WCMC Handbooks on Biodiversity Information Management

A DARWIN INITIATIVE PROJECT

WORLD CONSERVATION MONITORING CENTRE

COMMONWEALTH SECRETARIAT

Information Management Capacity

Volume 6

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World Conservation Monitoring Centre

Series Editor J.H. Reynolds

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The **World Conservation Monitoring Centre**, based in Cambridge, UK, is a joint venture between three partners in the *World Conservation Strategy* and its successor *Caring for the Earth*: IUCN – The World Conservation Union, UNEP – United Nations Environment Programme, and WWF – World Wide Fund for Nature. The Centre provides information services on the conservation and sustainable use of species and ecosystems and supports others in the development of their own information systems.

The United Kingdom's **Darwin Initiative for the Survival of Species**, launched at the 1992 Earth Summit in Rio de Janeiro, aims to support the Convention on Biological Diversity by drawing on Britain's scientific, educational and commercial strengths to assist in the conservation and sustainable use of the world's biodiversity and natural habitats. Key tenets of the Darwin Initiative include collaboration and cooperation with local people, capacity building, distinctiveness and complementarity of project initiatives, poverty alleviation, and long-term sustainability. Through training, awareness raising, and research on undervalued areas of biodiversity, Darwin support is particularly aimed at strengthening links between Britain and those countries rich in biodiversity but poor in financial resources.

Under the auspices of its **Environmental Training for Sustainable Development** initiative, the Management and Training Services Division of the **Commonwealth Secretariat** supports short- and long-term training, internships and institution development for environmental policy makers, environmental 'operatives', and environmental information professionals in the Commonwealth, in various areas of the environment including biodiversity and gender. Funding support for training, institution development and publications under the aegis of the Management and Training Services Division is provided by the Fund for Technical Co-operation (CFTC).

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The generous support of the *United Kingdom's Darwin Initiative for the Survival of Species* has provided for the development of a comprehensive programme of training in biodiversity information management. This programme comprises an international training team, drawing on expertise from collaborating organisations around the world; the preparation of a training resource in the form of a handbook series and related materials; and the development of computer-based demonstration tools. Training is being promoted through the delivery of post-graduate modules, and through regional and national workshops which have received additional support from The British Council, British Airways Assisting Conservation Scheme, and contributions from participating organisations. The programme has been appropriately titled *Darwin Initiative Training in Biodiversity Information Management.*

Development of the handbooks has also benefited from experiences gained through the Biodiversity Data Management (BDM) Project, administered by the United Nations Environment Programme (UNEP) and funded by the Global Environment Facility (GEF), and related initiatives supported through the European Union (EU) and European Environment Agency (EEA). Indeed, Volume 6 draws extensively on one of the key outputs of the BDM Project, the *Guide to National Institutional Survey* (UNEP/WCMC 1998), developed in consultation with participating countries, the BDM Advisory Committee and the UNEP management team. The concept of an information cycle was developed in collaboration with the International Institute for Environment and Development (IIED) with support from the UK Department for International Development (DFID). The handbooks have been published through the generous support of the Commonwealth Secretariat.

Fundamental to the development of this programme have been the partnerships established with training organisations around the world. These organisations have worked collaboratively in hosting workshops, in reviewing the handbook materials, and in providing guidance on how regional and national training needs can be met most effectively. The training programme has significantly benefited from the input of numerous individuals working in the field of biodiversity information management. Among these individuals, particular mention goes to Professor Ian Crain and Gwynneth Martin of the Orbis Institute, Ottawa, Claire Appleby, an independent consultant, and to Drs Jake Reynolds and John Busby of WCMC for their insightful work in developing the handbook series. Thanks are also extended to Laura Battlebury for her tireless administrative and logistical support. The series

editor for the handbooks was Jake Reynolds, while Donald Gordon managed the overall project.

To the many individuals, both within and outside WCMC who have contributed to the development of materials and the delivery of training in biodiversity information management, a profound debt of gratitude is owed. It is through this collaborative effort that a service is being developed to contribute to the conservation and sustainable use of living resources.

BACKGROUND

The purpose of the *WCMC Handbooks on Biodiversity Information Management* is to support those making decisions on the conservation and sustainable use of living resources. The handbooks form part of a comprehensive programme of training materials designed to build information-management capacity, improve decision-making and assist countries in meeting their obligations under Agenda 21 and the Convention on Biological Diversity.

The intended audience includes information professionals, policy-makers, and senior managers in government, the private sector and wider society, all of whom have a stake in the use or management of living resources. Although written to address the specific need for improved management of biodiversity-related information at the national level, the underlying principles apply to environmental information in general, and to decision-making at all levels. The issues and concepts presented may also be applied in the context of specific sectors, such as forestry, agriculture and wildlife management.

The handbooks deal with a range of issues and processes relevant to the use of information in decision-making, including the strengthening of organisations and organisational linkages, data custodianship and management, and the development of infrastructure to support data and information exchange. Experience suggests that some of the greatest challenges in information management today are concerned with organisational issues, rather than technical concerns in the delivery of information which supports informed decision-making. Consequently, topics are addressed at management and strategic levels, rather than from a technical or methodological standpoint, and alternative approaches are suggested from which a selection or adaptation can be made which best suits local conditions. Nevertheless, in adopting this framework approach, we have tried to adhere to recognised conventions and formalisms used in information management and trust that in producing a 'readable' set of handbooks the integrity of the materials has not been compromised.

Overall, the handbook series comprises:

Companion Volume
Volume 1 Information and Policy
Volume 2 Information Needs Analysis
Volume 3 Information Product Design
Volume 4 Information Networks
Volume 5 Data Custodianship and Access
Volume 6 Information Management Capacity
Volume 7 Data Management Fundamentals

Collectively, the handbook series promotes a shift from tactically based information systems, aimed at delivering products for individual project initiatives, to strategic systems which promote the building of capacity within organisations and networks. This approach not only encourages data to be managed more effectively within organisations, but also encourages data to be shared amongst organisations for the development of the integrated products and services needed to address complex and far-reaching environmental issues.

The handbook series can be used in a number of ways. Individual handbooks can be used to guide managers on specific aspects of information management; they can be used collectively as a reference source for strategic planning and project development; they can also provide the basis for a series of short courses and training seminars on key challenges in information management.

The companion volume provides the background to the handbook series. It also assists readers in deciding which handbooks are most relevant to their own priorities for strengthening capacity.

A second series of handbooks is planned to provide more detailed guidance on information management methodologies, including the areas of data and technology standards, database design and development, application of geographic information systems (GIS), catalogues and metadatabases, and the development of decision-support systems. The current series deals only briefly with formal system development methodologies, and for more detailed treatments the reader is encouraged to access the wide range of published and electronic resources available in libraries and on the Internet, some of which are alluded to in individual handbooks and reference sections.

A number of computer-based training tools have been developed to accompany the handbook series and are used in the training programme. These are based on a protected areas database, a tree conservation database, a GIS demonstration tool and a metadata directory. They aim to demonstrate key aspects in the collection, management and analysis of biodiversity data, and the subsequent production and delivery of information. They also illustrate practical issues such as data standards, data quality-assurance, data access, and documentation. Each training tool is supported by a user guide, together with a descriptive manual which traces the evolution of the tool from design, through development to use.

1 INTRODUCTION

The phrase 'information management capacity' means different things to different people. To some, it applies only to the hardware and software necessary to build databases and information systems. To others, it encompasses the political commitment, constructive policies and public support necessary to apply information to the resolution of environmental concerns. This document employs a pragmatic definition of information management capacity, namely the direct assets available to an organisation in terms of its **data**, **expertise** and **facilities**, and indirect assets in the form of **management systems** and **partnerships** with other organisations (see Box 1).

Direct assets are relatively easy to quantify, since they are physical in nature and can be documented. Indirect assets, which serve to consolidate the direct assets, are more subjective in nature. For example, two organisations with roughly similar data, expertise and facilities may perform very differently due to variations in the quality of their management systems, although it may be difficult to quantify exactly why. An organisation's management systems dictate the efficiency of everything from task allocation and scheduling, to project design, strategic planning and cooperation with external partners. If the systems work, then all of these aspects run smoothly; if they don't, then productivity may suffer.

Box 1 Elements of information management capacity

Direct assets

- Comprehensive data on appropriate themes.
- Expertise and facilities to store, maintain and quality-assure data.
- Expertise and facilities to integrate, interpret and convert data into information.
- Expertise and facilities to compile and communicate information to users.

Indirect assets

- Management systems and procedures to coordinate information production.
- Liaison, cooperation and partnerships with external organisations.

Constraints in information management capacity can seriously impede progress towards organisational goals, limiting the contribution that organisations are able to make to addressing environmental concerns. Considering the magnitude of the challenges affecting most countries in this area, building information management capacity can be seen as an issue of national importance. However, it is almost inevitable that 'needs' for capacity building will outweigh what can be delivered with available resources. This applies to individual organisations and networks alike, and equally to government, non-government and private organisations. Clear priorities for capacity building are needed, and the greatest challenge is deciding how and where to channel investments.

Taken as a whole, the capacity of a network of organisations depends on the individual capacities of its partner organisations. Thus, when attempting to strengthen the capacity of a network to manage information effectively, typical aims are to **address critical gaps in capacity, supplement (not duplicate) existing capacities, and seek efficiencies through closer cooperation** between the organisations concerned. These are strategic aims and, consequently, require strategic planning.

Clearly, investments in capacity building should, wherever possible, be based on a **survey** of where existing capacities are located and how readily these can be mobilised for specific tasks. This can be achieved by assessing the capacity of the network's partner organisations, for instance with respect to the range and quality of the datasets they manage, the human resources which they possess, and their ability to access technical and physical facilities.

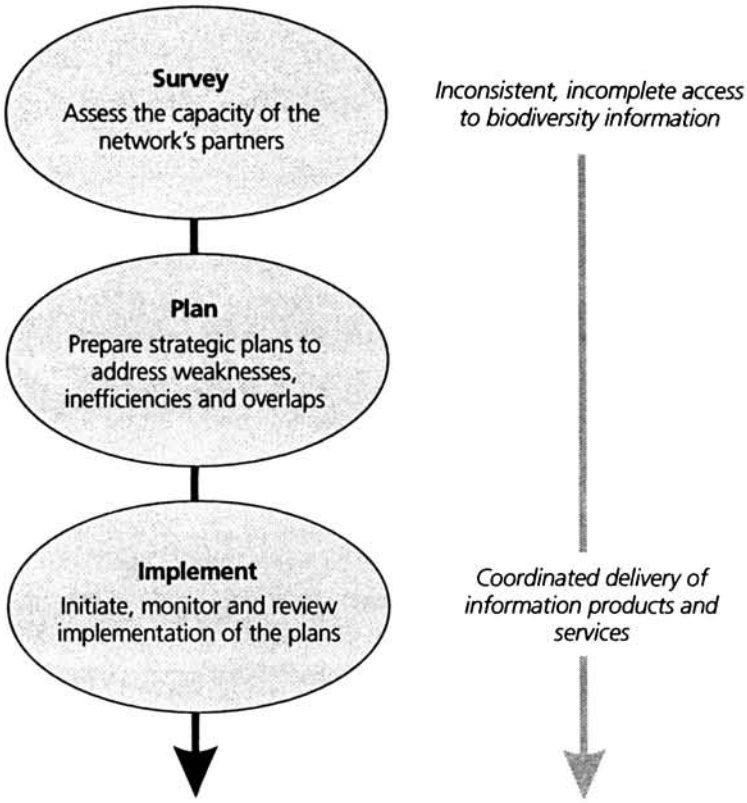
The survey contributes directly to the process of strategic planning, which involves identifying which types of capacity are **critically lacking**, which are in **need of** strengthening, and which areas would benefit from **closer cooperation**. This allows objectives, targets, roles and responsibilities to be assigned to organisations in such a way that their goals are achieved in concert with the needs of the network — and society in general — for information. The main justification for the effort expended on this process is to provide enhanced support to users, such as decision-makers in the public and private sectors.

A diverse range of tasks are encompassed by the phrase 'information management', and most organisations will take considerable time to achieve their maximum level of effectiveness in this area. Ways need to be found to accelerate this process for the benefit of the organisations concerned, and also the networks in which

they operate. Efforts to build information management capacity need to be **carefully prioritised**. They also need to be **well-coordinated**. Within an organisation this is the responsibility of senior mangers; within a network it is normally achieved through a steering committee plus associated administrative support (collectively known as a hub – see Volume 4).

Figure 1 presents a three-stage process for building information management capacity within a network. The process assumes that the network's goals have already been defined and that the information needs of its user base have been determined; in short, that the network is being effectively coordinated and managed. The aim is to transform a situation in which biodiversity information is inconsistently handled, incomplete in coverage and difficult to access, into one in which relevant and timely information products are available to defined sets of users.

Figure 1 Building information management capacity



2 INSTITUTIONAL SURVEY

2.1 Overview

When large numbers of organisations are involved in a survey, it may become very **demanding in both cost and time**. Taken from the design of the questionnaire to the analysis of the final results, a survey conducted at the national level, for example, covering upwards of 50 organisations, could take up to six months to complete. For this reason, it is essential to engage the **full support and resources** of the network's partners, by making it clear to them why the survey is being conducted and how it will be used to benefit them. Specifically, participating organisations can expect to:

- develop ties with other organisations;
- help plan the development of the network;
- understand better where to obtain data and information on complex, cross-sectoral issues, such as conservation and sustainable use of living resources; and
- review (and, potentially, address) internal strengths and weaknesses in information management capacity.

To ensure that the survey is taken seriously, it also needs to be recognised as being completely **impartial** (i.e. beneficial to the network as a whole, not specific organisations). Thus it is desirable for the survey to be overseen, if not actually implemented, by a steering committee, body or other group which **represents the interests** of the network's partners (e.g. a network hub). This group can be charged with the task of initiating the survey, and ensuring that its results are employed to the maximum effect.

In many cases, a comprehensive survey of capacity may be unnecessary. The main requirement is to determine the availability of **necessary capacities**, rather than all capacities, some of which may not be needed. A key question to bear in mind when conducting the survey is 'what capacities will be needed by the network to deliver its goals?', as well as the more elementary question of 'what capacities currently exist?'.

2.2 Factors to Assess

The survey should empower managers to review and, perhaps, restructure their information management activities in such a way that their corporate goals are consistent with those of the networks in which they operate. It should address all of those capacities outlined in Box 1, plus additional capacities where these are relevant or specific to local conditions. Aspects of an organisation which might be considered for inclusion in the survey are summarised below (these are expanded in the sample questionnaire presented in Annex 2).

- **Institutional details**

  Basic institutional details need to be recorded, for example the full name (with acronym if applicable), address and further contact details. The overall mission of the organisation, plus details of specific programmes and projects, should be described as they relate to the network's goals. In particular, brief suggestions on how the network is expected to contribute to the organisation, and *vice versa*, should be solicited. Finally, details of the individual or group completing the survey should be obtained, for example their role within the organisation, and their contact details for follow-up.

- **Direct assets**

  1. Datasets

  Summaries of the datasets for which the organisation acts as custodian, for example their theme, scale, completeness, currency, reliability, precision and pricing strategy, plus an indication of how they were collected, their intended uses, and the data standards and quality-assurance procedures which have been employed. Particularly important datasets (i.e. essential datasets – see Volume 3) should be highlighted, as should priority data needs.

  2. Expertise

  Descriptions of the expertise available to the organisation which is of most relevance to information production, for example the number and education/ training-level of researchers, data managers, librarians, statisticians, analysts,

designers, publishers or communicators. Particularly strong or relevant expertise should be highlighted, as should priority needs.

3. Facilities

Descriptions of the main facilities accessible by the organisation to enhance information production, for example measuring equipment, computer software and hardware, data input and output devices, and physical facilities (e.g. dedicated premises, transport). Particularly useful or relevant facilities should be highlighted, as should priority needs.

- **Indirect assets**

1. Management systems

The best evidence for effective management systems is productivity, and a good means of measuring this is by reviewing the organisation's portfolio of projects as they relate to the provision of data and information to users. Particularly impressive or illustrative projects should be highlighted. Weaknesses in management systems, where these are widely recognised, should also be described.

2. Partnerships

Memoranda of Understanding (MoUs) provide indirect evidence of external partnerships, although these do not guarantee cooperation in themselves. Further indicators include the extent to which data and other commodities are shared with other organisations (e.g. lists of data sources), the number of joint projects, and the degree to which common standards and policies for information management are employed. Organisations should be encouraged to prepare diagrams illustrating the nature of their linkages with other organisations, in particular those which involve the transfer of data and information (see Section 3.4). Productive partnerships should be highlighted, and weak ones also noted.

2.3 Method of Assessment

One of the earliest tasks for the group undertaking the survey is to define its scope, in terms of both the **number** and **type** of organisation to include. In the simplest case,

this may be the membership of an existing network focused on conservation or environmental issues. Under such circumstances it may be desirable nevertheless to include additional organisations — both nationally and abroad — where these have important contributions to make (e.g. data holdings).

Where no existing network is established, a policy of **inclusion** is normally the best strategy. This may lead to a larger, more diverse survey, but avoids the possibility that some organisations will feel neglected. In countries with rich institutional structures, where a policy of inclusion would lead to an impractically large workload, the survey may be conducted in two stages. Initially, a **letter of invitation** is delivered to all potential organisations explaining the purpose of the survey and inviting them to decide whether they would like to participate. The letter may also invite each organisation to describe briefly how it expects to help mobilise biodiversity information. Many organisations will decide not to participate at this point, saving both themselves and the survey team much work at a later date.

Once the task of selecting organisations has been completed, the next challenge is to identify specific people within them to take charge of the survey. These people are sometimes referred to as **focal people** or **focal points**. Various options are then available for implementing the survey. The simplest option is to produce a questionnaire and distribute this to focal points in the selected organisations. The main problem with questionnaires is that they have a notoriously poor response rate. Various techniques exist to improve this (see Section 2.4) but, even when these are employed, the response rate still may be too low to be effective. Some form of active engagement of the organisations is usually necessary. Various suggestions are presented below.

- Before distributing the questionnaires, invite participants to a workshop to discuss the purpose, time-scale and method of completion of the questionnaire. This provides an opportunity to engage them in the process and assist by reviewing the questionnaire.

- Telephone or visit each of the selected organisations after the questionnaires have been distributed, or invite them to a 'surgery' where their reservations or difficulties can be addressed.

- After most of the questionnaires have been returned, invite participants to a further workshop to review the survey's findings, and consider how these can be transformed into strategic capacity-building plans.

In complex cases, more intensive site visits may be necessary to assist with the completion of questionnaires. For instance, it may be necessary to conduct individual or group meetings, brainstorming sessions and other fora in order to generate the required level of commitment. Interactive dialogue is especially useful when addressing the more subjective aspects of the survey, such as the requirements the organisation has of the network, or the success of its external partnerships. Ideally, the survey encourages staff to review their personal and corporate strategies with respect to information management and consider how efficiencies can be made.

2.4 Questionnaire Tips

Typically, a response rate of less than 10 percent is likely from a questionnaire sent out 'blind' without any forewarning, involvement or contribution by the receiving organisation. This figure can be improved upon substantially by anticipating the problems which may occur. One of the simplest ways of improving response rate is to ensure that the questionnaire is written in an **appropriate language**. Naturally, this applies mainly to international surveys, but also applies to individual countries where multiple languages are spoken. Further ways to improve response rate are described below:

- **Generate interest**

  Organisations are unlikely to commit a lot of time into filling out questionnaires unless they perceive that tangible benefits will be gained. Benefits should therefore be made explicit in a covering letter, together with an indication of why the involvement of the organisation is essential to the survey. Annex 1 presents a sample covering letter based on several excellent examples drawn from surveys world-wide (for example, see Government of the United Kingdom 1995 or Government of Sri Lanka 1996a). Where possible, questionnaires should be sent to a specific unit or individual focal point in the organisation who can be relied upon to take appropriate action.

- **Make it brief**

  Questionnaires should be kept as short as possible and should remain focused on questions which directly support the network's developmental goals. Wherever possible, questionnaires should be completed as far as possible before they are

distributed (e.g. the name and address of the organisation is already printed). It is far easier and more compelling for recipients to correct existing data than to enter details from scratch.

- **Make it clear**

  The thematic scope of the survey should be made clear, the questions simple, and jargon or confusing terms avoided. For example, the term 'biodiversity' would need to be defined since it commonly has several meanings, including all lifeforms, the diversity of lifeforms, or simply the conservation of living resources. A good way of clarifying how the questionnaire should be completed is to include an 'example' questionnaire which has already been filled out by another, perhaps fictitious, organisation.

- **If all else fails . . .**

  On rare occasions, questionnaires will not be returned due to lethargy, low priority or suspicion of motives. One solution is to publish an interim set of survey results showing blanks where organisations did not respond. When these are sent to the organisations concerned, accompanied by details of a final publication date, a rapid response may be forthcoming, since few organisations would wish to be seen as uncooperative.

3 ANALYSING THE RESULTS

3.1 Overview

The results of the survey can be analysed in a number of ways depending on the circumstances in which it was conducted and the requirements placed on it by the lead organisation. In general, the analysis profiles the organisations concerned in such a way that capacity-building activities can be planned in a consistent and transparent manner. This is especially true if the analysis is to be used to allocate or redistribute resources, for instance financial resources. Typical outputs from the analysis include a status report, a dataset catalogue and a summary of institutional partnerships.

It is tempting to see the survey results as a pool of data suitable for statistical analysis. For example, one might determine that 43% of the organisations surveyed were equipped with the Windows operating system, whereas only 10% were equipped with UNIX. Similarly, one might determine that 15% of organisations managed biological datasets, whereas only 5% managed data on human social conditions. Whilst these statistics help identify general trends across many organisations, they do not assist significantly with the planning process. Indeed, the main reason for conducting the survey is to determine the **capabilities and needs of individual organisations** to enable strategic planners to identify specific investments, efficiencies and areas for increased cooperation.

3.2 Status Report

At minimum, the main results of the survey should be summarised in a report suitable for distribution to participating organisations. This injects transparency into the survey process and compensates organisations for their efforts in completing questionnaires. If successful, the status report could be updated on a regular basis and form the main vehicle for documenting the growth of the network.

Simple diagrams, maps, charts, and tables may be used to express how information management capacity is distributed across the organisations surveyed. Typical questions that the report may wish to address include:

- What range of datasets is available to the network and in which areas are data lacking?

- What (if any) standards are applied to the collection, storage and quality-assurance of data?
- What expertise is available and in which areas do the greatest shortages occur?
- What range of facilities is available and what specific facilities are needed?
- Which facilities are in common use across the network (e.g. software and hardware, laboratory equipment, communications facilities)?

In addition, the status report highlights areas of duplicated effort, areas requiring closer cooperation, and under-utilised capacities which could be mobilised in support of the network's goals. These topics could be covered within a more comprehensive discussion of the network's strengths and weaknesses, which might also summarise the productivity (or otherwise) of the partnerships between individual organisations. Narrative text, as opposed to charts and tables, is usually the best form in which to present these more subjective assessments of information management capacity.[1]

Optionally, the status report could also contain specific plans for developing information management capacity (e.g. investments, efficiencies and cooperation). This is the realm of strategic planning (see Section 4), where available capacity is compared with what is needed to enable the network to deliver relevant and timely information products to its user base. The actual survey data, if presented at all, is usually consigned to annexes or included as a separate volume. Naturally, an executive summary should be prepared to highlight the report's key findings.

3.3 Dataset Catalogue

Potentially the most useful output of the survey is a catalogue or directory of datasets (Medyckyj-Scott *et al.* 1996). This helps users to **locate the data and information they require**, and provides sufficient description for them to decide whether or not the dataset is appropriate to their needs (for example, see WCMC 1994 or Government of Sri Lanka 1996a). If a dataset catalogue is to be generated from the survey results, it is suggested that a **separate form** is prepared for describing

1 Ample time should be provided for participating organisations to review the report before it is published and distributed widely.

datasets. If this is done, the dataset catalogue can be assembled easily by collating and editing the dataset forms when they are returned, without needing to extract this information from lengthy institutional details (see Annex 2). Naturally, brief details of the custodian should be included on each such form to facilitate access to the data by prospective users (see Volume 5).

Not all datasets described in the questionnaires need to be included in the catalogue. For example, there is little point including those which, for reasons of corporate policy or lack of capacity, are not physically accessible to external users. In addition, datasets which are so specialised that they have little bearing on the network's goals may be excluded. The aim is to create a catalogue that presents a set of **useful datasets**, as opposed to an exhaustive list. This, together with accuracy, will build the reputation of the catalogue. In summary, the following questions may be asked of the final catalogue:

- Does it enable users to locate datasets easily?
- Are all the listed datasets relevant to the network's goals?
- Are all the listed datasets accessible?
- What mechanism has been established to keep the catalogue up to date?

Dataset catalogues can be published in several ways, for example as hard-copy publications, as computerised databases or as an on-line information service, and may be disseminated widely to promote their use (electronic versions are often referred to as **metadatabases**, since the raw data are metadata or, literally, data about data). As the profile of the catalogue rises, and it becomes the main method by which users locate data, many organisations will wish to submit new details to keep the catalogue up to date. In this way, the catalogue can become virtually self-sustaining, rather than relying on specific project funds or donations.

3.4 Analysis of Linkages

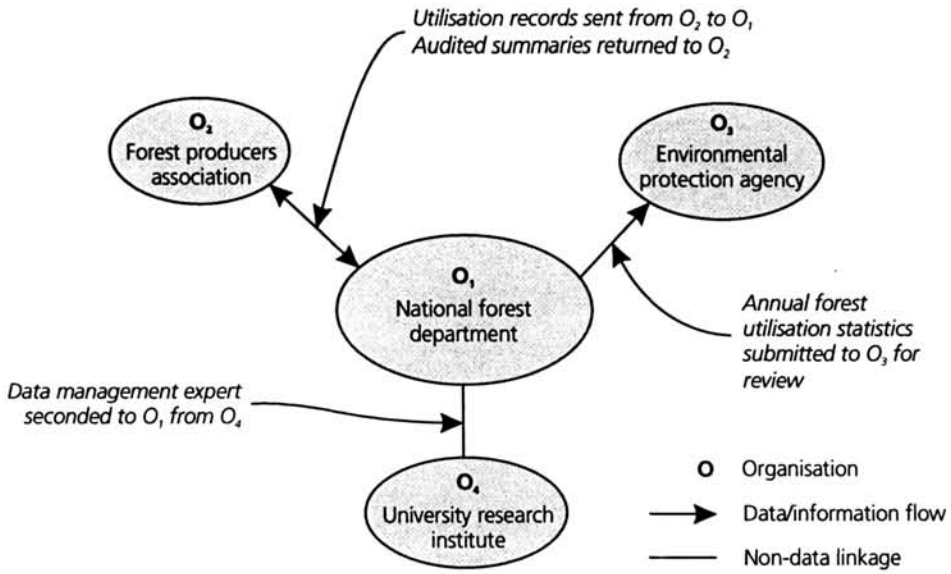
Cooperation between organisations, variously referred to as linkages, ties, partnerships and collaborations, can be represented using special-purpose diagrams, such as the one shown in Figure 2. The diagrams follow a convention in which organisations are represented by ovals and paths of data flow by arrowed lines. Standard lines depict other types of cooperation, such as the sharing of expertise or

facilities. Labels expressing the general nature of the cooperation may be used to clarify the diagram as shown.

Figure 2 illustrates how a national forestry department (labelled O_1 in the diagram) views its linkages with other selected organisations. In this case it receives data from the forest producers association (O_2), an industry body, and provides data back to this organisation and the environmental protection agency (O_3). A non-data linkage is maintained with a university research institute (O_4), in this case involving the secondment of a member of staff.

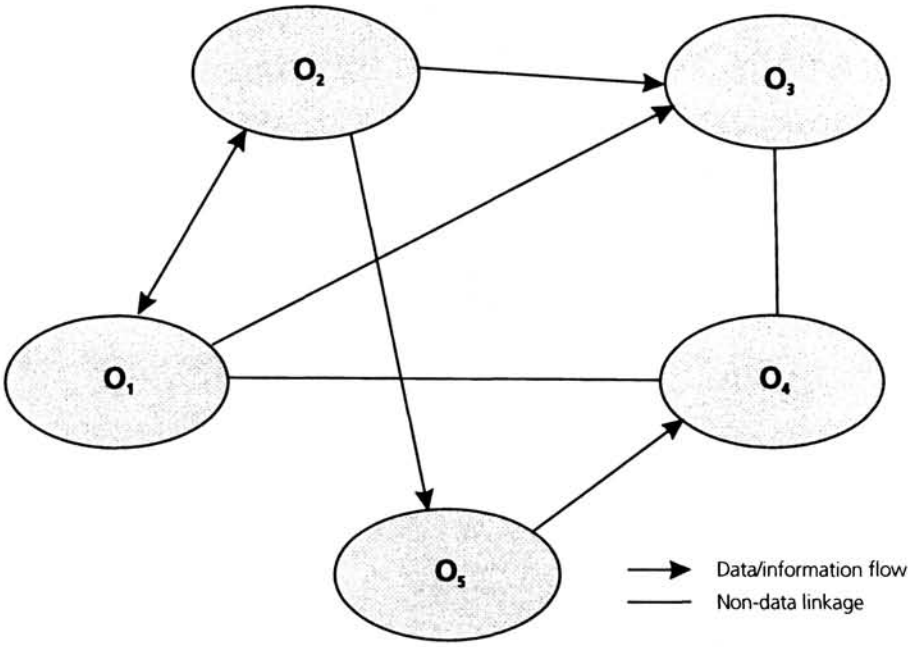
Similar diagrams could be produced by all those organisations participating in the survey, revealing interesting inconsistencies when two organisations perceive their inter-relationships in different ways. For example, in the current case O_1 may illustrate its provision of data to O_3 (see Figure 2), but the latter may not recognise this if the supply is uninformative or unreliable.

Figure 2 Example linkage diagram



As well as providing a good opportunity for self-assessment within an organisation, linkage analysis can be applied at the network-level to reveal areas requiring closer cooperation, or areas where duplication of effort may be occurring. To do this, the linkage diagrams produced by individual organisations must be reviewed, harmonised and merged into a single composite diagram, such as that shown in Figure 3. This may involve significant dialogue between the organisations concerned as they agree a common position on the nature of their linkages (each linkage in the composite diagram should be acknowledged to be correct by both parties).

Figure 3 Composite linkage diagram



The composite diagram is a useful way of summarising the linkages between a group of cooperating organisations. However, when large numbers of organisations are involved, the diagram can quickly become overloaded. Thus, for clarity, it may be necessary to separate it into a series of simpler diagrams representing cooperation on specific themes.

Composite diagrams can be interpreted in several ways. For example, organisations which generally supply data may be important **custodians**. Organisations which generally receive data may be important **users**; and organisations which generally maintain non-data linkages may be important **facilitators** of the information production process (see Volumes 4 and 5). Notable absences of cooperation are equally revealing, particularly between organisations which are known to possess similar goals (and may be duplicating each other's efforts) or have complimentary skills and equipment which could be shared. In summary, linkage analysis clarifies where cooperation **is occurring** and, also, **where it could be occurring**.

4 STRATEGIC PLANNING

4.1 Overview

Having assessed the distribution and quality of existing capacity, the next step is to create plans for the development of new capacities to achieve organisational and the network's goals. The survey prepares the ground for this endeavour, ensuring that these plans reflect the true needs of participating organisations for investment and cooperation.

The results of the survey are not the only source of information needed for strategic planning. Indeed, the reason why the process is referred to as **strategic** is that the new capacities which the network builds are intended to address its long-term, collective needs, as well as the immediate priorities of individual organisations. For this reason planning is guided not only by the results of the survey, which highlight areas in which capacity building may be required, but also by the results of earlier processes which have identified the overall goals of the network (the processes in question are amply described in the 'information cycle' introduced in Volume 1). Active consultation and consensus-building may be necessary to determine the network's goals, which then translate into the definition of a series of priority **products and services** for the network to deliver to its users (see Volume 3).

In the case of a biodiversity information network operating at the national-level, the main goal may be to support government policy-making in the area of sustainable use of living resources. This may translate into a series of one-off information briefings on current issues of concern (i.e. products), plus a commitment to continuously monitor agreed ecological parameters (i.e. a service). A complementary goal of the network may be to reduce the loss of sensitive habitats through ill-informed development planning. This may translate into a series of map-based products illustrating the location and value of sensitive habitats, for use by construction companies and local authorities.

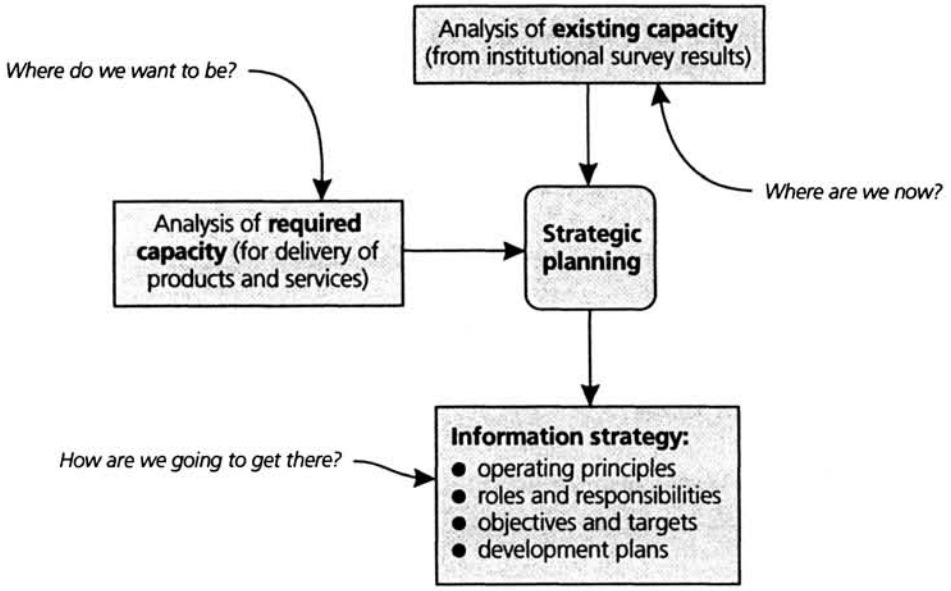
Once the network's products and services have been agreed, it is possible to analyse what capacities are required to deliver them, for instance in terms of essential data, expertise and facilities. This process is very important since it sets targets for capacity building across the network which, once reached, enable it to achieve its goals effectively. Strategic planning then becomes a relatively simple task: **match the capacities outlined in the survey to those required, and prepare a strategy to**

move forward (see Figure 4). As with other strategic exercises, this process can be summarised in terms of three underlying questions as follows:

- Where are we now?
- Where do we want to be?
- How are we going to get there?

The first question is addressed by the results of the institutional survey; the second by analysing which capacities are required to deliver the network's main products and services; and the third through the preparation of an **information strategy**.

Figure 4 The strategic planning process



4.2 Information Strategy

Typically, a network information strategy contains a statement of operating principles, covering the goals of the network, its membership, form of cooperation and organisational structure. It goes on to describe the major products and services which the network aims to deliver, and the users for whom these are designed (for example, see BCIS 1996). The roles and responsibilities of the network's partners are also highlighted and, where appropriate, specific objectives and targets for information production are assigned to them. Finally, the strategy contains plans for the development of the network's capacity in areas which have been identified as crucial to its success (for example, see Government of Sri Lanka 1996b, Government of Egypt 1997 or Government of Thailand 1997). These may include extensive detail, for example projected sources of data, job descriptions and procurement plans, confined to annexes.

It may be possible to implement parts of the strategy simply by improving coordination between organisations or sharing scarce resources. Also, the value of 'free' resources for capacity building should not be underestimated. For example, Internet-based literature, self-teaching tools, training materials and 'source books' for skills development are widely available from governments, non-governmental organisations and international organisations. Nevertheless, many information strategies will require direct financial support to implement and it is the role of senior managers within the network, coordinated by its steering committee, to enable access to financial resources in such cases. Potential sources of financial support are presented in Box 2.

4.3 Development Plans

Development plans are the heart of the information strategy. They range from brief concepts for small-scale projects, up to detailed proposals for the development of the network's data, expertise, facilities and partnerships (i.e. the areas covered by the survey). In order to maximise the benefits of network participation, individual organisations may wish to extend the development process to the operation of their internal management systems.

Typically, a development plan would include a set of clearly-defined objectives and targets for capacity development, plus preliminary indications of costs, time-scales and management responsibilities. Plans could be generated for the

Box 2 Sources of financial support for capacity building

- Direct contributions from the network's partners.
- 'In-kind' contributions from the network's partners (e.g. the exchange of data, expertise or other services).
- Implementation of joint projects with government, industry or international organisations.
- Government grants or incentive schemes.
- Support from bilateral and multilateral development assistance agencies.
- Funds released by efficiency savings or from changes in government priorities.

network as a whole, or be prepared for individual organisations — provided these also address the needs of the network as a whole. When presented in the form of sound business cases, development plans may prove useful in helping to convince potential sources of financial support to invest in the network.

Key areas in which to build information management capacity are reviewed below. The reviews necessarily are brief since, in any particular situation, local conditions, needs and perspectives are bound to dictate precise requirements.

- **Data**

  A network's datasets need to **underpin the products and services it wishes to generate**. The mobilisation of data on essential themes should therefore be one of the network's top priorities. An early task is to determine which datasets are essential to the network's operation, and to ensure that the custodians (i.e. primary sources) of these have the capacity to manage them effectively. Capacity building can then focus on the twin objectives of improving the **quality** and **accessibility** of datasets.

Responsibility for managing datasets can be identified using the principles of custodianship (see Volumes 4 and 5). Other fundamental techniques, relating to the storage, standardisation and quality-assurance of datasets, can also be applied to the mobilisation of datasets after management responsibility has been assigned (see Volume 7).

- **Expertise**

A network's expertise should reflect its needs for generating products and services, and may be very wide ranging. They include the basic skills necessary to collect and process data, but also embrace the areas of publishing, communication and management, plus specialist areas, such as computer systems support, programming and electronic communications.

Skills development can be addressed through a variety of learning processes, including formal education and training courses, lectures, seminars, informal workshops and discussion groups, and 'on the job' coaching sessions. Secondments, study visits and self-study breaks are also popular and useful. Depending on the topic, some learning environments are more appropriate than others. For example, training in the use of computer software may be delivered directly in the workplace, perhaps using real problems to illustrate how the software is used. Conversely, training in matters of corporate policy and management may need to be tackled in discussion groups free from the everyday distractions of the workplace. In general, highly applied topics, such as the generation of information for policy-making, benefit from a combination of experience-sharing and formal instruction.

- **Facilities**

The network's facilities should support its needs for information product development (see Volume 3). Typical facilities embrace the equipment necessary to gather and process data, through to the facilities needed to publish and distribute information. Although computer equipment (including communication technologies) tends to dominate discussions of information management facilities, the need for physical infrastructure, such as buildings and transport, should also be considered.

Requirements for facilities are best specified in functional terms (i.e. the tasks which need to be done), rather than focusing on particular equipment brands or models. The latter change very rapidly and should be selected on the basis of proven experience or following independent advice. A process of tender is often applied to the procurement of equipment, allowing quotations from a range of potential suppliers to be compared in advance of purchase (Aronoff 1991). Organisations may wish to share the burden of acquiring and maintaining facilities by doing so as a group, particularly where they are expensive or used only intermittently (e.g. specialist data collection or processing devices).

When acquiring new facilities, due consideration should be given to training needs, running costs, maintenance and technical support. This is particularly relevant to computer equipment which, although not always essential, can significantly enhance information management capacity (see Volume 7).

- **Management systems**

The management policies, systems and procedures adopted by the network's partners bind together its physical assets into a cohesive information management capacity. They govern the quality of the contributions made by individual organisations to the network, and affect the degree to which constructive partnerships are formed.

Organisations evolve a particular style of doing things, based upon their histories, the personalities of their staff, and the degree to which they are constrained by bureaucracy and resources. Like human cultures, organisational 'cultures' evolve naturally and need not necessarily be changed unless they are ineffective. Where this is the case, change is often encouraged to emerge from within the organisation, perhaps with external facilitation, unless exceptional circumstances prevail. For example, the organisation may not be fulfilling its obligations to provide access to data, or may be failing to ensure the safety of its staff.

Organisations evolve their management systems in line with market demands, the expectations of society, and the opportunities created by new technologies. Sometimes this results in job losses, although it can be argued that the efficiencies gained serve to enhance the productivity (and therefore the prospects) of the organisation in the long term. The pace of change has quickened over the last two decades, such are the opportunities presented by global markets and information

technology. For example, many organisations have decided to replace their traditional management hierarchies with flexible, self-regulated teams.

When deciding how to enhance the management of an organisation, staff at all levels should be engaged in consultation. Almost certainly, it is their vision which will unlock the potential of the organisation. Consultation should not be rushed, since it may take considerable effort to assess, reconcile and consolidate the different views expressed. Typical areas to examine include project management, reporting and control, performance assessment, time management, management of human resources, and management of external cooperation.

- **Partnerships**

Partnerships between organisations are a relatively unexploited form of capacity, with many organisations still preferring to duplicate each other's activities. Making partnerships an obvious, attractive way of doing business is one of the greatest challenges for an information network, and much progress still has to be made (see Volumes 4 and 5).

Partnership generally occurs at two levels: the **management level**, where formal agreements may be signed to develop or confirm long-term alliances; and at the **operational level**, where data and expertise can be given, bartered or sold to address urgent and immediate challenges. At the management level, formal ties, such as Memoranda of Understanding (MoUs) and 'twinning' arrangements, provide helpful frameworks in which to plan cooperative activities. At the operational level, cooperation can be facilitated through various cooperative activities, including joint project teams, shared training courses, seminars, workshops, formal secondments and by encouraging informal communications between staff.

Ideally, the sharing of data, expertise and facilities should become an everyday activity amongst the network's partners. This can be promoted through the agreement of consistent principles, policies and procedures for cooperation, and by building trust through common objectives and a spirit of fair dealing.

5 CASE STUDY: BIODIVERSITY DATA MANAGEMENT (BDM) PROJECT, GHANA

5.1 Overview

Several policies and programmes exist in Ghana for sustainable development of natural resources and the environment. Ghana's *Vision 2020*, for example, sets the framework for Ghana to become a middle income country by the year 2020, recognising that success will depend on the integration of science and technology in the various development programmes to ensure the integrity of the environment.

The *National Environmental Policy* seeks, among other objectives, to maintain ecosystems and ecological processes essential for the functioning of the biosphere, and to ensure the sound management of natural resources and the environment. Other framework documents include the *National Forestry and Wildlife Policy* (1993), *Ghana Wildlife Policy* (1994), and the *Forestry Development Master Plan* (1996), which provide for the establishment of a viable system of ecologically-representative protected areas, and seek to increase public awareness of the benefits of conservation and biodiversity. Further, a policy and legislative framework for bioprospecting is currently in preparation.

Key project initiatives include the *Ghana Environmental Resource Management Project* (GERMP), which commenced in 1993 for five years and whose primary objectives are to support implementation of the *National Environmental Action Plan* (1988), and to strengthen the capacity of both government and society at large to manage environmental resources. A component of this project is the development of an environmental information system for:

1. the collection of information to monitor environmental quality against agreed threshold levels; and

2. for the collection, interpretation and presentation of topographic, present land use, land ownership, land suitability and meteorological information determined by the needs of information users, planners and managers of environmental resources (World Bank 1992).

Other landmark initiatives include the *Forest Resource Management Project* (World Bank 1988), and its successor, the *Natural Resources Management Project*

aimed at sector policy reforms, management strengthening and institution building to facilitate the sustainable use and development of forest, wildlife and natural resources.

Actions Ghana has taken specifically in support of the CBD include the *Biodiversity Country Study*, which is providing baseline information on the status of biodiversity in the country, the *Biodiversity Strategy and Action Plan*, and the *Biodiversity Data Management Strategy*, which is an output of the *Biodiversity Data Management (BDM) Project.*

5.2 The BDM Project

In order to assist countries with the implementation of the CBD, the United Nations Environment Programme (UNEP), in collaboration with WCMC and others initiated a GEF-funded project entitled Biodiversity Data Management Capacity in Developing Countries and Networking Biodiversity Information (BDM).

The overall objective of the Project is to facilitate the building of national capacity for biodiversity data management and exchange as required by the CBD. Focusing on developing countries and initially on biodiversity data compiled in the parallel Biodiversity Country Studies Project, it aims to mobilise these data as a key instrument in building advanced national capacity for planning biodiversity strategies and actions for conservation and sustainable use.

The Project provided for ten countries (including Ghana) to participate in the following activities:

- conducting a national institutional survey, to report on the existing national capability for data management;
- preparing a national plan for the management and application of biodiversity data in support of the CBD;
- developing a series of basic guidelines to support efficient information management; and
- compiling a resource inventory as a 'toolbox' of available methods and technologies from which countries can draw upon selectively to suit their needs, involving both North-South and South-South cooperation.

The Project is now almost complete in Ghana. Key outputs include the *Institutional Survey Report* and the *Ghana Biodiversity Data Management Strategy*.

5.3 Institutional Survey

In support of the *Ghana Biodiversity Data Management Strategy*, an institutional survey was conducted focusing on three main topics:

1. the information management capability of organisations within Ghana, notably the availability of human resources (expertise) and technical facilities;

2. linkages between the organisations surveyed, notably those involving the transfer of data (including some overseas);

3. the national coverage of datasets on biodiversity themes.

In compiling the survey report, over 120 organisations (government, research/academic organisations, information centres, NGOs and international agencies) were approached, using a questionnaire similar to that provided in Annex 2. In addition, a national workshop on the institutional survey was held in July 1996. It should be noted that Ghana was one of three counties (with Poland and Thailand) which tested and reviewed the preliminary questionnaire developed for the Project by WCMC.

Of the organisations approached, 30 were fully assessed in the report. Some of the major findings were as follows:

- There is a need for both facilities (e.g. hardware, software and electronic communications) and human resources (e.g. computer scientists, information analysts) in the majority of organisations surveyed.

- The use of computers for managing biodiversity data was generally low.

- There is a relatively high degree of data flow between organisations, with around half considered to be major providers and users of biodiversity data.

- There is a high degree of dataset complementarity between organisations surveyed and the data are generally considered to be well maintained.

- Most datasets are available during working hours.

- Although there is a wide range of taxonomic groups, biomes and land-use categories covered, gaps in dataset coverage do exist and are present due to lack of funds, absence of trained manpower, and unavailability of equipment and/or laboratory facilities. Further, whatever data exist tend to be scanty, scattered and not in forms that lend themselves well to policy-relevant analysis.

- It would be beneficial to extend the study to organisations that did not initially respond.

The full survey report, providing results and analysis, is given in Oteng-Yeboah and Bamfo, 1996.

5.4 Ghana Biodiversity Data Management Strategy

A key output of the BDM Project in Ghana is a strategy for how to translate the country's biodiversity data into information products and services for decision-makers capable of influencing implementation of the CBD. The *Strategy* comprises the following sections:

- Introduction: provides background to preparation of the Strategy.

- National development context: this section considers development of the Ghana Biodiversity Data Management System (GBDMS) in the context of Vision 2020 and current environmental policy.

- Biological resources in Ghana: an outline of the resource base of the country, conservation concerns, and resource management, particularly in the context of the wildlife and forestry sectors.

- Biodiversity information: key issues in the production of information in support of decision-making, potential users of the GBDMS, and definition of priority information products and services are considered. The standard products which are suggested include:

    1. Ghana Biodiversity Report: envisaged to be a series of reports on specific natural resource conditions, changes and policy measures which affect biodiversity;

2. Biodiversity Data Compendium: an indicator-based product aimed at collating and presenting accurate and reliable data and other facts related to biodiversity in Ghana, and providing a tool for referral, forecasting and action planning;

3. Ghana Biodiversity Update: intended to be a bulletin to inform on the status of implementation of the Convention on Biological Diversity; and

4. National Biodiversity Assessment: an annual report to review issues and problems affecting biodiversity; highlight key concerns; present data; outline achievements of on-going interventions; document new knowledge and experience; and propose new policy directions and follow-up actions.

- Data resources: following from the institutional survey, this section provides an overview of data types available in the country and further requirements in the production of priority information products.

- Data handling: consideration of system requirements in the development of the GBDMS, which is envisaged to be a distributed network of integrated information centres and custodians managing and sharing data in accordance with agreed procedures and standards. The GBDMS, in being a GIS-centred data management system, is to build on and complement the spatial framework developed for land-related datasets within the Environmental Information System under the GERMP initiative. A prototype GBDMS will demonstrate how such a system can be used to highlight biodiversity and sustainable development issues.

- Management of biodiversity data: considerations include the national framework for managing data within GBDMS (e.g. through constitution of an inter-agency Steering Committee; Technical Committee to oversee development of the system, with responsibilities such as identifying and prioritising data and information requirements, carrying out needs assessments, identifying data gaps and recommending relevant custodians, developing quality standards, along with procedures and protocols for data exchange, and making inputs into national environmental information policy; establishing a network of data centres, and a GBDMS hub to facilitate the flow of data and information), issues of custodianship, data management standards and guidelines, and data exchange, with attention being given to GBDMS adopting a standard framework for standardising and harmonising date to enhance exchange and use.

- Capacity development: the final section considers institutional strengthening, human resources and training, network strengthening, and technology issues. The long-term goal for institutional strengthening is to build a strong, self-sustaining basis for the management of biodiversity data in Ghana. Actions necessary to implement the GBDMS over a three-year period are outlined and an indicative budget is presented (RSAU Draft).

To date, the institutional survey has helped to identify those organisations most appropriate to serve as data centres and custodians of priority datasets. The development of biodiversity data infrastructure under GBDMS will involve further detailed surveys of organisations and their data holdings. This will allow for an assessment of capacity, identification of important data gaps, and will enable capacity building within the GBDMS network for the production of priority information products.

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ANNEX 1 SAMPLE COVERING LETTER

This letter represents the output of a fictitious National Biodiversity Committee attempting to survey sources of data and expertise which could contribute to the preparation of a National Biodiversity Strategy and Action Plan.

Survey of Biodiversity Information

in support of the National Biodiversity Strategy and Action Plan

Why are we conducting a survey?

The Government has embarked upon the preparation of a National Biodiversity Strategy and Action Plan to provide a framework for the conservation and sustainable use of the country's rich heritage of living resources. As one of the first steps in this process, we are attempting to survey sources of information which may be of use to policy-makers and resource managers in the public and private domains. In particular, we aim to identify key gaps in data, expertise and information management facilities which need to be addressed for improved availability of biodiversity information.

It should be stressed that the Government does not intend to use the survey results to relieve organisations of any of their data management responsibilities. Rather, the Government is attempting to help policy-makers, resource managers, researchers and the general public to gain access to information about biodiversity more easily than they have been able to before.

What benefits will this bring?

Two important products of the survey will be distributed to all of those taking part, and more widely as appropriate. These are as follows:

1. **Catalogue of Biodiversity Data Sources**, containing details of key datasets and information sources relevant to the conservation and sustainable use of living resources. Once this is published, the Government intends to update it annually. The catalogue will summarise information about:
   - organisations managing biodiversity data
   - major datasets and information sources which are available (including access procedures)
   - relevant sources of expertise.
2. **National Biodiversity Information Management Plan**, detailing priority investments, efficiencies and collaborative programmes which will be implemented to enhance the management of biodiversity information.

In addition, your involvement in the survey provides an opportunity to review the current state of your information management capacity and to consider what steps, such as investments, efficiencies and partnerships, are required to enable your organisation to respond more effectively to national needs.

How will the survey be implemented?

The survey will be implemented through the use of two separate questionnaires, relating to **institutional details** and **datasets** respectively. **Only one** copy of the former should be completed per organisation (or sub-organisation as appropriate). Multiple copies of the latter may be completed, one for **each** major dataset managed by the organisation.

Will any help be available?

To help you complete the questionnaires, we have organised two half-day **workshops** during which we will walk you through the questions and address any difficulties you may have. If you would like to attend one of these workshops, please try to complete as much of the questionnaire as possible beforehand so that your difficulties are clearly identified. In addition to the workshops you are welcome to **telephone** this office at any time to discuss all aspects of the survey on 0129 228943.

When should the questionnaires be returned?

Questionnaires should be returned by September 1 1997, providing ample time for organisations to complete the forms and subject them to internal review. Remembering that this is as much your initiative as ours, we do hope that you respond both fully and quickly to the survey.

Thank you and good luck,

Chairperson

National Biodiversity Committee

ANNEX 2 SAMPLE QUESTIONNAIRE

Comprising: Form 1: Institutional Details

Form 2: Datasets

Two separate forms are provided since most organisations have more than one, perhaps many datasets to describe, whereas institutional details need to be recorded only once.

Before using this questionnaire, the organisers of the survey may consider reviewing and adapting it to suit local conditions.

Form 1 Institutional Details

(fill in one copy of this form per organisation or sub-organisation as appropriate)

CONTACT DETAILS

Name of organisation:	**Acronym:**
Full postal address:	
Telephone number:	**Fax number:**
Email:	**Web-site:**
Name of host organisation(s) (if applicable):	
Contact person:	**Position:**
Telephone number:	**Extension:**

DESCRIPTION

Which of the following best describes your organisation (tick any which apply)?

☐ Governmental	☐ Semi-governmental	☐ Local authority
☐ Private	☐ Non-governmental	☐ Charity
☐ Profit	☐ Non-profit	

Other (please specify):

At what levels does your organisation operate (tick any which apply)?

☐ International	☐ National	☐ State (or similar)
☐ District (or similar)	☐ Local	☐ Community

Other (please specify):

DESCRIPTION (CONT.)

What is the core business of your organisation (tick any which apply)?

☐ Facilitation ☐ Coordination ☐ Regulation ☐ Administration

☐ Trade ☐ Industry ☐ Service ☐ Consultancy

☐ Resource management ☐ Nature conservation

☐ Environmental protection ☐ Policy ☐ Law

☐ Information/monitoring ☐ Research ☐ Education/training

☐ Outreach ☐ Lobbying ☐ Campaigning

Other (please specify):

What is the annual turnover of your organisation in US$ (optionally tick one)?

☐ <1K ☐ 1–10K ☐ 10–100K ☐ 100K–1M ☐ 1M–5M ☐ >5M

How many staff does your organisation employ (tick one)?

☐ <10 ☐ 10–25 ☐ 25–50 ☐ 50–100 ☐ 100–250 ☐ >250

Enter the mission statement of your organisation:

Note any programmes or projects which may be relevant to this survey:

1.

2.

3.

Does your organisation have an information strategy? ☐ yes ☐ no

Does it have a data quality policy? ☐ yes ☐ no

Does it have a data exchange policy? ☐ yes ☐ no

Indicate whether your organisation manages/uses/needs any of the following information:

		Manages	Uses	Needs
Land use	Forestry	☐	☐	☐
	Agriculture/livestock	☐	☐	☐
	Fisheries	☐	☐	☐
	Nature conservation	☐	☐	☐
	Indigenous peoples	☐	☐	☐
	Tourism	☐	☐	☐
	Water	☐	☐	☐
	Mining	☐	☐	☐
	Energy	☐	☐	☐
	Transport	☐	☐	☐
	Urban planning	☐	☐	☐
	Other (please specify)	☐	☐	☐
	.....	☐	☐	☐
Ecosystems	Forest	☐	☐	☐
	Woodland/scrub	☐	☐	☐
	Grassland	☐	☐	☐
	Heathland/moorland	☐	☐	☐
	Freshwater	☐	☐	☐
	Coastal and marine	☐	☐	☐
	Dryland/desert	☐	☐	☐
	High altitude	☐	☐	☐
	Other (please specify)	☐	☐	☐
	.....	☐	☐	☐
Species/genes	Mammals	☐	☐	☐
	Birds	☐	☐	☐
	Reptiles/amphibians	☐	☐	☐
	Fish	☐	☐	☐
	Insects	☐	☐	☐
	Other invertebrates	☐	☐	☐
	Bacteria	☐	☐	☐
	Viruses	☐	☐	☐
	Plants (higher)	☐	☐	☐
	Plants (lower)	☐	☐	☐
	Germplasm/tissue	☐	☐	☐
	Genebanks	☐	☐	☐
	Other (please specify)	☐	☐	☐
	.....	☐	☐	☐

INFORMATION MANAGEMENT (CONT.)

		Manages	Uses	Needs
Social/ economic/ political	Culture	☐	☐	☐
	Health, welfare and equity	☐	☐	☐
	Land tenure and property	☐	☐	☐
	Demography and population	☐	☐	☐
	Policies, plans and laws	☐	☐	☐
	Public administration and governance	☐	☐	☐
	Trade and industry	☐	☐	☐
	Sustainable development	☐	☐	☐
	Other (please specify)	☐	☐	☐
	.....	☐	☐	☐
Physical features	Hydrology	☐	☐	☐
	Geology	☐	☐	☐
	Soils	☐	☐	☐
	Topography	☐	☐	☐
	Climate	☐	☐	☐
	Other (please specify)	☐	☐	☐
	.....	☐	☐	☐

EXPERTISE

Indicate the number of staff in your organisation with expertise in the following areas:

	Post graduate	Graduate	Diploma	Short course	School leaver	Total
Strategic planning	____	____	____	____	____	____
Project management	____	____	____	____	____	____
Quality management	____	____	____	____	____	____
Data collection/monitoring	____	____	____	____	____	____
Data entry/quality assurance	____	____	____	____	____	____
Data analysis	____	____	____	____	____	____
Technical writing	____	____	____	____	____	____
Graphic design/publishing	____	____	____	____	____	____
Communications/marketing	____	____	____	____	____	____
Management information systems	____	____	____	____	____	____
Geographic information systems	____	____	____	____	____	____
Database development	____	____	____	____	____	____
Systems management	____	____	____	____	____	____
Local area networks	____	____	____	____	____	____
Internet access/web-site	____	____	____	____	____	____

EXPERTISE (CONT.)

	Post graduate	Graduate	Diploma	Short course	School leaver	Total
Public education/awareness	___	___	___	___	___	___
Training/workshops	___	___	___	___	___	___
Other technical assistance	___	___	___	___	___	___
Forestry	___	___	___	___	___	___
Agriculture/livestock	___	___	___	___	___	___
Fisheries	___	___	___	___	___	___
Nature conservation	___	___	___	___	___	___
Indigenous peoples	___	___	___	___	___	___
Tourism	___	___	___	___	___	___
Water	___	___	___	___	___	___
Mining	___	___	___	___	___	___
Energy	___	___	___	___	___	___
Transport	___	___	___	___	___	___
Urban planning	___	___	___	___	___	___
Environmental protection	___	___	___	___	___	___
Environmental impact assessment	___	___	___	___	___	___
Environmental economics	___	___	___	___	___	___
Health, welfare and equity	___	___	___	___	___	___
Land tenure and property	___	___	___	___	___	___
Demography and population	___	___	___	___	___	___
Policies, plans and laws	___	___	___	___	___	___
Public administration	___	___	___	___	___	___
Trade and industry	___	___	___	___	___	___
Sustainable development	___	___	___	___	___	___
Ecology	___	___	___	___	___	___
Biogeography	___	___	___	___	___	___
Conservation biology	___	___	___	___	___	___
Taxonomy/systematics	___	___	___	___	___	___
Hydrology	___	___	___	___	___	___
Geology	___	___	___	___	___	___
Soils	___	___	___	___	___	___
Climate	___	___	___	___	___	___
Other (please specify):						
.....	___	___	___	___	___	___
.....	___	___	___	___	___	___
.....	___	___	___	___	___	___

EXPERTISE (CONT.)

Which areas of expertise does your organisation most need to develop?

1.

2.

3.

FACILITIES

Indicate what facilities your organisation owns or has access to (in good working order):

Communications	Telephone	☐ yes	☐ no	total:
	Fax	☐ yes	☐ no	total:
	Email accounts	☐ yes	☐ no	total:
	Internet access points	☐ yes	☐ no	total:
Computers	IBM-PC 386 or lower	☐ yes	☐ no	total:
	IBM-PC 486 or higher	☐ yes	☐ no	total:
	UNIX workstation	☐ yes	☐ no	total:
	Macintosh	☐ yes	☐ no	total:
Other (please specify):	.....			
Operating systems	DOS	☐ yes	☐ no	users:
	Windows 3.1/3.11/95/NT	☐ yes	☐ no	users:
	UNIX/Linux	☐ yes	☐ no	users:
	Macintosh	☐ yes	☐ no	users:
	Local Area Network	☐ yes	☐ no	users:
Other (please specify):	.....			
Geographic information systems	PC-ARC/INFO	☐ yes	☐ no	users:
	Workstation ARC/INFO	☐ yes	☐ no	users:
	ArcView	☐ yes	☐ no	users:
	MapInfo	☐ yes	☐ no	users:
Other (please specify):	.....			

FACILITIES (CONT.)

Database Management Systems	xBASE	☐	yes	☐	no	users:
	Access	☐	yes	☐	no	users:
	Oracle	☐	yes	☐	no	users:
Other (please specify):	.....					
Related software	Image processing	☐	yes	☐	no	users:
	Statistical/modelling	☐	yes	☐	no	users:
	Desktop publishing	☐	yes	☐	no	users:
	Graphics/presentation	☐	yes	☐	no	users:
Other (please specify):	.....					
Data input/output	Digitising tables	☐	yes	☐	no	total/size:
	Scanners	☐	yes	☐	no	total/size:
	Plotters	☐	yes	☐	no	total/size:
	Colour printers	☐	yes	☐	no	total:
Other (please specify):	.....					
Field survey	Vehicles	☐	yes	☐	no	total:
	Global positioning systems	☐	yes	☐	no	total:
	Laptop computers	☐	yes	☐	no	total:
Other (please specify):	.....					
Miscellaneous	Library	☐	yes	☐	no	books:
	Photocopier	☐	yes	☐	no	total:
	In-house printing	☐	yes	☐	no	
Other (please specify):	.....					

Which facilities does your organisation most need to acquire or strengthen?

1.

2.

Please provide details of the most important networks, steering groups or committees (relevant to biodiversity conservation) with which your organisation is involved:

	Network, steering group or committee	Coordinate	Facilitate	Participate	Support
1.		☐	☐	☐	☐
2.		☐	☐	☐	☐
3.		☐	☐	☐	☐
4.		☐	☐	☐	☐
5.		☐	☐	☐	☐

Estimate how many organisations regularly provide data or information *to* your organisation:

Provide details of the most important of these as follows:

	Organisation	Data or information provided	Formal agreement/MoU	
1.			☐ yes	☐ no
2.			☐ yes	☐ no
3.			☐ yes	☐ no
4.			☐ yes	☐ no
5.			☐ yes	☐ no

Estimate how many organisations regularly receive data or information *from* your organisation:

Provide details of the most important of these as follows:

	Organisation	Data or information provided	Formal agreement/MoU	
1.			☐ yes	☐ no
2.			☐ yes	☐ no
3.			☐ yes	☐ no
4.			☐ yes	☐ no
5.			☐ yes	☐ no

PARTNERSHIPS (CONT.)

Your organisation may also share other resources, for example expertise and facilities.

Provide details of the most important of these as follows:

	Organisation	Nature of cooperation	Formal agreement/MoU	
1.			☐ yes	☐ no
2.			☐ yes	☐ no
3.			☐ yes	☐ no
4.			☐ yes	☐ no
5.			☐ yes	☐ no

Please provide details of any partnerships which are being planned in the near future:

	Organisation	Proposed cooperation
1.		
2.		
3.		

CONCLUSION

How could your organisation contribute most effectively to a biodiversity information network?

1.

2.

3.

What would you expect from such a network?

1.

2.

3.

Form 2 Datasets

(fill in one copy of this form per dataset managed by your organisation or sub-organisation as appropriate)

CONTACT DETAILS

Title of dataset:

Contact person: **Position:**

Telephone number: **Extension:**

DESCRIPTION

Source of data (tick any which apply):

☐ Primary research ☐ Acquired copy ☐ Public domain ☐ Mixture

Other (please specify):

If not primary research please indicate the original source(s):

Form of data (tick any which apply):

☐ Hardcopy ☐ Audio-visual ☐ Electronic files ☐ Mixture

Other (please specify):

Type of data (tick any which apply):

☐ Books/reports ☐ Sound recordings ☐ Word processor files ☐ Mixture

☐ Forms/notes/tables ☐ Photographs ☐ Spreadsheet

☐ Pictures ☐ Video/film ☐ Database

☐ Card index ☐ GIS coverage

☐ Maps ☐ Other digital files

Other (please specify):

DESCRIPTION (CONT.)

Geographic coverage of data (tick any which apply):

☐ International ☐ National ☐ State (or similar) ☐ District (or similar)

☐ Local ☐ Community ☐ Dispersed ☐ Mixture

Specify more exactly:

Thematic coverage of data (tick any which apply):

☐ Land use ☐ Physical features ☐ Social/economic/political

☐ Ecosystems ☐ Species ☐ Genes ☐ Mixture

Specify more exactly:

Time period of data (tick any which apply):

☐ Pre-history ☐ Pre-1900 ☐ Post-1900 ☐ The future

Specify exactly from: to:

PURPOSE

For what purpose was the dataset originally built?

1.

2.

3.

Indicate any uses it has been put to subsequently:

1.

2.

3.

PURPOSE (CONT.)

Are there any uses of the data which would be unwise or improper?

	Use	Unwise	Improper
1.		☐	☐
2.		☐	☐
3.		☐	☐
4.		☐	☐
5.		☐	☐

Indicate the current limitations, uncertainties and errors in the data:

	Limitation	Uncertainty	Error
1.	☐	☐	☐
2.	☐	☐	☐
3.	☐	☐	☐
4.	☐	☐	☐
5.	☐	☐	☐

What is the life-expectancy of the data (tick one)?

☐ Everlasting ☐ >10 years ☐ >5 years ☐ >1 year ☐ >6 months

☐ Immediate future only

DATA DEVELOPMENT

When did the development of the dataset begin?

Describe how the data were originally obtained:

DATA DEVELOPMENT (CONT.)

Indicate which data standards were followed, if any:

	Data standard
1.	
2.	
3.	

Describe the main processing, interpretation and quality-assurance tasks which were later applied:

	Task applied	Processing	Interpretation	QA
1.		☐	☐	☐
2.		☐	☐	☐
3.		☐	☐	☐
4.		☐	☐	☐
5.		☐	☐	☐

Which of the following best describes the status of the data (tick one)?

☐ Complete ☐ Nearing completion ☐ Under-development ☐ Early stages of development

DATA MANAGEMENT

Are the data actively managed? ☐ yes ☐ no

How many people help manage the data (tick one)?

☐ None ☐ 1 ☐ 1–5 ☐ >5 ☐ >10

How regularly are they updated (tick one)?

☐ Every day ☐ Every week ☐ Every month ☐ Every quarter
☐ Every six months ☐ Every year ☐ Every two years ☐ Every five years
☐ Every ten years ☐ Never ☐ No need

Other (please specify):

When were they last updated?

ACCESS PROCEDURES

Which of the following best describes access to the data (tick one)?

☐ Unrestricted ☐ Restricted to some ☐ Restricted to most
☐ Unavailable for external use

Where access is provided, which of the following applies (tick one)?

☐ Free ☐ Free to most ☐ Free to some
☐ Charged

Where charges are made, how are these determined (optionally tick one)?

☐ Cost recovery ☐ Cost plus overhead ☐ Market value

Where access is provided, in what formats are the data available (tick any which apply)?

☐ Hardcopy ☐ Floppy disk ☐ CD-ROM ☐ Email
☐ Internet (FTP) ☐ Magnetic tape ☐ DAT ☐ Private network

Other (please specify):

Has the dataset been documented for external users? ☐ yes ☐ no

Where access is provided, briefly describe the recommended access procedures:

THANKS

Congratulations on completing this questionnaire. Your efforts are much appreciated. Please return the questionnaire as soon as possible.

These handbooks have been developed for use by senior decision-makers and mid-career professionals. They review the issues and processes involved in the management of biodiversity information to support the conservation and sustainable use of living resources. They also provide a framework for the development of national plans and strategies and for meeting reporting obligations of international programmes and conventions. Collectively, the handbook series may be used as a training resource or, more generally, to support institutions and networks involved in building capacity in information management.

Companion Volume
Volume 1 Information and Policy
Volume 2 Information Needs Analysis
Volume 3 Information Product Design
Volume 4 Information Networks
Volume 5 Data Custodianship and Access
Volume 6 Information Management Capacity
Volume 7 Data Management Fundamentals

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