups of individuals (on, for example, the defining of monitoring priorities or the development

of indicators), are lacking. It is difficult to know if the process of negotiation itself or the documentation of the (often illuminating) negotiation process, was excluded.

Few of these case studies address social differentiation explicitly. The exception, Case Study 3 from Mali, found only minor differences in the indicators developed by men and women. A challenge for these approaches may be to develop the social discussion around the use of PRA and explore in more depth the different perspectives and priorities of men and women, the rich and poor, and the old and young. Without this differentiation and triangulation of perspective, some of these approaches perhaps provide only a superficial understanding of local conditions.

Dealing with diversity in diagramming

Many of the case studies suggest that mapping is an important method for documenting the process of change. However, experiences the Philippines (Prain and Piniero in Campilan 1997) suggest that while a useful tool, there may be problems associated with interpreting the maps that are produced (Box 17). While more of an evaluation, than a monitoring, exercise, the project found that the analysis of the maps was complicated by inconsistencies in map style and format. The key features of PRA, such as diversity, innovation and 'handing over the stick', can hamper the comparison of a time series of diagrams. The Philippine experience suggests that sufficient time is needed to facilitate a collective analysis of a time sequence of maps and to understand overall trends. This may help to overcome some of the 'problems' in comparing individual maps.

Box 17.

Reflections on the use of participatory mapping

Participatory mapping was used to assess the impact of home gardening on biodiversity. At the beginning of the project, co-operating home gardeners drew maps, indicating features such as size, location and crops grown. After two years of participatory trials of crop species, a second workshop was held to evaluate changes in home garden biodiversity. Again, maps were drawn by the participants and these were compared with the original maps. On the whole, mapping proved a useful tool and helped home gardeners analyse changes arising from their involvement with the project. However, there were two limitations to its use. First, it was not possible to compare accurately and analyse the two maps since these were drawn independently and therefore differed substantially in terms of scale, perspective, boundaries and symbols. Secondly, time was a constraint, the mapping workshop had limited opportunity for collective analysis of the outputs of the exercise.

Source: Campilan (1997)

In Brazil (Guijt et al 1996), this problem will be overcome by using what is being called the 'base map', which shows basic infrastructure. An exact copy of the base map will be used each year. Any changes in the basic infrastructure will be marked on the map in addition to the information related to the indicator being monitored. By comparing the two maps, analysis of the changes can occur. In another context, the same map is used with colour coding of the indicators for each new year or moment of measurement (Meera Kaul Shah, pers. com., 1997).

4.2 Oral Testimony

Many development agencies produce monitoring and evaluation reports as written documents. The inclusion of oral testimony can introduce a wider dimension and shift the balance towards a more qualitative assessment. A broad 'unofficial' history of project activities sought from project staff, target population and other affected individuals can help to build a picture of the project process. Case studies 6 and 7 are project-led examples of how oral testimony can be used to uncover individual ways of noting and recording change. Case Study 6 provides an example of this from Lesotho, where historical narratives on soil conservation practices were uncovered through interviews with elderly Lesotho residents. Case Study 7 provides more general information about environmental changes as noted by pastoralist, farmers and refugees, who depend on the environment to sustain their livelihoods.

In their book 'Listening for a Change', Slim and Thompson (1993) outline the many forms through which people express their experiences and transmit interpretations of life. These include: songs, legends, stories, plays,

traditional accounts or family histories passed down through the generations, personal life histories, recollections and memories. Such oral testimonies can focus entirely on the past or they can provide evidence about more recent events and articulate future plans and aspirations. Oral testimony can be collected individually or in groups. It provides an opportunity for the often 'silenced majority' to speak out about their concerns and priorities in a way that is comfortable to their main form of communication.

Oral testimony is often regarded as anecdotal and not very reliable because it is subject to the vagaries of people's memories and changes over time. Lindblade (1997) cautions that a discriminating attitude must be displayed towards oral information gathered from communities. She suggests that 'as recognition of the magnitude and complexity of local knowledge has grown, there has been a tendency to accept it at face value'. From her work in Uganda, she suggests that local perceptions may have been shaped by external forces, such as government campaigns or the agendas of development agencies. Without the triangulation of information, 'received wisdom' can be perpetuated because it is difficult to gain an in-depth of understanding of the internal and external processes that have shaped local conditions.

However, Showers and Malahleha (1992) contest the unreliability of oral environmental evidence as they argue that it is based on ecological knowledge and detailed observations from residents of a particular location. As early as 1962, Levi-Strauss cited numerous examples of indigenous inventories, classifications and taxonomies of the natural world. In Box 18, Gündel (1996) describes the Mayan classification of forest types. This information is passed on orally between generations and is grounded in its practical application to the local context. It shows how the language construction and classification is based on an intimate knowledge of the environment and can be used to detect environmental change.

Retrospective analysis, using oral histories, is particularly useful in exploring environmental change (see Box 19). Given the large number of project implemented in Africa before formal monitoring and evaluation existed, Showers and Malahleha (1992) suggest techniques of historical environmental impact assessment would help contemporary planners who must begin with the legacy of the past and move forward (cf. Fairhead and Leach 1995). Although many people are aware of the importance of environmental monitoring for understanding change in the landscape, there is no standard methodology for evaluating historical interventions in the landscape. Their concept of an 'historical environmental impact assessment' (see Case Study 6) arose out of a concern that most technicians operate in an ahistorical and largely non-social context and that social scientists are generally unaware of the significance of technical information.

Box 18.

Environmental Classification and Change

Peasant farmers in the Yucatán, Mexico make their comparison of changes over time. Changes in crop performance are observed between cropping seasons (temporal) rather than spatial. Farmers point to the differences between the present situation and the time when their fathers and grandfathers prepared the *milpa* (slash-and-burn system). In the Mayan language, the different forest types are classified according to their age and the composition of species. A main distinction is made between the *Chee'che káax*, which describes a forest with a dense tree population, and the *Pi'ice káax*, which means literally 'if you look into the forest, you can see far'. As high forest stands are becoming very rare in the region, the Mayan name for them, *Kanaan káax*, is losing its importance in the active vocabulary of younger generations. The typical vegetation type to be found is the *Hub'che*, which refers to a vegetation of two to three years regrowth. There are three different stages of low vegetation - *Hub'che*, *Kaba Hub'che* (3-4 years regrowth), and *Kana Hub'che* (4 - 6 years regrowth). The following stage is called *Yaax káax* (*káax* meaning forest). On the other hand, new categories are being created as new vegetation types or new ways of using them emerge. For instance, abandoned sisal plantations with forest regrowth are being converted into milpa plots as the access to available forest areas becomes restricted. A new category *Xla'pach*, has therefore been added to the traditional classification system.

Source: Sabine Gündel (1996)

Box 19.

Listening for a change

In 1986, at a conference on drought and desertification, two satellite images of Africa taken a year apart and costing tens of thousands of dollars showed either the 'advancing' Sahara or 'retreating' vegetation in lurid colour. A few weeks earlier, at Taragma village, Sudan an elderly villager was entertaining a small group of villagers from the UK development agency SOS Sahel. Stepping outside his front door he pointed towards nothing - just a wide expanse of desert occasionally relieved by the odd, unpalatable shrub. Here, he said, just 40 years ago the trees and shrubs were so numerous that it was difficult to ride a donkey to market without getting scratched.

Satellite imagery and oral testimony both have a part to play in shaping our understanding of environmental change. The people on the ground, several miles below the camera, know exactly what has happened in their locality; they may be amused or interested by the broader picture, but they can't see that it tells them anything they don't already know. They have been taking mental snapshots all their lives.

Source: Slim and Thompson (1993)

Oral testimony allows for socially differentiated monitoring of changes, as individuals recount their personal histories. Megan Vaughan used oral testimony to delve back over 30 years and piece together the history of famine in Malawi and the role of gender in shaping the disaster (see Box 20). In addition to interviewing people, she collected the local songs, prayers, and the taboos that accompanied them. Of particular interest were the 'pounding songs' that women sing when pounding maize. These showed the extreme vulnerability of women and 'locate the famine within a larger historical process of change in the economic and social status of women'. These songs are still in use and demonstrate the diverse ways in which events and change are recorded in cultures that are, or were, primarily oral.

Box 20.

The story of an African famine:

gender and famine in twentieth century Malawi

'Famines gather history around them. In the Blantyre District of Southern Malawi many people remember the famine which occurred in 1949-50, and many more have been told about it. There are stories and songs and recollections of the famine: accounts of foraging and migration; of 'famine disease' and death; of both the cohesion and the disintegration of communities and families; of selflessness and the extremes of individualism. Survivors of the famine can give close accounts of the events of that year. They begin with the abnormal weather conditions - what the clouds looked like and what this meant; how high the crops grew before they died, and which crops survived; the names of the children who starved and the husbands who left; the wild foods eaten and their methods of preparation; the minute details of the famine relief system - the coarseness and the colour of the grain distributed, the size of the tins which acted as measures, the behaviour of the queuing people who waited to receive it. Older people can tell stories of famines that went before - the 1922 famine and famine of 1903 which drove people into the area from Mozambique. They say nothing comparable to 1949 has happened since. People calculate their ages be reference to it, and women consciously keep the communal memory of the event alive when they sing the pounding songs they composed then'.

Source: Vaughan (1987).

Oral testimony may be used in combination with the visualisation techniques of PRA and ecological assessments. This will be particularly important for triangulation of the findings, as Lindblade suggests. Slim and Thompson (1993) suggest that the 'PRA experience has shown that people's ability to express themselves verbally can be heightened if they can simultaneously present things visually' particularly if the interview process is unfamiliar to the

interviewee.

4.3 Ecological Methods

There are few approaches to assessing and monitoring plant and animal populations that are reliable and easy to understand and implement. Ecologists continue to debate the most appropriate sampling methods, particularly for assessing animal populations. Marks (1994) notes that a basic question in animal ecology remains: how to obtain estimates consistently for population numbers of wild mammals in an area so that trends can be examined?

Many problems are associated with the standard wildlife census techniques, such as aerial and ground counts. Aerial surveys are capital intensive operations that record only the larger and more visible species, such as elephant, buffalo, rhinoceros and hippopotamus. The counts are difficult for anyone but technicians to interpret (but see below) and require sophisticated statistical analysis. They only record animal species in semi-open terrain and are not appropriate for more forested habitats.

Ground counts are an alternative method whereby animals or animal spore are recorded. But because of biases, due to factors such as the visibility of different species and comparability between different habitats, ground census data require quite sophisticated sampling strategies and analysis. Any sampling method requires extrapolation for estimates of density to be made and this introduces margins of error.

Despite the challenges associated with estimating plant and animal populations, several authors have tried to include local people in ecological assessments using standard techniques. Fabricius (1997) describes how traditional healers participated in transect-based plant surveys in South Africa. In a similar vein, Steinmetz and Mather (1996) describe how Karen villagers helped to survey the fauna of Thung Yai Naresuan Wildlife Sanctuary in Thailand. Steinmetz and Mather suggest that through their local environmental knowledge, individuals can become involved in the data collection process and in the interpretation of results. However, because of the complexity of conventional ecological assessment, in both these cases local people are excluded from the research design (the sampling strategy being pre-designed by statistical demands) and data analysis (which is often technically sophisticated). Steinmetz and Mather believe their approach could be the starting point for community based ecological monitoring, but note that ‘outside wildlife researchers would still be necessary for a few years to launch a monitoring program’.

Given the limitations of scientific methods and the difficulty in explaining them to local people, Case studies 8, 9 and 10 use novel approaches to make ecological assessments more accessible to local people. While more of an assessment of ecological resources than a monitoring programme, Case Study 8 describes how local people in Kalimantan assessed the value of tree resources by counting all of the tree resources in each of their field plots. While a laborious method, it ensured that each participant could understand all stages in the research process.

Marks (1994, 1996) has experimented by working with local hunters in the Luangwa Valley to record the animals they encounter (see Case Study 9). The method assumes that local hunters seek to maximise their contacts with wildlife during each foray. Rather than sample along pre-determined transect lines, numbers of animals observed as a function of time spent in the field is used as an indicator of local wildlife abundance. This method reduces problems of sampling strategy and requires little in the way of capital investment - a watch, a notebook and pencil.

Marks suggests that the method increases the capacity of local hunters to collect data and analyse change. Additionally, it increases their awareness of wildlife management and protection. The method is also cost-effective when compared with standard census techniques. The employment of local hunters legitimises their status, encourages accountability and the monitoring of local resources upon which their livelihoods depend. Marks notes that developing this participatory approach to monitoring would requires a shift in organisational culture by wildlife agencies to devolve responsibility to local communities. He recognises that changing direction and implementing new methods will not be an easy process, as the new methods will test the commitment of wildlife management agencies to local level management.

While the method developed by Marks in the Luangwa valley enables local hunters to participate in data collection, the analysis is undertaken by outsiders. Case Study 10 builds on these methods and shows how multiple stakeholders, including communities, can be involved in the analysis of data for setting the quotas for commercial wildlife offtake in Zimbabwe. In this approach, the stakeholders in wildlife attend a workshop where each group of stakeholders provide a different source of data. Adapting Marks’ approach, local communities complete ground transects using number of animal encounters per unit time. This is a cheap and quick way of assessing wildlife numbers which can be understood by all the participants within the communities. Although more technical information, such as aerial counts, is provided at the workshop by wildlife agencies, interactive games are used to ‘demystify’ and explain the data to all participants.

Whatever methods are chosen, Box 21 suggests that wildlife monitoring should not be used to try and show a

cause-effect relationship between an intervention and a response. As outlined earlier in this paper, cyclical changes and disequilibria in the environment, and particularly in wildlife populations, are poorly understood by scientists (see also Box 7). This can complicate an analysis of the impact of wildlife management and impede an assessment of whether quotas or community-based management or both correspond with increased wildlife populations.

Box 21.

Monitoring wildlife management: proof or propaganda?

What kinds of data are needed? Quantitative data remain the easiest to interpret and compare across communities. For CAMPFIRE, this could include simple assessments of expenditure, income and the percentage of income returned to communities. This makes the Ward Wildlife Committees accountable to the people to whom they serve. Much of this is being done in an informal ways, through the 'exercise books' being maintained (to different standards) in different communities. However, other quantitative approaches, e.g. ground counts, have poor performance because they can be difficult to implement in the thick Zambezi bush that covers many CAMPFIRE areas. This requires alternative, perhaps more informal or *ad hoc*, approaches to sampling wildlife populations, such as those based on animal counts per unit time (see Case Studies 9 an 10). However, inherent in wildlife sampling is a need for an improved understanding of the cyclical nature of wildlife populations and disequilibria in natural systems. The linear association between cause (e.g. CAMPFIRE) and effect (e.g. increased wildlife populations) may be difficult to prove, and may be the wrong starting point.

Source: based on discussions with Prof. Marshall Murphree, Centre for Applied Social Sciences, University of Zimbabwe.

5. Framework for choosing a participatory approach to monitoring

It is difficult to compare the ten different approaches to participatory monitoring that have been described above. Some of the approaches have only been piloted, some are in progress and rarely include discussions about the impacts of the approaches. Thus, the framework in Table 4 is a subjective assessment of the methodologies used in each approach. The criteria used to compare the monitoring approaches are adapted from those derived for monitoring sustainable agriculture in Brazil (see Box 22).

Table 4 separates the different components of the monitoring methodology into design, data collection, compilation, analysis and dissemination. The table indicates that few of the methodologies have been designed by, or with, local people. While all the methodologies are highly participatory in data collection, few of them enable local people to participate in the very early or later stages of the monitoring process. Table 4 suggests that there are costs to selecting approaches that sustain local participation from data collection to dissemination: these approaches take longer and are more difficult to implement. However, on a more positive note, Table 4 suggests that the information derived from the more participatory approaches is of greater use in the monitoring process than those approaches where the role of local people is merely in data collection.

Box 22.

Monitoring the monitoring process in Brazil

In February 1997, a third workshop was held in Paraiba, Northeast Brazil as part of a process of designing participatory monitoring. One important objective was to assess the quality of the monitoring work carried out so far. To evaluate the experiences with the indicators identified in July 1996, four criteria were used to assess the methods used and two to assess the indicator. These criteria were selected prior to the workshop by a small organising committee consisting of two NGO staff members, one Rural Worker's Trade Union representative, and the (foreign) workshop facilitator.

Method-related criteria:

- the level of participation of farmers in the collection, collation, analysis and devolution of the data;
- time demand (for collection, collation, analysis and devolution of the data);
- the degree of difficulty of applying the method (mainly related to collection and analysis);
- the potential to extend the application of the method besides the current monitors.

Indicator-related criteria:

- reliability of the information;
- relevance of the final information (for different audiences: farmers, union, NGOs, donors, public agencies).

Initial discussions were lengthy as no systematic assessment had been undertaken immediately after the use of a new method for a different indicator. That is already one issue that will be changed - immediate assessments after each new application. This will ensure a more ongoing learning process.

This process enabled the refinement of the chosen methods, a rich exchange of tips about dealing with application problems, and clarification of the need to think through the end use of the information in more detail. For example, one particular set of indicators related to contour planting was doubted. We identified several reasons for this that will help improve the next application of the methods:

- different definitions between farmers of the word `atravessado' (an approximate form of contour planting) which will have to be defined exactly before asking the question of how much area is planted in this way;
- the degree of precision of the indicators (exact area and yield from fields) does not match the degree of precision of the farmers' knowledge, as they do not need this for their everyday lives;
- ambiguous questions about `where they learnt about `atravessado', which could mean from whom they first learnt it as a child or who reactivated their interest in using it.

The discussion about reliability of information was particularly interesting as the different value systems were revealed between the university trained NGO staff and the trade union representatives, many of whom have farming backgrounds.

Source: Guijt (1997a)

Table 4. Comparing the methodologies of different to approaches participatory monitoring

Approach	**Case Study**									
	1	2	3	4	5	6	7	8	9	10
	Brazil	India	Mali	SE Asia	Philippines	Lesotho	Sahel	Kalimantan	Zambia	Zimbabwe
Method-based criteria Degree of participation by local people in the design of the monitoring process	H	L	L	L	L	L	L	H	L	L
Degree of participation by local people in data collection	H	H	H	H	H	H	H	H	H	H
Degree of participation by	H/M	M	H	H	M	L	L	H	L	H

local people in data compilation										
Degree of participation by local people in data analysis	H	M	H	H	M	L	L	H	L	H
Degree of participation by local people in data dissemination	H	M	H	H	L	L	L	H	L	H
Ease of application	2	1	2	3	3	2	2	2	2	3
Time involved	M/H	L	M	M/H	M/H	M	M	H	H	H
Extent of replicability	M	H	M	H	L/M	M	M	M	H	M
Content-based criteria Reliability of findings	M/H	M/H	M/H	H	M	M/H	M/H	M/H	M	M/H
Useful	M/H	M/H	M/H	H	L/M	L/M	L/M	M/H	M/H	H

Key:

Case Study 1 Sustainable agriculture in Brazil, *2* Village level soil and water conservation programmes, India.

3 Sustainable soil fertility management, southern Mali, *4* Participatory pest analysis in South East Asia.

5 Sustainable farming systems in the Philippines, *6* Oral evidence in historical environmental impact assessment, Lesotho

7 Oral testimony in participatory development, the Sahel., *8* Community inventory of natural resources in East Kalimantan

9 Engaging local hunters in wildlife surveys, Zambia, *10* Participatory methods for quota setting in CAMPFIRE areas, Zimbabwe

- H High M Medium L Low
- 1 Easy to apply 2 Requires training 3. More difficult to apply

6. Key findings and Gaps in Knowledge

Participatory monitoring is a growth topic. Much is written about the potential benefits of involving multiple stakeholders in the monitoring process, but documented experiences of participatory monitoring are relatively few. Even rarer are experiences that document the impacts of a participatory monitoring process. This makes it difficult for us to assess ‘best practice’ in participatory monitoring or advocate approaches that seem to be more successful than others. Our review identified several key issues, some of which need to be addressed through future research on participatory monitoring. These are grouped into six questions that are discussed below:

1. Does participatory monitoring deliver all that is promised of it?

Because of the many claims made by advocates of participatory monitoring, there is a real need to assess its impact, in terms of:

- Does participatory monitoring deliver on its promises, and if so, what for whom?

- Does participatory monitoring increase the sustainability, accountability and efficiency of activities, as is often claimed?
- What have been the impacts of participatory monitoring for local people?

2. What trade-offs are involved?

Participatory monitoring requires trade-offs, yet few articles address this issue directly. In this paper we have discussed one of the most basic trade-offs, that between attaining 'scientific rigour' and 'local participation'. The balance between rigour and participation depends on the objectives of the participatory learning exercise, on whether it is predominantly a learning exercise or a way of gaining evidence. Another compromise is the need to gain comprehensive information while recognising the reality of limited resources. Information that is 'good enough' must be provided 'soon enough'.

Another central trade off is between the need for standardisation while recognising the value of site-specific indicators and standards. This is a particular issue where data aggregation at higher levels is being pursued through collating, comparing or contrasting community monitored data. As Irons and Walker (1996) explain:

> `*The difficulties of matching data collected over various physical areas is compounded by the variation of scale for which each data set is appropriate. Data concerning a paddock, for example, becomes inconsequential at the sub-regional level. ... To select one scale and assume that it can be treated as a static bounded entity.. has tended to be the usual approach... One result has been a decline in the complexity and diversity of the ecosystems on which agriculture depends."*

In the CEM survey in Australia, there were very different opinions but most were in favour of standardisation, as long as this happened through a supportive, consultative process and sufficient time and resources would be available (Alexandra et al 1996).

In contexts with less high-technology and less information exchange the challenge will be even greater than in Australia, and perhaps not the most important or pressing objective of participatory monitoring. It should be stressed that the less immediately-relevant the information, the more likely that those collecting the data will lose interest over time. Requiring farmers to collect information that is not directly relevant to them may require a more commercial approach to participatory monitoring (see below).

3. How can we deal with baselines, and the general lack thereof?

Many donors demand that baseline data is used against which to measure the impact of one or the other intervention. Likewise, to assess the full extent of environmental degradation or regeneration, many scientists urge for the collection of reference data. However, identifying the point in time and/or the condition against which the current situation should be compared is a recurrent problem the world over. Trying to establish a realistic starting point often proves fruitless if basing it on existing data, or prohibitively expensive if commissioning a baseline survey. Irons and Walker say that there is little that can be done about it:

> `*the alternative is to adopt monitoring procedures which side-step the need for a baseline, meanwhile indicating the direction of change - improvement or decline - against either the previous measurement or a desired condition'*.

In Brazil, the NGOs are using the first year of monitoring data as their 'baseline', plus some supplementary data they can collect through the little that has been documented about basic biophysical and socio-economic conditions. They simply cannot afford more, yet are worried that the funding agencies will find this unacceptable.

This has clear implications for funding agencies and the scientific community alike. It requires the development of approaches that are not dependent on the use of baseline data, or the provision of sufficient funding and time to enable this to take place.

4. How are monitoring data used, what are the feedback loops?

It cannot be stressed enough how important it is to know exactly who the end user of the information will be and how the information is to reach them. This determines the entire framework for the methodology: the indicators, the methods, the timing, the reporting and analysis style, the costs, etc. This has been particularly clear in the Brazil

work discussed in this paper (see Box 10). In the first stage of identifying indicators, the most sophisticated suggestions are made by farmers and academics alike. When the reality of who is going to use the information sinks in, indicators are thrown out *en masse*, in favour of others that are more finely tuned to the anticipated end-users (Guijt et al, 1997b).

Yet few participatory monitoring approaches invest sufficient time in the planning stages on this aspect. Too much energy is spent refining monitoring methods and sophisticated techniques, without thinking about the translation of the data into practical application. One example comes from the USA (Bosch et al, 1996):

> *"The Nevada Rangeland Monitoring Handbook (1984) amply describes monitoring methods and techniques, as well as providing definitions of terms used in range condition assessment. Unfortunately, little or no space is devoted to explaining what to do with the data, or how to interpret it once it has been collected. The result is that very little monitoring is today carried out in the rangelands of this area."*

A central challenge and objective for future research is the application and integration of information from participatory monitoring into a participatory development process. Without sufficient feedback from monitoring into development processes, the monitoring process becomes an end in itself, rather than a means to sustaining the participation of stakeholders and improving the development process.

5. What are the roles of different of stakeholders?

Development of participatory monitoring requires a clear understanding of the different roles of different stakeholders. The Brazilian experiences highlight the difficulties of trying to ensure that the needs of different stakeholders are balanced in the monitoring process. It easy for those groups who are familiar with monitoring, such as scientists and donors, to dominate the selection of indicators and methods, without appreciating the needs of local people and the practicalities of implementing the monitoring. Furthermore, few experiences have dissected the needs of 'local people' and addressed the social differentiation of monitoring. The community or village sub-group is often the 'local stakeholder' with little consideration of the different roles of people within the community. Clearly, priorities and indicators will vary enormously depending on how one depends on the natural resource in question. Further research should address this local diversity and explore the complexity of negotiation between stakeholders in the development of a participatory monitoring process.

6. Who bears the costs of Participatory Monitoring ? (And how much are they?)

Ensuring and facilitating the participation of a diverse group of stakeholders is a much more demanding process than designing a monitoring questionnaire in an office, and is time-consuming and expensive (see Box 23). Campilan (1997) highlights that participatory monitoring 'can be costly not only for an organisation or a project, but also for local people themselves'. It their resources that underpin the implementation of a participatory monitoring process and there need to be clear incentives for them to ensure their long-term participation. Although 'often considered taboo in participatory research and development projects', Campilan notes that financial incentives have been used to compensate farmers for the time they invest in several South Asian agricultural development projects. Although contentious, some 'consider it highly justified considering the opportunity coasts involved in taking away a significant amount of time which farmers could otherwise have spent for income-earning activities'.

Box 23.

Acknowledging The Cost of Participatory Monitoring

The first year of developing a participatory monitoring methodology in Brazil has cost one of the NGOs involved about US$10,000. This is mainly comprised of day rates for NGO and trade union staff to attend the many meetings required. This amount does not include expenses occurred in developing the proposal and securing funding, the costs of IIED (which is facilitating the process), the voluntary days that farmers spend at the meetings, the support of local CBOs in facilitating some of the planning meetings, most of the transportation costs to travel to/from meetings, and some of the day rates for the time spent monitoring that which has already been decided by the NGO. The actual application costs will

be low, due to the limited technical nature of chosen indicators but the final costs of implementing the monitoring will be much more than was originally anticipated.

This issue of expense is particularly pertinent for funding agencies who often demand the most complex data on impact, without allocating extra funding for designing or implementing this process. One environmental NGO in Australia, implementing a multi-million dollar community-based revegetation programme, often commented that it would cost as much to count how many trees had been planted through its efforts as it would to plant them! This is directly related to the participatory nature of their work. A community-based facilitator encourages community groups to revegetate but has no direct way of knowing what they have actually implemented. The time it would take to chase up each individual who had been influenced by the facilitator would be inordinately expensive relative to the value of the information that was produced. It is an ongoing concern for many organisations how to monitor effectively without spending a disproportionate amount of the overall budget on it. A recent condition of funding for this programme is that 2 and 5 % of the total budget must be spent on monitoring for accountability. But is this enough? And is it money wisely spent if the information has no local relevance?

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0. trends in natural systems can only be determined by consistent long-term monitoring but community groups rarely have access to sufficient resources to enable this;
1. the time spent by participants' needs must be valued carefully, as despite much current interest, 'there is no reason to believe that it is sufficient to motivate consistent, long-term monitoring services in the community without proper remuneration'.

Future research should address:

- What is the real interest of all the stakeholders (from farmers to donors) in developing a participatory monitoring process?
- In what ways can the interests of different stakeholders be maintained?

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Annex 1. KEY STEPS IN INDICATOR-BASED PARTICIPATORY MONITORING

In planning a system of participatory monitoring based on indicators, a number of essential steps need to be taken. The steps do not, however, necessarily follow each other in strict sequence. The formulation of objectives and the identification of the indicators will be an iterative process. The objectives form the basis for the selection of indicators, and the indicators help in formulating objectives more clearly.

The final choice of indicators will also depend on what is possible to achieve with the available methods. You may wish to use indicators for which you cannot find a reliable or feasible method of measurement. For example, whilst your preferred choice of indicator may be nitrogen content of the soil, measuring this might be too expensive and time consuming for your organization. In these circumstances, an alternative indicator may need to be found, or the method of measuring nitrogen adapted to overcome the constraints of money and time.

1. *Make the decision to start a participatory monitoring process.* This is not a decision to be taken lightly. Many consequences arise from the choice of indicators, methods and analysis. A participatory process implies working with several different (groups of) people. The more people there are, the more complex and expensive the process and the longer it may take. Also, clarify what you hope to achieve from a participatory monitoring process that you would not achieve with an externally-driven and implemented approach.
2. *Identification of the possible participants*. With whom are you already working? Who has a perspective or knowledge which is essential? Invite them to become partners in the monitoring process, making it clear that all steps will be negotiated with everyone.
3. *Identify the objectives of the monitoring* (and not the objectives of the intervention!) from the perspective of each of the groups participating. Clarifying objectives and motivation for monitoring will help clarify to what extent each group is willing and able to participate in different tasks and will help to motivate participants in the systematic work required. The result of this stage will be to finalise who would like to be a 'partner' in the process.
4. *Identify the objectives of the work being monitored*. Monitoring usually measures the extent to which objectives of certain activities are being achieved (or general change is occurring).Normally, formulating objectives will happen as part of the planning of activities, and should be clear and available to everyone (usually in written form). In a participatory process however, the specific objectives are not always defined in a way which is clear for all concerned.
5. *Identification and selection of indicators*. This is likely to be one of the most difficult steps, because each objective will be able to be measured or assessed with many different indicators. The choice of indicators will depend on several factors, particularly the availability of data and the ease with which it can be recorded. One popular way to help clarify whether an indicator will work well is to see it if is `SMART': Specific, Measurable, Action-oriented, Realistic, Time-framed.
6. *Selection of methods*. This depends on the available time, skills, and resources. It may well be possible to find one method that can be used to assess several indicators at once.
7. *Formulation of monitoring calendar or programme.* To avoid confusion, it is essential to clarify the following:

    - who is going to collect and register which bit of information;
    - who is going to collate information;
    - who is going to analyse information;
    - who is going to devolve the final information to whom;
    - where is it going to be carried out (which community/field/forest, how many in sample size);
    - with which method; and
    - when (how often and which month/week/day).

8. Preparation of the methods. Test the methods and any tools used for measuring the indicators to ensure that they are both relevant and practical. Consideration should also be given to training those who will do the monitoring to enable them to be confident with their tasks.

9. Systematic implementation of the calendar. It is important to be systematic in the collection of data in order to understand what changes are occurring where and when. It is impossible to obtain an objective picture upon which to base an understanding of cause and effects without systematic monitoring with comparable data or information. For example, if it has been decided to monitor three sites over a period of two years once every two months, then sporadic monitoring of one or two sites for no more than six months will not provide a useful record for assessing if

objectives are being met. It may however, be necessary to adjust some method or indicator during the process if it becomes obvious that they are not going to provide relevant or accurate information.

11. Dealing with the data. After data is collected, it needs to be collated, analysed, and shared with the relevant people or groups. It is important to consider which methods will be used to analyse the data and who will carry out the analysis. As far as possible, those who participated in the data collection should take part in the analysis to avoid misinterpretation of the data and findings. Sometimes a method allows for all stages to happen at once, for example a participatory map to assess if there are more farmers adopting a certain planting technique this year as compared to last year. The group of farmers construct the map and identify which households have started using that technique this year, as compared to last year - this is the data collection. They add up how many these are - the data collation. They discuss why there are so few (or so many) and what can be done to increase/improve the work - the data analysis. As this group of farmers is the intended audience of the monitoring work, they have shared in the monitoring at the same time as conducting it.

12. Documentation of the analysis. The content and format depend upon the target audience(s). It is possible that the same data and findings may be presented to several groups but may need to be rewritten/redrawn to make it meaningful in each case.

13. Using the information. Finally, the data and analysis should be used by each relevant group in decision making processes, to solve problems, and/or for the planning of future activities. The findings of the monitoring may be used to change the activities of farmers, CBOs or NGOs, donors, researchers, and/or policy makers where appropriate, to improve the achievement of objectives or limit unanticipated negative impacts.

Annex 2. CASE STUDIES ON PARTICIPATORY MONITORING

includes approaches based on:

1. Participatory Rural Appraisal

2. Oral Testimony

3. Ecological methods

Approaches to Participatory Monitoring Based on PRA

Case Study 1.

Participatory Monitoring of Sustainable Agriculture,

Paraiba and Minas Gerais, Brazil

Unit of analysis: varies per indicator as some relate to individual activities and others to collective efforts. Paraiba: individual and community level; Minas Gerais: individual, community and municipal level. Both: group and individual discussions and exercises.

Sequence of Methods:

There is no fixed set of methods as each indicator has its own (combination of) methods. Also, the methods tend to be more complementary than sequential. Methods being used to date include: participatory maps of the community and the municipality to assess the spread of various innovations, models of individual properties to assess land management changes, individual questionnaires filled in

by members of the seed bank committees, impact flow diagrams, a range of visual forms (with scales to rank impacts of certain measures) for group-based assessments, critical incident analysis to assess institutional relationships.

Process:

The stages of developing a monitoring methodology together in both areas are:

- prioritising which of the different field activities of the partnership would be evaluated
- identifying objectives of each activity per stakeholder group
- merging the objectives of the stakeholder groups to create a common understanding of the partnership
- prioritising which objectives would be monitored (about 2 to 4 per activity)
- identifying the indicators for each prioritised objective (about 2 to 4 per objective)
- selecting a feasible, reliable method for collecting and registering the data, that could be managed by farmers and union representatives
- identifying when and how often measurements would take place
- identifying who would be involved in data collection, collation, and analysis
- clarifying with whom the final information would be shared and for what purpose (and refining indicators/methods to be more fine-tuned to the end-users)
- implementing the `monitoring calendar'
- interim assessment of the viability and value of the methods and indicators
- use of the information for farmer discussion, planning, donor accountability.

Most indicators are measured only once or twice a year.

Indicators:

In Paraiba, 24 indicators are being monitored to date, related to four key activities (contour planting, IPM for banana weevil, community seed banks, nitrogen-fixing forage experimentation).

In Minas Gerais, four key activities (of the 28 in one municipality) are being monitored, with work proceeding on developing indicators and methods for a fifth activity in bee-keeping:

- *Agroforestry*: percentage of soil covered, diversity of production, costs incurred, production.
- *Mineral Salt (for cattle):* number of meetings of each mineral salt group, number of participants at each meeting, number of farmers who make and use salt, number of farmers who have started using salt as a result of contact with the group, number of farmers who only use salt (and do not adopt another of the other livestock related improvements), state of hide of cattle eating salt.
- *Traditional Maize Varieties*: number of fields with traditional varieties and the varieties on them, the number and type of farmer (Besides those participating in the experimentation fields) who are planting traditional varieties, the number of farmers who are substituting the use of chemical inputs with alternative practices that have the same positive effect, annual production.`
- *Biodigital' (local herbal medicine treatment*): number of people who have seen herbalists and who return for follow-up, number of people seen per herbalist, number of diseases per person treated with `biodigital' per year.

Comments: Four stakeholder groups are involved: farmers (male and female); representatives of the Rural Worker's Trade Union (who are often also farmers); staff of a local NGO; academics from the Department of Soils of a nearby university (only in Minas Gerais). No one knew anything about systematic monitoring before the collaboration started. The collective skill building has been a valuable process, bringing the partners closer together in understanding why each is involved and expects to get out of the collaboration. A challenge that remains is how to extend the monitoring approach, without overburdening already heavy workloads, to all areas of the work.

Source: Guijt et al 1996a, 1996b, 1996c, 1997a, 1997b; Guijt and Sidersky, 1996

Case Study 2.

Participatory Monitoring Of Village-Level

Soil And Water Conservation Programmes, India

Unit of analysis: Farmer (Stages 1 and 2) and village subgroup (Stage 3)

Sequence of Methods:

1. Paper **map** of farmers' field drawn from a ground map of conditions prior to soil and water treatments: 'Before'

2. Paper **map** of a farmers' field showing the conservation treatments carried out: 'After'.

3. **Group meeting**: 'Before' and 'After' maps and indicators are aggregated at the watershed outlet group level by extension volunteers (EV s) and consolidated amongst the group members.

Process:

Village institutions nominate village EV s who are trained and take responsibility for the programme. Presentation of findings in watershed outlet groups leads to a discussion of alternative technologies and adaptation to local conditions.

Key implementation indicators, such as gullies which have been partially or fully filled and reclaimed, are recorded on the 'After' map. Comparisons are made of crop growth and productivity levels in the farmers' treated and untreated fields (as well as those of his neighbours).

Comments:

The approach can be easily linked to planning and management activities, but appears to depend heavily on the ability of the EV. Monitoring becomes an internalised process for the community: they start collecting information because they need it to inform their farming activities.

Source: Shah et al (1993)

Case Study 3.

Towards More Sustainable Soil Fertility Management, Southern Mali

Unit of analysis: Farm households

Sequence of Methods:

1: Diagnosing and analysing farmers' strategies:

i. **Mapping** natural resources by groups of men and women from the village

ii. Analysing the diversity in soil fertility management:

- assessing farmers' criteria of diversity (e.g. good management and socio-economic indicators)
- selection of key criteria, farm classification and selection of 'test' farms for farm-level discussions.

iii. Visualising farmers' soil fertility management practices.

Farmers from each class draw **resource flow models** to:

- analyse present strategies and linkages between farm enterprises and off-farm activities

- identify improvements adapted to farmers' conditions and strategies

iv. Motivating other farmers through **village meetings** held to present visualisations, exchange ideas on technologies and discuss the implications of improvements.

2. Planning of systems adapted improvements.

- **Farmer workshops**, **exchange visits** and **demonstrations** of 'new' technologies
- choice of methods to improve management and drawing of **planning map** by 'test' farmers

3. Implementation of activities.

At their demand, 'test' and other farmers are assisted in implementing the 'new' techniques.

4. Evaluation of Planned activities, one year after Phase 2. Individual evaluations by 'test' farmers using the original **planning map** (comparing planning with execution, visualisation of flows effectively implemented, comparing diagnostic map with improvements), discussion in a general **village meeting**.

Process:

The participatory action-research approach is designed to guide farmers in improving soil fertility management practices. Initial mapping activities are differentiated by gender. Farmer criteria for assessing the diversity of soil management practices are assessed separately by three groups of farmers: older men, younger men and women. This classification is suggested by researchers but ultimate definition is by villagers. The outcomes, however, are pooled in a list of key criteria.

Indicators:

Farmers' criteria for differentiating soil fertility management centre on: crop reside recycling and crop-livestock integration. Differences in the criteria listed by older men, women, and younger men were minor. Socio-economic differences underpin diversity in soil fertility practices. Access to productive resources (such as active household members, cattle and carts) plays a major role in managing soil fertility. Knowledge, courage and household organisation and decision-making structures influence the way farmers manage soil fertility. Physical factors also play a role: farmers with little fallow land, low quality soil or erosion-sensitive soil put more emphasis on manure production to maintain soil fertility.

Comments:

Farmers participate in collecting data and analysing the diversity in soil fertility management practices. The process is claimed to be quick, participatory and relatively easy. Farm classification is made by farmers and based on their own criteria. Farmers felt the resource flow models helped them to prioritise and keep records of changes but felt that more household members needed to be trained in the mapping technique. This would reduce the reliance on one person and could promotes greater discussion within and between households. Further work is needed to develop sustainability parameters and more attention given to inter- and intra- household organisation as determinants of decision making processes. The paper suggests that to maintain the interest of the researchers, 'there is a need to further upgrade the participatory methods to allow for quantification and statistical analysis without sacrificing farmer participation'.

Source: *(Defoer et al 1995)*

Case Study 4.

Participatory Pest Analysis, South East Asia

Unit of analysis: Farmers

Sequence of Methods:

1. **Transect walk** with a group of farmers through a field

2. **Observation** of crops and **drawing** of individual plants, including: the plant, beneficial insects, pests, neutral insects (those which are neither pests nor beneficial) and diseases.

Process:

The task is to train farmers in apply integrated pest management in their own fields. This requires them to develop skills in: assessment, transects, observation, drawing and quantification of insect incidence. Farmers are often slow and unsure of drawing on their first experience. But with repeated transect walks, they gain confidence and improve their drawing and analytical skills. Crops are usually inspected weekly, as insect numbers change quickly. This allows farmers to create a regular habit of field observation and demonstrates the evolution of the ecosystem over the cropping season.

Indicators:

Beneath each plant drawing, the farmers prepare a table showing the number of beneficiary insects by type, the number of pests by type, the number of neutral insects and the number of diseased plants for each known disease.

Comments:

Previous work suggests that farmers may not have the skills necessary to identify insects, distinguish between the different types of insect (beneficial or harmful) or know the appropriate spray to use. This approach develops the skills that a farmer needs to monitor the kinds of animals that are in their fields: identification skills by careful observation and drawing, analytical skills by considering and discussing the complexity of ecosystem interactions, their judgement, by responding to questions after presenting findings and critically assessing other farmers' analysis, their understanding of pest-natural enemy relationships by asking and answering questions in peer groups. By building the capacity of individual farmers, they can decide whether or not to apply pesticides to their own field. .

Source: *Mangan (1997)*

Case Study 5.

Farmer Participatory Procedures For Managing And Monitoring

Sustainable Farming Systems, Philippines

Unit of analysis: Village group (Stages 1 and 2) and household (Stages 3 and 4)

Sequence of Methods:

1. Natural resources **map**

2. Village **transect** of natural resource types and products harvested.

3. **Product flow diagram** showing the amount and frequency of flow of farm-generated biological materials between enterprises and natural resource types.

4. **Monitoring diagram**, consists of a transect with a matrix underneath it for recording inputs, labour, primary farm produce and by-products (for subsistence and commercial use) for each natural resource type.

Process:

When the monitoring diagram is completed, it is displayed in a central place, visible to all household members during the period of monitoring. Recording can be daily or more on a more *ad hoc* basis. Aggregate figures can be used.

Indicators:

Selection of appropriate indicators and even knowing where to start was not a simple task. Working set of 'sustainability' indicators developed: economic efficiency, bio-resource recycling, species diversity and natural resource capacity. Recognised that some vital parameters of social and institutional nature are extremely hard to measure and were excluded. Ultimately, selection of appropriate indicators was pragmatic, recognising 'we-cannot-do-everything'.

Comments:

Impact assessment must be built into the experimental process. The dynamism of agricultural systems suggests that sustainability may not be characterised by stable outputs, stable inputs and stable income as originally perceived. Sustainability indicators need to be improved, but difficult to define indicators that can be compared over time and used to compare between farming systems.

Source: Lightfoot et al 199x

Approaches to Participatory Monitoring Based on Oral Testimony

Case Study 6.

Oral Evidence in Historical Environmental Impact Assessment:

Soil Conservation in Lesotho in the 1930s and 1940s.

Unit of Analysis: Key informants

Sequence of Methods:

This approach focuses on **key informant interviews.** Each informant suggested additional informants, providing a snowballing approach to interviewing.

Process:

Age, mental lucidity and length of residence at the site were important factors in informant selection. Only two of the nine informants were women as the population of adult women in the location had not grown up in that area but moved there on marriage. Thus, most women's memory of the location's landscape begins on the date of their marriage. This helped to establish specific dates of when features did or did not exist, but for continuity of changes, men were able to provide a longer time sequence.

Indicators:

Oral testimony revealed that soil erosion was not a defined concept in Sesotho in the 1930s but farmers had technologies (e.g. grass field boundaries) to treat potentially erosive spots. But in response to colonial concern about soil conservation in the 1930s, contour banks were installed. The Basotho were not passive recipients of soil conservation technology; oral testimony shows they made observations, experiments and modifications of the contour system that was imposed on them. For example, one informant described how by changing the location of the contour banks in his field, he made 'plots' that were a size and shape he could work with, and eliminated the problem of water being concentrated in the same location year after year. However, the removal, relocation and reshaping of contour banks had to be done in secret because of the authoritarian nature of the colonial administration. Fields which were clearly visible to a visiting official were left untouched, but in those fields which were obscured from view by topography, contour banks were modified or eliminated. The British administrators acknowledged this 'wilful destruction' of contour bank in their Annual Reports, but never considered that such action could be the result of a coherent programme of monitoring and mitigation.

Comments:

Oral testimony is based upon the perceptions of local residents. Its success or failure will depend upon whether people agree to participate fully and tell researchers their observations. Access to information becomes synonymous with rapport and trust. The elderly informants' reconstruction of the 1930s highlighted the existence of an indigenous monitoring and evaluation process. Oral testimony revealed that what was seen as resistance was in fact a rational attempt to correct or prevent the negative impacts of an imported soil conservation technology on the landscape.

Source: Showers and Malahleha (1992)

Case Study 7.

Talking back: the role of oral testimony in participatory development,

the Sahel

Unit of Analysis: Individual informant

Sequence of Methods:

1. Recorded **semi structured interviews** using a questionnaire or 'checklist of themes' to explore traditional environmental knowledge and chronicle environmental change.. Informants included elderly farmers, pastoralists and refugees

2. **Translate** and **transcribe** the interviews

3. **Return the evidence**

Process:

500 interviews completed in 19 locations in six Sahelian countries, generating 600 hours of tape. Interviewers were all local to the interview area or fluent in the local language. The most successful interviewers were good interviewers who had a natural curiosity and interest in the respondents. The time allocated to the actual interviews in each country was about a month. A three-day training programme preceded the interviews, involving a review of the questionnaire, role-play and a 'pilot' interview and transcription.

Indicators:

The tapes indicate that change is recorded everywhere. There is clear agreement about the reasons for environmental degradation and the part humans and animals have played in it: lower rainfall, inappropriate development, and population growth leading to pressure on marginal areas.

Comments:

The paper suggests that many oral testimony projects get stuck after the collection phase. What to do with the tapes and transcripts? How to interpret them? How to publish them? How to return them to the informants? These things need to be considered carefully at the beginning of the project. Emphasis was placed on returning information to the community. One of the immediate and significant benefits of the project was that it forced project workers, even those born and raised in the community, to respect traditional knowledge. The project showed that oral testimony takes time, and requires a longer-term time investment than many monitoring and evaluation projects may be prepared or equipped for. Inevitably oral testimony provides individual responses, prejudices and interpretation that can both delight and infuriate, lead to new questions and answers and new puzzles and potential solutions.

Source: Cross (1993) in Slim and Thompson (1993).

Approaches to Participatory Monitoring Based on Ecological Methods

Case Study 8.

Community Inventory of Natural Resources, East Kalimantan

Unit of Analysis: Individual farmer

Sequence of Methods:

Self-recorded **inventories** of all tree resources (including, 5 species rattan, 1 species of bamboo, various species of honey trees, and 16 species of fruit trees or plants) within each of the farmers' fields.

Process:

In response to an industrial plantation/transmigration project that was causing the clearance of the Dayak farmers' rattan gardens, farmers' conducted an inventory of their resources to seek compensation for their losses. The number of clumps, trees or plants of each resource were counted in each field. Each resource was then quantified in the units by which it was sold in the local market.

Indicators:

Although the approach was designed to make an inventory of resources, the data recorded for each resource would serve as useful indicators within a monitoring process:

- Rattan, number of clumps and dry weight (kilograms) per clump per year
- Bamboo, number of clumps and harvestable shoots per clump per year
- Honey trees: number of trees, number of bee hives per tree and number of litres of honey per bee hive per year
- Fruit trees: number of trees/plants and number of fruit/bunches of fruit/kilograms per year

Comments:

This inventory was conducted by one community on its own initiative. The community did not develop a sampling design. Instead, individual farmers conducted a 100% enumeration of all the resources in each of their gardens. Harvest quantities were estimated by local farmers, using their knowledge of past harvests. The accuracy of these estimated could not be verified and because the assessment is based on the judgements made by local farmers, the valuation may not be considered sufficiently 'scientific' by the government officials from whom compensation is being sought. If this approach were to be adapted to a monitoring process, the farmers themselves could record the actual productivity of each of the trees and plants throughout the year, increasing the 'rigour' of the approach.

Source: Stockdale and Ambrose (1996)

Case Study 9.

Engaging local hunters in wildlife surveys, Zambia

Unit of Analysis: Hunter key informants

Sequence of Methods:

Self-recorded **wildlife surveys** by hunters.

Process:

Designed with local hunters in 1988-89, this experiment was carried forward on the hunters own initiatives since 1990 and was revived formally in 1993. The terrain is divided into blocks and each block includes or is separated by known topographical features, such streams, saltlicks or waterholes. The

blocks enabled the hunters movements and directions and animal dispersal to be recorded. Hunters keep records of the wildlife sighted, together with details of their times and activities when in the field. Hunters are encouraged to make 10 or more trips each month but they decide for themselves the dates, times and places to visit during each foray. Other residents kept journals of events, activities and rainfall broadening the framework for subsequent analysis and interpretation.

Indicators:

Direct wildlife counts, number of encounters, number of stalks, time spent searching, hiding, stalking, following, butchering, preparing and carrying meat.

Comments:

Although time based, rather than line- or area- based, as is the case with more standard wildlife transects, these surveys provide reliable and useful information about species abundance and hunters' interactions. Variations in count between individuals are related to skill (more experienced hunters count more game), age, location (those hunting further from settlements count more wildlife) and weapon used. Although not providing all the criteria for standard census procedures, the method does provide socio-economic information on time investment in hunting and their allocation of hunting time in the field. By grounding wildlife counts in local lives and livelihoods, a more complete picture of community-based resource management is developed. Moreover, the incorporation of data on resource stocks together with that of its users allows a more 'realistic' interpretation of trends than is obtained when wildlife counts alone are considered.

This method is low cost, emphasises local skills and knowledge and allows frequent assessments of the smaller, as well as the larger, animals. Small animals are difficult to census with standard ecological methods, yet these species dominate local consumption. Thus, the method involves hunters in recording and monitoring the resources on which they rely. Employing local hunters to census wildlife emphasises local participation, skills, trust and knowledge - all attributes that are critical in developing constructive relationships between wildlife management agencies and local communities. This approach puts the rhetoric of community based natural resource management into practice: the method devolves responsibility from wildlife agencies and empowers local people to monitor the wildlife upon which they depend. However, it requires wildlife agencies to acknowledge the role of bushmeat in local livelihoods. The method is developed in Case Study 10 to involve local people in the analysis of the wildlife data which, in this case study, is completed by outsiders.

Source: Marks (1994, 1996)

Case Study 10.

Participatory Methods for Quota Setting in CAMPFIRE areas, Zimbabwe,

Unit of Analysis: Rural Development Council

Sequence of Methods:

An annual **facilitated workshop** brings together the key **stakeholders** in setting quotes for wildlife offtake: Department of National Parks and Wild Life Management (DNP&WLM), CAMPFIRE ward wildlife committees, villagers who have participated in ground counting exercise, problem animal reporters, traditional and political leaders and safari operators. The workshop is facilitated by Worldwide Fund for Nature (WWF) and Safari Club International and is timed to follow a three day **ground counting exercise** which is also held annually with local communities and with support from WWF. Other data compiled from stakeholders includes: **trophy quality analysis**, **aerial survey analysis** and **quota and location analysis**. Interactive exercises are used to explain technical methods to the participants.

Process:

The objective of the workshop is to examine all available information on sport hunting and to recommend to DNP&WLM CAMPFIRE unit a quota for the Rural District Council. The workshop begins with a review of the ground counting exercise. This is followed by group work on four topics: trophy quality, aerial

surveys, ground counts and quota trends. ‘Games’ are used to develop the participants’ understanding of the topics. For each topic, all available data is examined by the participants for trends, such as changes in trophy quality, changes in animal populations observed from the air or from the ground etc. The final part of the workshop examines the available trend information on each species and uses this to adjust the existing hunting quota.

Indicators:

The indicator’ wildlife population’ is determined using several different methodologies: aerial surveys ground counts and trophy quality. In addition, a subjective assessment of changes in animal numbers is provided by safari operators. As shown in Table 1, for each indicator, a species is classified as: showing a population increase (Ý), showing a population decrease (ß), showing a stable population (Û) or information not available (X).

Comments:

Quota setting workshops have been held annually in some areas since 1992. The methods used have evolved from ward and village level mapping and estimation of populations to the current approach where quotas are modified on the basis of available trend information. Participants are informed well in advance so they can prepare relevant information. The workshops are designed to involve the participants in all aspects of the process, from data extraction to analysis and presentation. They are characterised by a high level of interest and where the indicators show a decline in population, participants are quick to reduce the offtake. For most species, the recommended 1997 quota have not changed since 1996 indicating general agreement between the stakeholders that the current level of offtake is satisfactory. Careful facilitation is required to secure and balance the participation of all stakeholders during the workshop. This appears an elegant approach that is accessible to all participants.

Source: based on discussions with Ivan Bond and Russell Taylor, WWF Harare and project documents: (DNP&WLM/WWF 1994 and 1996)

Case Study 10. continued.

Table 1. Gokwe North Rural District Council (Area 1) Quota Setting Workshop, a summary of the key indicators and the suggested quota for 1997

See text for details of symbols and the quota setting process.

Species	1996 Quota	Aerial Survey trends	Ground Counting trends	Trophy Quality trends	Safari operators’ assessment	Requested quota for 1997
Male elephant	7	⇔	⇓	⇔	⇓	7
Male buffalo	20	⇔	⇔	⇔	⇔	20
Lion	3	X	X	X	⇔	3
Leopard	3	X	X	⇔	⇑	6
Sable	1	⇔	⇑	X	⇑	2
Eland	1	X	⇓	X	⇔	1
Kudu	7	X	⇔	⇔	⇔	7
Bushbuck	9	X	⇔	⇔	⇓	7
Waterbuck	4	X	⇔	⇔	⇔	4

Reedbuck	2	X	⇔	X	⇔	2
Zebra	2	X	⇔	⇔	⇔	2
Impala	44	X	⇓⇓	⇔	⇓⇓	24