GLOBAL ENVIRONMENTAL AND SOCIAL MONITORING

Proceedings of the 1st International Thematic Workshop held in Vienna, Austria 9–11 May 2004

Contents

UNESCO–MAB

Proceedings of the 1st International Thematic
Workshop held in Vienna
Austria, 9–11 May 2004

First Published 2004
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SC–2004/WS/40

Volume Editors: Cathy Lee, Thomas Schaaf
Publication Editor: Chris Carr
Book design and layout by Curran Publishing Services, Norwich, UK

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Publication Editor: C. M. Carr
Book Designer: C. M. Carr

United Nations Educational, Scientific and Cultural Organization (UNESCO)

The workshop was organized by:

The University of Vienna

Global Observation Research Initiative in Alpine Environments (GLORIA)

The Mountain Research Initiative (MRI)

The United Nations Educational, Scientific and Cultural Organization (UNESCO)

The Man and the Biosphere Programme (MAB)

The International Hydrological Programme (IHP)

with support from:

The International Geosphere–Biosphere Programme (IGBP)

The International Human Dimensions Programme on Global Environmental Change (IHDP)

The Global Terrestrial Observing System (GTOS)

16 *Extending BRIM to BRIA: Social Monitoring and Integrated Sustainability Assessment*

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INTRODUCTION

In 2003, the Austrian Man and the Biosphere (MAB) committee had decided to devote at least part of its research funds to the development of biosphere reserve integrated monitoring (BRIM), in support of the international MAB agenda in general and Austrian biosphere reserves in particular. We were given the task to build on UNESCO–MAB'S so-called *Rome Report* (Lass and Reusswig, 2002), give it a somewhat narrower focus and make it operational for an Austrian research plan.

In approaching this brief, we had to take into account several features of the Austrian MAB research landscape. First, MAB research funds come from the federal government, and are allocated to 'research', while management and routine monitoring in biosphere reserves are financed by the states. It is therefore important to draw a clear distinction between research and the development of tools on the one hand, and monitoring and management support on the other. Second, the Austrian MAB committee had made it quite clear that it wanted to fund research that would be directly related to, and in support of, attaining the goals of biosphere reserves (BRs), as distinguished from simply using these reserves as research sites. While the use of BRs as research sites is to be encouraged, funding for this should come from other sources. Third, MAB research funds have so far been almost exclusively spent on the natural sciences. While there is an openness to and friendly welcome for the social sciences where their research questions link closely to ecological sustainability issues, there is neither a tradition nor a surplus of funds to finance a full-scale social science programme. We therefore believed that, unless the social science agenda were specified in a very focused way, integrated monitoring across the 'great divide' of natural and social sciences would remain in the realm of wishful thinking.

Our goal was not to give answers to research questions; rather it was to develop a conceptual scheme that would allow us to specify reasonable areas, and reasonable questions, to guide future research and cumulatively contribute to the development of a coherent monitoring and assessment tool for biosphere reserves into a 'science plan'.

THE INTER-RELATIONS BETWEEN MONITORING, SUSTAINABILITY ASSESSMENT AND MANAGEMENT

The point of departure for our considerations is the vision spelled out in the Seville Strategy (1995).

> Biosphere reserves are thus poised to take on a new role. Not only will they be a means for the people who live and work within and around them to attain a balanced relationship with the natural world; they will also contribute to the needs of society as a whole by showing the way to a more sustainable future. This is the heart of the vision for biosphere reserves in the twenty-first century.

If this is to be a valid vision for biosphere reserves, scientific monitoring and research must be organized so as to support it. This is a far more complex task than monitoring various features of the state of the environment alone. A much greater range of variables – in both the natural and the social sphere, and their interactions – have to be taken into account. It is also more complex with regard to the processes that monitoring and research have to support: the relevant processes include not just a diagnosis of the situation and the prospects of future development, but also the specifying of shared goals and targets, the identification of adequate management responses, and the development of communications that will be trusted by insiders and outsiders concerned with science and biosphere reserves. All this complexity was fully represented in the Rome BRIM Report (Lass and Reusswig, 2002) and visualized in Figure 16.1.

But does the design shown here fully serve its purpose? The major distinction drawn in Figure

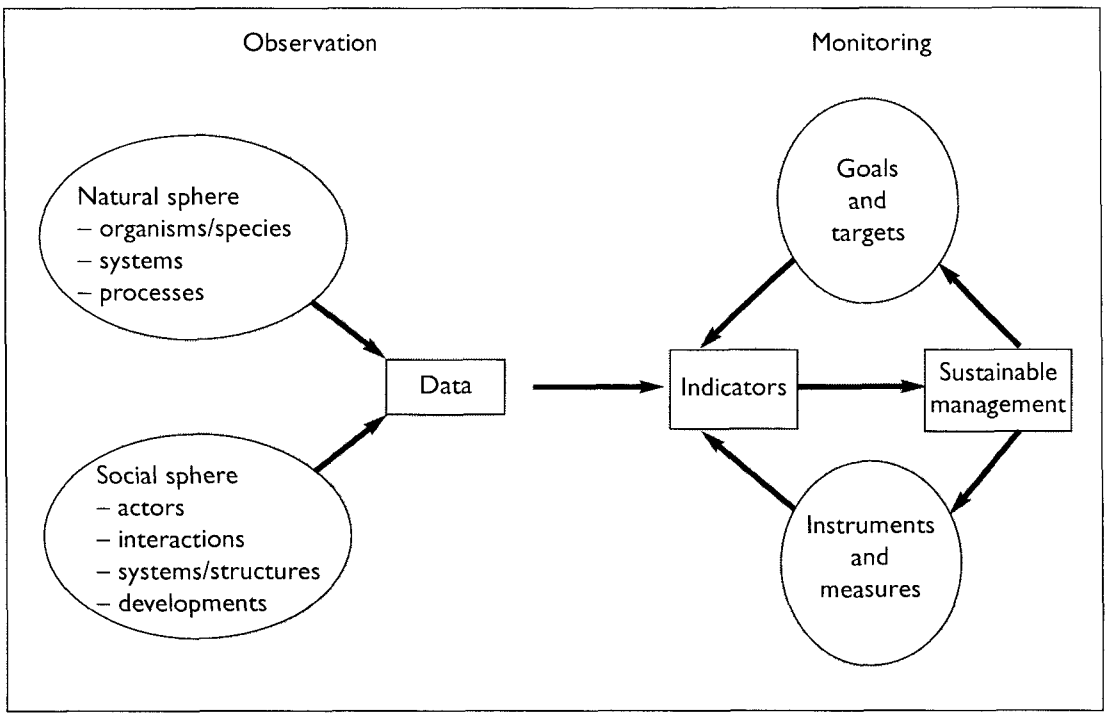

Figure 16.1
From observation to monitoring

16.1 is between 'observation' and 'monitoring'. While observation produces data, monitoring starts with indicators and – after a detour across sustainable management, goals and targets, and instruments and measures – also produces indicators. This is not fully satisfactory: is it not clear how data become indicators, nor is there a feedback loop from management to the natural and social realities that are the basis of observation. Moreover, there is an unusual stretching of the notion of 'monitoring' to encompass also goal setting and management. We suggest returning to a more common use of language, and accordingly modify Figure 16.1 by separating 'observation and monitoring' on the one hand, from 'sustainability assessment and management' on the other (Figure 16.2).

The main output from 'observation and monitoring' would be indicators (not 'data', as above), from both the natural and the social sphere (for more detail see below). These indicators would be subject to scientific analysis. Scientific analysis, in contrast to monitoring, could be defined as non-routine scientific efforts to answer specific research questions. We feel there is no way in which indicators, without further analysis, could directly provide answers to complex questions or inform management decisions. We rather believe that such an analysis has to take place (performed by scientists from outside or by the management itself), and its results will have to be evaluated by the biosphere reserve management in the light of policy goals and targets. This evaluation leads to the consideration of various potential interventions (including a happy no-need-to-do-anything option), and it should be communicated to stakeholders to guide their opinions and reactions.

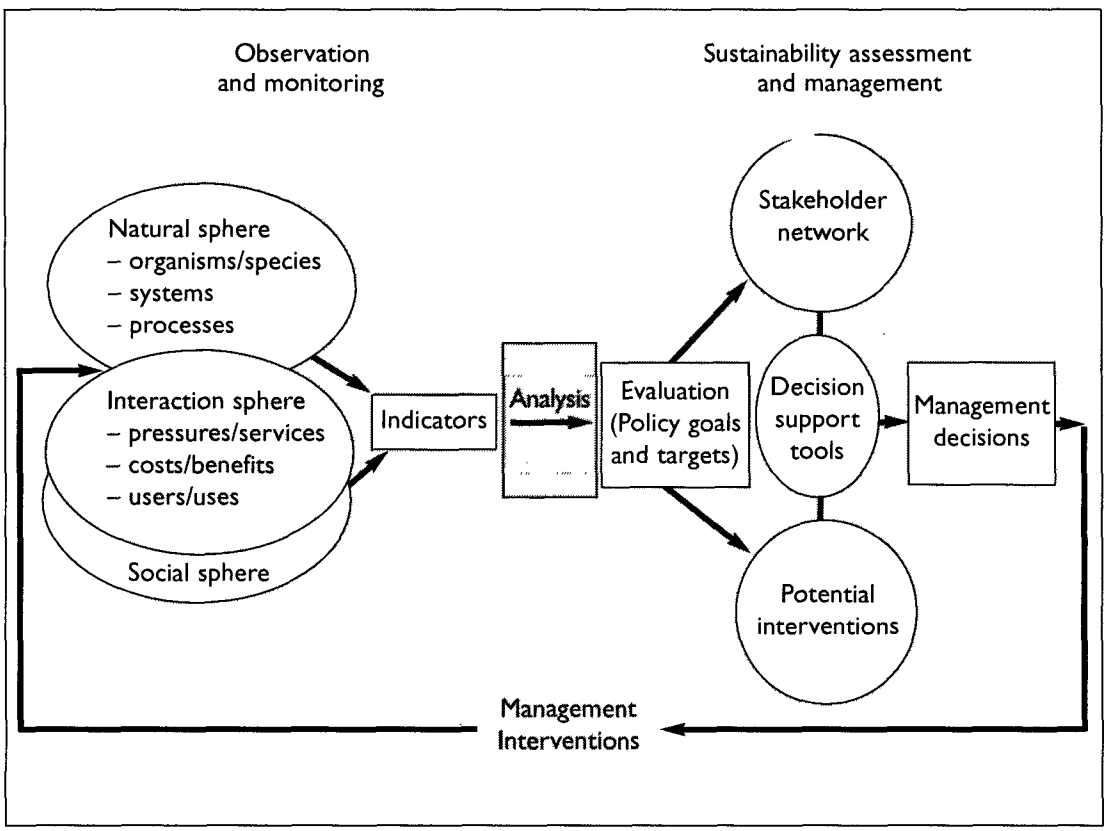

Figure 16.2
From observation and monitoring to sustainability assessment and management

In complex cases, where there would be major threats or conflicts of interest, formal decision support tools could be applied, either qualitative ones (such as mediation processes, participative organizational development) or modeling-based quantitative tools (such as multi-agent modeling, or multi-criteria analysis). Whether or not such tools are applied, the assessment would lead to decisions resulting in management interventions that alter some features of the 'real world' and are reflected again in observations and monitoring. So for the box 'sustainability assessment and management' (right part of Figure 16.2) the input would be analysed indicator data and certain goals and targets. The output would be management decisions and practical interventions in the natural or social sphere in or outside biosphere reserves, but relevant to them.

This somewhat modified overall design (Figure 16.2) makes it clearer where scientific research and analysis – as differentiated from (routinized) observation and monitoring – comes into the picture, and which role it has to fulfil. The main tasks of scientific research and analysis can be specified as follows:

- *Indicator development.* The development of a scheme of indicators, including operational guidelines for an observation and monitoring methodology. For the natural sphere, various conventions have been established already; but there still remains the task of defining a core set of indicators. This is not only a question of theory and methods, but also entails organizing a common international process across biosphere reserves to generate agreement and compliance. The problem of securing the necessary sources of funding will still have to be faced. These challenges are interconnected: the more theoretically well-founded, consistent and agreed-upon the core set of indicators is, the more easily funding agencies can be persuaded to support such a scheme. For work on the social sphere, the path to improvement is even longer. We will come back to this in the next section.
- *Data analysis and evaluation.* In order to find out whether a biosphere reserve develops according to its set of goals, the indicators resulting from observation and monitoring have to be analysed periodically. In many cases, this can be done by the biosphere reserve management itself, although for specific research questions support from outside scientists to analyse the data will sometimes be required. This analysis should feed into an evaluation of the situation in relation to the goals and targets set, help to keep stakeholders informed and interested, and guide the creation of an 'option space' for potential management interventions. At the same time, of course, access to readily available data can allow scientists to pursue their own research goals, using biosphere reserves as convenient sites. Even if such research were unrelated to management problems, it would add to the reputation and institutional status of biosphere reserves.
- *Scientific decision support.* In complex situations, where critical developments, conflicts of interests, changing resources or new opportunities play a major role, scientific consultancy can assist management by means of a wide variety of decision support tools. Some of these are 'soft tools' developed within management science and organizational consulting, and some are 'harder tools' (in terms of quantification and modeling). In response to the challenges of sustainability management, this toolbox keeps expanding towards various forms of stakeholder involvement and participatory arrangements. Since biosphere reserve managers tend to have limited resources and administrative power, management skills, including the

ability to organize stakeholder support, will be crucial for attaining the goals laid down. In the third section of this article we will outline some approaches to increasing stakeholder awareness and involvement.

MONITORING THE 'SOCIAL SPHERE'

In our suggestions for the development of social monitoring, our point of departure is again the UNESCO–MAB Rome Report, which stated:

> It is necessary to establish a search process for an integrative framework for both natural and social monitoring that is open and flexible enough to adopt new theoretical and empirical evidence. [The] guiding principle should be the search for major human–nature interactions in biosphere reserves and the hypotheses that social and natural sciences have with regard to them.

As we have tried to explain above, the 'social sphere' plays a major role on both sides of Figure 16.2. Equally, social science has two points of entry: one in the realm of (routinized) observation and monitoring, and the other in the realm of sustainability assessment, stakeholder involvement and management decisions. What we will focus on now is the question of which aspects of the social sphere should be included in regular observation and monitoring, in order to generate (quantitative) indicators that have a direct bearing on the sustainability of the biosphere reserve. In the next section we will discuss further aspects of the social sphere in the light of their relevance for managerial decision-making.

In our view, it is most important to concentrate observation and monitoring efforts on those elements of the social sphere that have a direct causal impact on the biosphere ecosystem. Such an impact can only be attributed to activities that intervene biophysically in the ecosystem. Ecosystems are not directly sensitive to values, attitudes, communication and money flows; they can only be directly modified by material impacts. From a methodological point of view, there is the advantage that social activities with direct material impact upon the ecosystem can be readily and unambiguously observed and quantified.[1] Still, we are talking about 'social activities', which may not only have a material impact, but also a social meaning through the actors, intentions and interests governing them. The very same social activity looks different from the perspective of the ecosystem and from the perspective of the social system, as we try to visualize in Figure 16.3.

Figure 16.3 distinguishes a natural sphere and a social sphere, which are not mutually exclusive but overlap. If we think of a farm, for example, it is at the same time part of the natural sphere (in the sense that many of its processes are guided by natural laws) and of the social sphere (in the sense that many of its processes are guided by communication, culture, money and so on). The same applies to biosphere reserve ecosystems: they are always part of the natural sphere, but some aspects of them are also governed by the social sphere (such as, for example, roads and pathways that are continuously maintained). Conversely, the social system(s) in the biosphere reserve are always part of the social sphere, but some aspects of them are also governed by natural processes (as are human bodies, or farms).[2]

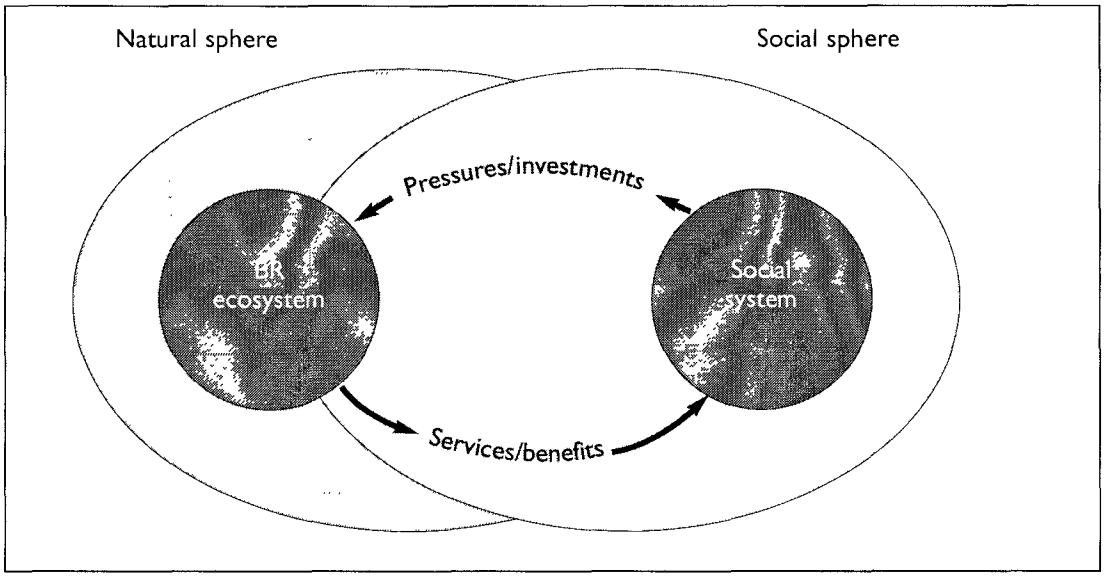

Figure 16.3
A simple model for the interaction of social and natural systems

Many of the interactions between the social system(s) and the ecosystem(s) of the biosphere reserve we can now conceptualize as an exchange process. If the social system wants to make use of the BR ecosystem, this is typically reflected in a social activity that the social system views as an investment or cost (such as ploughing the soil, driving or walking into the BR, setting up a tourist information stand); from the perspective of the ecosystem, this very same activity can be considered an environmental pressure (such as soil exposure, sealing of the surface, emissions). The goal of these social activities, from the perspective of the actors in the social system, is some kind of benefit: a harvest, a beautiful view or an income from the sale of souvenirs. This benefit may be achieved because ecosystems, by their very functioning, provide certain 'services' (such as soil fertility, beautiful landscapes or slopes for skiing). What we propose is to focus observation and monitoring on exactly these use-related interactions between the social and the natural systems in biosphere reserves. Thus, a core monitoring scheme should be developed that continuously registers:

- *uses* (such as habitation, agriculture, forestry, tourism) and *users* (both from inside and from outside the territory of the BR), both qualitatively and quantitatively
- *pressures* (types, and their quantities) and *costs/investments* (types, and quantity in terms of money value and possibly human time investment)
- *benefits* (types, and their quantities in money value, and/or user satisfaction) and *ecosystem services.*

As we have argued above, we feel the core set of indicators to be monitored in BRs should be directly causally related to their key mandates (conservation and development), and provide useful information for managing their sustainability. We claim that the above obeys these criteria. Conservation and development can be, or even tend to be, conflicting goals: conservation depends on restricting uses, while development depends on allowing and even supporting uses of BRs. The

internal sustainability of BRs depends on resolving such conflicts, or at least keeping them at bay. Sustainability from the perspective of the social systems and actors can be secured if they feel their costs/investments are balanced by benefits. If this is not the case, then actors will try to make a change, and this may well be at the expense of conservation goals. For example, if farmers feel that in the BR they have to work harder for less income than elsewhere without any beneficial return, or if manufacturers and retailers feel their investment in tourism is wasted, or if tourists feel the trip was not worth the effort, then the maintenance of the BR will be threatened. Equally, if uses exert pressures upon the ecosystems that put the conservation mandate at stake and substantially reduce ecosystem services, then ecological sustainability is failing.

If we put our proposal into the scheme of Figure 16.2, social sphere-monitoring would be confined to an 'interaction sphere'-monitoring, relating to users/uses, pressures/services and costs/benefits. All these could be reliably monitored on an annual basis, with an acceptable degree of reliability and comparability and at reasonable cost. While, compared to the original list of potential social indicators in the Rome Report,[3] a large number of interesting variables has disappeared, the remaining core can be clearly justified theoretically as causally relevant for the ability of a biosphere reserve to monitor its balance of the key mandates conservation and development.

TAKING ACCOUNT OF SOCIAL PROCESSES IN SUSTAINABILITY ASSESSMENT AND MANAGEMENT OF BIOSPHERE RESERVES

In the scheme shown in Figure 16.2, the sustainability assessment and management cycle starts with input from the analysis of indicator (and possibly other) data, which are evaluated in the light of policy goals and targets.[4] This evaluation, unless everything is absolutely perfect and in an optimal state of affairs, results in the definition of a problem and, thanks to the previous analysis, hopefully some causal explanations for this problem. So a classical problem-solving cycle, well known from standard management literature, is started. The stages of such a cycle are commonly described in the following way:

1. Defining the problem (and its likely causes).
2. Generating options and scenarios for problem solutions.
3. Selecting a preferred solution.
4. Implementing the selected solution.

For each of these stages there are a number of tools that can be of help, and for each of these stages social science (and consulting) support may be usefully employed. What perhaps distinguishes sustainability assessment and management from more standard managerial practice is the fact that neither management itself, nor the goals it uses for its guidance, can rely on a pre-arranged, strong, administrative power (backed by ownership, well-established hierarchies and capital, or alternately by elections and a constitution). Most of the processes are subject to negotiation, and have to be strengthened by charisma, networking and alliances.[5] This is also in accordance with the philosophy of sustainability management: unless people really participate in creating a more sustainable future, it just will not happen.

But in biosphere reserves as anywhere else in society there are interest groups of unequal standing, and the stronger parties can push decision processes very much in their direction. There is little to be done about this except to create a maximum of transparency for the whole decision process. Decision-support tools may provide exactly this.

The social sciences can mainly contribute skills in understanding stakeholders. This knowledge often does not come in the form of quantitative data, but rather is a case for qualitative data and their systematic analysis. For Austrian biosphere reserves, the stakeholder matrix shown in Figure 16.4 proved useful. The matrix classifies stakeholders into three types: users, scientists and decision-makers. Each of these types of stakeholder can be characterized by (a) a specific interaction with the BR ecosystem, (b) a certain interest and preference structure, and (c) certain resources and competencies.[6] In the cells of this matrix, we have entered general hypotheses of what we suppose the respective features to be.

In our discussion of monitoring, we have already elaborated upon the users of BRs and suggested monitoring their interactions with the BR ecosystem (shaded fields in Figure 16.4), because, as we noted, they are vital for the internal sustainability of the BR. As far as their interests and preference structures are concerned, we characterize them by a desire to have a good balance of costs/investments and benefits. Users will be happy, so we hypothesize, if they get a reasonable return on their investment. What they have invested, and what kind and amount of return they expect, depends on the type of use they make: a farmer and a tourist will have very different perspectives. Users are important as stakeholders because of their resources and competencies. Typically, they have a certain amount of control over the BR ecosystem. They may own part of the land, have rights to roam over various areas, inhabit a house there, be entitled to fishing or logging or have a license for a souvenir business. Besides their ability to control certain aspects of the BR reserve, they are – like all social actors – able to communicate. They may for example have 'indigenous knowledge' and

	Users	*Scientists*	*Decision-makers*
Interactions with BR ecosystem	• Invest and exert pressures • Receive services and benefits	• Measuring, monitoring, assessments	• Providing framework conditions
Interests and preference structures	• Good balance of costs and benefits	• Generate knowledge • Make a professional living	• Specify policy goals • Popularity
Resources and competencies		• Expert knowledge • Research funds • Communication	• Legal and financial resources • Communication
Major categories	• Onsite/offsite • Productive/ consumptive • Economic activity	• Onsite/offsite • Disciplines	• Onsite/offsite • Government/NGO • scale level

Figure 16.4
Stakeholder matrix

communicate it to the BR management; they can communicate their (dis)satisfaction with the BR to anybody willing to listen, and under certain circumstances (for example, if they are on site) they can organize to defend their interests or possibly to fight other user interests. For BR management, it is vital to have an eye on the major user groups and know about their economic and mental state.

Scientists, the second major stakeholder group in Figure 16.4, sometimes interact biophysically with the BR ecosystem if their research task requires them to (by marking animals or collecting plants, for example), but usually their material contact remains peripheral. Their interests and preference structure are directed at doing research and gaining knowledge, and this often entails a lively interest in the conservation of their research object. They bring in competencies in the form of expert knowledge, and usually some funds for doing their research.[7] Their major resource, though, consists in their capacity to communicate within a potentially large, international scientific community that often also has access to the public media. So scientists, even if they may sometimes not provide much help to the managerial process of practical problem solving, are invaluable as communicators, and often also as organizers of public support.

Decision-makers, finally, do not usually interact directly with the BR ecosystem at all, but they provide the major framework conditions – legally and economically – for its existence. Their interests and preference structures are determined by certain policy goals associated with their particular role. These goals will vary depending on whether they are publicly responsible for, say, a region's tourism or for its nature conservation; for the country's relations with international bodies like UNESCO, for science and research, or for finances. Whichever decision-making body they belong to, even across the governmental/non-governmental divide, they also strive for a certain public acceptance and popularity (at least within their clientele). Decision-makers control legal and financial resources. They determine the legal status of the BR system, financing modalities, the employment of staff, the substance of and inclusion of the BR into general development plans (or its exclusion from them). Beyond their capacity to actually make decisions, they are very important communicators within the network of public policy (at various levels), and with the public media. So these stakeholders, even when they hardly ever come into direct contact with BR ecosystems, are crucial for the 'external sustainability', the ability of the BR to survive.[8]

For the management, it is very useful to draw a 'stakeholder mind map' for their BR and keep it up to date. The kind of data outlined in Figure 16.4 would be very hard to formalize quantitatively (and probably not worth the effort), but can quite easily be collected as qualitative data, updated by occasional interviews or notes from observations. Whenever a more substantial problem arises, it makes sense to invite stakeholders to participate in a second stage of the process: generating options and scenarios for problem solutions. Such an invitation demonstrates to stakeholders that they are taken seriously, and it shows the management and the stakeholders themselves that different groups have very different ideas and that making choices among them is not trivial. How participatory the next stages (selecting an option and implementing it) should and can become is easier to decide on the basis of the experiences with the second stage of the process. At this point, one may also consider experimenting with more formalized decision support tools and calling in social scientists for assistance.

CONCLUDING REMARKS

During the preparation phase of the report to the Austrian MAB National Committee, M. Fischer-Kowalski was invited to present her considerations on social monitoring to the GLOCHAMORE Workshop of the Mountain Reserves Initiative in Vienna. She gratefully accepted this opportunity to expose a preliminary version of her ideas to comments and criticism from members of the international scientific community gathered at this workshop, and their reactions were indeed encouraging for the Austrian concept.

In a next step, the concept was discussed with representatives from all Austrian biosphere reserves; again, the reaction from the practitioners was encouraging. In June 2004, the BR Neusiedlersee hosted an international workshop in Illmitz, endorsed by UNESCO, to which the Austrian project team had invited the authors of the 2001 Rome BRIM Report and a few dozen further experts on biosphere reserve monitoring to hear their opinion on the Austrian MAB science plan in preparation. The presentations were well received, and several working groups discussed in detail how they would advise the National Committee to proceed. While many considered the proposal as an important step towards putting the Rome BRIM report into practical operation, others were afraid that some of the broadness in approaching the social dimensions could get lost. The ensuing debate centred around strategy: would the likelihood of practical social monitoring and the application of social science research in BRs be enhanced by narrower, more focused guidelines, or is a broad range of deliberation necessary to motivate research? This issue could not finally be resolved, but all participants strongly welcomed the following general principles for future Austrian MAB research:

1. *Interdisciplinarity* across the 'great divide' of natural and social sciences. All research questions should entail a focus on the interaction of natural and socio-economic processes.
2. *Transdisciplinarity* ('mode 2 research'). MAB research should take stakeholders perspectives seriously and communicate its research results to them. Stakeholders should have a fair chance to invoke research to help in solving their problems.
3. *International orientation.* Austrian MAB research should be embedded into international research efforts, and use at least part of its resources for internationally comparative and or cooperative projects.

NOTES

1. For a comprehensive description of the MEFA approach, for example, see Haberl et al. (2004).
2. We have explained this epistemological model and the associated idea of social systems being 'hybrids' of the natural and the cultural sphere in more detail in Fischer-Kowalski and Weisz (1999).
3. This list included: 'basic demographics and well-being of people', 'ecosystem use', 'socio-economic dynamism', 'management, participation and governance', 'values and attitudes', 'information, education and research' and the 'future seen through the eyes of experts and inhabitants' (Lass and Reusswig, 2002, p. 10).
4. We have not dealt here with the process of generating policy goals and targets. One could of course make the model for sustainability assessment more complex by introducing feedback loops to goals and targets. One should not view that too mechanically: whenever a gap between reality and goals/targets is identified, there is the option to modify targets in order to comply with reality: targets may appear as unrealistic or even undesirable in the light of new experiences. So 'evaluation', in comparing goals and realities, always deals with both sides as candidates for change through management decisions and interventions.

5. See, for example, the new book by Berkhout et al. (2003): *Negotiating environmental change.*
6. This classification follows a classical 'actors' paradigm' and specifies those characteristics that usually also enter single and multi-agent modeling. At the same time, it can be linked into a social systems perspective (by focusing on the respective contexts in which those actors are performing).
7. This can be a very touchy subject. On the one hand, such research funds help to deal with questions that otherwise, for lack of resources, could not be tackled. On the other hand, scientists often need all their research money for themselves and request support from practitioners for free. In many cases both sides are legally obliged to handle the situation in a particular way that does not seem fair to some of the parties involved. For smooth collaboration between science and on-site staff it is very important to clarify roles and quantities of time and money flows in advance.
8. In social systems theory terms, one might look upon decision-makers as the crucial social environment for the BR system.

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