

ORGANIZATION OF RESEARCH AND COMMUNICATION OF RESULTS

9.1 The Framework in Practice

The foregoing sections present a set of guidelines for potential practitioners on alternative approaches and tools that they might consider adopting in undertaking a climate impact and adaptation assessment. The scope of these guidelines is very broad, though the methods described are often detailed. By way of synthesis, therefore, this concluding section reviews the analytical framework developed in the report, and suggests a four stage method for applying the framework in practice.

9.1.1 The Seven Step Framework

The guidelines have been arranged in a seven-step analytical framework that aims to capture the major components of an assessment study (cf. Figure 4). The framework is able to accommodate the wide range of methods followed in a large number of previous assessments, as is demonstrated in some of the boxed examples in this report. However, it should not be regarded as a definitive approach to assessment. There are other assessments that follow perfectly valid alternative analytical methods (for example, studies where the main focus is on adaptation to climate change). Nonetheless, while the logical order of analysis may be different in these studies, most of the basic tools and methods that are actually applied are embraced in these Guidelines.

While this report has sought to be as comprehensive as possible, it should not be inferred that all the seven steps or all procedures within each step should be applied in any one assessment. Applying the former may not be necessary or appropri-

ate; applying the latter would simply not be feasible. Each assessment study has its own unique requirements, focus and objectives, and these are probably served by only a small subset of the approaches described. Furthermore, there are certainly aspects that are not covered in the Guidelines—the field is large, and methods of climate impact assessment are developing rapidly—and their exclusion here should not preclude their use in future assessments.

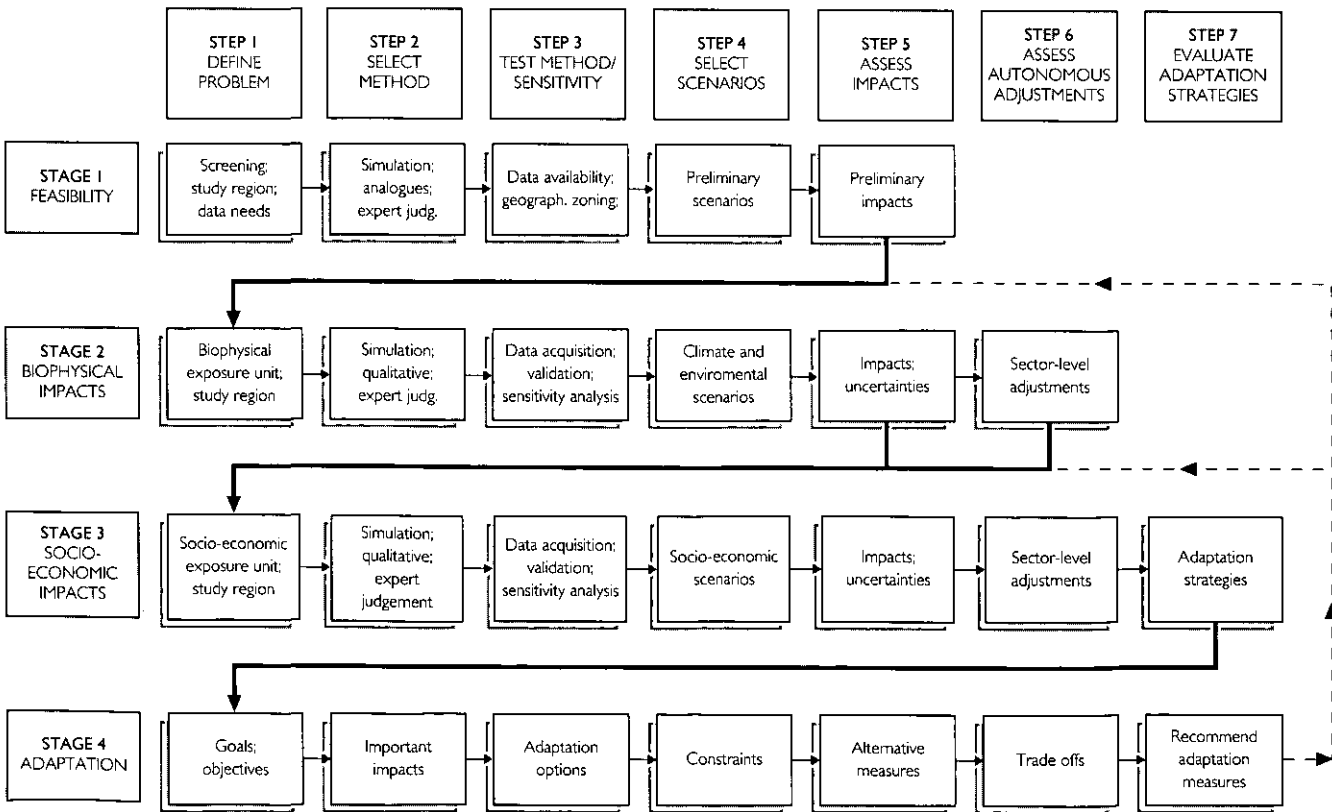
9.1.2 A four stage method for conducting assessments

The observation was made in Section 2.4 that the procedures contained in each of the seven general steps are themselves sometimes arranged in a multi-step framework which parallels the seven steps. This is not surprising, when one considers how most assessments are actually conducted in practice. Few studies proceed monotonically through all the necessary steps without repeating at least some iterations. For example, where the outputs of one impact model are used as the inputs for another, similar procedures for, *inter alia*, data acquisition, model testing, parameter selection, fixing of assumptions and scenario development, must occur when applying each model.

In all, four main stages of iteration can be identified through which an assessment may need to proceed (Figure 9):

- Feasibility.
- Assessment of biophysical impacts.
- Assessment of socio-economic impacts.
- Evaluation of adaptation options.

Figure 9. A four stage method for conducting climate change impact and adaptation assessments



These stages are depicted as rows in Figure 9. The columns represent broadly comparable steps, with some of the alternative procedures at each step listed in the boxes. Thick arrows show the linkages between stages and thin arrows link the steps. Dashed lines represent reiterations that may be required to repeat an analysis under a new set of assumptions.

This kind of 'walk-through' method can offer a useful template for conducting assessment studies at the national level. Following this approach, the United Nations Environment Programme is currently preparing non-expert Workbooks based on the Technical Guidelines described here. When completed, the IPCC Technical Guidelines and UNEP Workbooks will form a complementary pair of guides: the former primarily for researchers and the latter for non-experts.

9.2 Organization of Research

The effective organization of research is a key element in most climate impact studies, but especially so in large, multi-disciplinary projects. Two aspects are important to consider: the coordination of research, and research collaboration.

9.2.1 Coordination

Experience suggests that the executive responsibility for coordinating research activities is usually best assigned to a single location, group or person. Overall guidance is sometimes provided by a panel of experts or steering committee, including the coordinator. Subordinate responsibilities can be delegated to other researchers, but the structure should preserve a framework of accountability.

Several tasks can be identified that should normally be the responsibility of the coordinator, involving the planning of the research, identification of stakeholders, selection of common approaches, initiation of studies and monitoring of the research.

Planning of the research. Regardless of the nature of the study, the source of funding or the client being served, it is necessary, at an early stage of preparation, to formulate a research plan. This usually comprises a statement of the research objectives, a description of the main tasks, the research methods, the intended outputs, a preliminary schedule and the estimated cost. A research plan can serve several functions:

- It provides a framework for initiating the research and making preliminary arrangements for elements such as excursions and meetings.
- It is helpful for identifying resource requirements such as staff, working space, equipment and data.
- It can be distributed to other experts for comments and advice.
- It can be used as a working document for discussing possible research collaboration, additional funding, publication or other cooperation.

Identification of stakeholders. The most successful impact studies are often those which involve a broad cross-section of the community in the study region. Thus, a valuable element of study design is the identification of important 'stakeholders'. Some possible stakeholders to consider are listed here:

- Policy makers, who commission the impact assessments in order to obtain information that can be used to guide policy.
- Experienced climate impact researchers, who are familiar with the issues and the analytical methods. It may be primarily their responsibility to formulate the methods, gather and

collate the data, and analyse and report the results of the study.

- Other researchers, who may have no experience in climate impact assessment, but may possess local knowledge, analytical tools or data that could be valuable in an impact assessment.
- Government officials and local advisers, who may be able to assist by supplying data, exercising judgement or identifying key regions or persons.
- Persons of regional influence, such as village elders, industrial executives and landowners, who might be able to provide advice, resources, access or other assistance to the study.
- Communicators, such as teachers, newspaper editors and radio and television producers, who can describe the research to the community.
- Other members of the community, whose cooperation may be required in conducting surveys, field experiments and other research activities.

Common approaches. The coordinator may also bear responsibility for enforcing some commonality of approach in research. This ensures that the results of an assessment are readily comparable, both within the project, and relative to other projects. It may entail, for example, the adoption of standard scenarios, use of standard projection periods, and consistency in the reporting of results. Consistency is especially important in cases where results from one part of the study are used as inputs to another.

Initiation of studies. As a preliminary stage of research, some projects carry out pilot studies to explore the feasibility of the methods (Section 5.1). In some cases, pilot studies may have to be conducted as a prerequisite for the receipt of funding or of development loans. Other projects may hold a meeting of researchers, to exchange ideas, forge new links, agree on the workplan, allocate tasks, and decide a schedule. Where research is being conducted at multiple sites or in different countries, another option is for coordinators to travel to meetings at each centre. This has the advantage of exposing the coordinator to a wider range of researchers, to local conditions and to local problems. Finally, in some projects, particularly commissioned studies, where the goals are clear and deadlines tight, it may be sufficient to despatch guidelines to the participants so that they can begin work immediately.

Monitoring of the research. It is often a contractual requirement for projects to provide funding agencies with regular reports on progress. Although these reports do not always receive close scrutiny from funding bodies, they are a useful method of assessing progress, achievements, and financial status. They can also form a basis for the publication of results. It is common for international projects to receive a mid-term review by independent experts, where researchers are required to present their work, justify their methods and report preliminary results. Even if this is not a formal requirement, a mid-term review can be a valuable aid to project coordinators, as a means of assessing progress to date, and future goals.

9.2.2 Collaboration

Collaboration in conducting an assessment can be required at up to four levels: between researchers, between stakeholders, nationally and internationally.

Collaboration between researchers. Climate impact assessment is interdisciplinary, involving the collaboration of researchers who, in many cases, may not have worked together before. The identification of researchers who understand the goals of the research, and are willing to work together, often under tight time constraints, can be a major undertaking in the planning and execution of many assessment studies. The effectiveness of collaboration may also be influenced by the working environment. At one extreme, some international projects purposefully bring together researchers to work at a single site. At the other extreme, studies may be conducted with no direct contact between researchers. A useful framework for interdisciplinary and interjurisdictional collaboration at a regional scale is provided by Integrated Regional Impact Assessment (see Section 2.3.3, above). Studies have been aided considerably in recent years by the establishment of international networks of researchers, common databases and newsletters.

Collaboration between stakeholders. The involvement of other stakeholders in the assessment process has many advantages but also some drawbacks. Local knowledge and experience can be very useful in conducting the study, mobilising resources, interpreting results and in gaining regional acceptance of the results and recommendations. In addition, the monitoring of a project by funding agencies can be helpful in focusing the goals of the research. However, policy makers should beware of jeopardizing the integrity of the research by excessive participation, whilst researchers should ensure that their work meets the needs of policy as much as possible.

National programmes. Under the auspices of the World Climate Programme (WCP), many countries have now organized their own national climate programmes. Within these programmes most have made provision for climate impact studies, and have set up committees for directing research and channelling funding through national scientific bodies and government departments. Examples of countries with national programmes include: Australia, Canada, Finland, Hungary, Netherlands, Japan, Switzerland, UK and USA.

Internationally, there are different levels of cooperation and organization. Some important activities at global scale include:

- The World Climate Impact Assessment and Response Strategies Studies Programme (WCIRP), which is run by the United Nations Environment Programme (UNEP), is one component of the WCP. Projects receiving funding from UNEP are generally international in scope, and innovative in content.
- The United Nations Regional Economic Commissions, which liaise with national meteorological services in assessing the socio-economic and population impacts of climatic variability and change.
- The Intergovernmental Panel on Climate Change (IPCC) Working Group II (Impacts), which was established by WMO and UNEP for reviewing research on the impacts of future climate change.
- The International Geosphere-Biosphere Programme (IGBP) of the International Council of Scientific Unions (ICSU), which has a number of elements devoted to climate change and its impacts. Its function is to promote international collaboration in research. Funding is provided by national governments.
- The Human Dimensions of Global Environmental Change

Programme (HDP) of the International Social Science Council (ISSC), which has a similar structure to the IGBP, but whose focus is on socio-economic aspects of environmental change.

- The Scientific Committee on Problems of the Environment (SCOPE), which is also organized by ICSU, prepares state-of-knowledge surveys on major environmental issues.
- The Man and the Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO).
- The Organization of Economic Cooperation and Development (OECD).

9.3 Communication of Results

An effective impact assessment is usually characterized by the establishment of good communication between researchers and other interest groups. Four lines of communication are important for researchers: with other researchers, with policy makers, with private enterprise and with the public.

9.3.1 Communication among researchers

Two issues are of critical importance in communicating and evaluating research results among researchers: the reporting of results and peer review.

Reporting of results. There is a burgeoning literature on the possible effects of future climate, but as yet there has been little attempt to coordinate or standardize either the approaches used or the reporting of results. It is critical that the methodology, assumptions and results of studies are transparent. A number of important requirements for reporting results are listed here:

- Methods of assessment should be detailed in full.
- Information from climate models used in scenario construction should be correctly interpreted and original sources accurately cited.
- The major assumptions of a study need to be outlined and substantiated.
- Impact models should be properly tested, fully documented or cited, and accessible to other researchers so that results are easily reproducible.
- All results should be accompanied by estimates of their attendant uncertainties.

Peer review. The peer review of results is a vital element ensuring the quality control of published research. Proper vetting by expert reviewers is the only means by which non-specialists are able to evaluate the quality and significance of research.

Most reputable scientific journals subject submitted papers to a rigorous review process. However, there are some cases where, given the interdisciplinary nature of the research, specialist review cannot be offered for some elements of a study. Therefore, researchers bear some responsibility for ensuring that all their methods and models are exposed to such a review process from appropriate experts. Indeed, many large projects organize their own review process, whereby specialists are asked to provide formal reviews of results prior to final publication.

9.3.2 Communication with policy makers

Much climate impacts research seeks to answer questions that impinge on or are specifically defined by policy. Thus, communication between policy makers and researchers is essential, the former demanding of the latter solutions to problems and the

latter alerting the former to issues of importance and requesting the resources to research them.

One of the major problems of communication between researchers and policy makers is the need to convey the considerable uncertainties attached to future estimates, while demonstrating that there is a problem to be addressed. Moreover, the recent upsurge of interest in environmental issues has led to a rapid increase in the demands on researchers to communicate results directly to policy makers (e.g., through government hearings). Since many of the goals of policy makers are short-term, there may be advantages in presenting research results in the form of the types of impacts likely to be experienced in the early stages of a more general climatic change. Such results could usefully be expressed, for example, in terms of the risk of certain events occurring that are of immediate concern (e.g., drought or coastal flooding). Nonetheless, there are still major issues that should be addressed over a longer time perspective (for example, potential impacts such as extinctions, that are irreversible, or more tangible planning questions such as construction of dams or coastal defences).

9.3.3 Communication with private enterprise

The private sector is a key player in influencing climate policy, both as a significant contributor to GHG emissions and as an end-user of climate as a resource. Besides wielding considerable political and economic influence, some sectors, such as insurance, are greatly concerned about the possible impacts of climate change and sea level rise on their activities. Moreover, in many countries engineering consultant firms are key players in the preparation of climate assessments, often as part of larger environmental impact assessments of proposed developments.

9.3.4 Communication with the public

Ultimately, most policy makers are answerable to the public, and public opinion plays an important role in determining policy. It is important, therefore, that the public is kept well-informed about progress in research. Effective communication is thus vital, and it is brought about partly through education but primarily via the mass media. While researchers have a responsibility to communicate their work in a clear and concise manner to the public, the media also bears a great responsibility for accurate reporting of the research. Unfortunately, there has been a tendency by some to report only the most dramatic or controversial aspects of climatic change and its impacts, rather than to present a more balanced view. Researchers should be wary of checking thoroughly any material which is to be communicated to the public in this way.