Integrated global change impact studies in the Arctic: the role of the stakeholders

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Responses to global change impacts require the specification of mitigation and adaptation options. Integrated regional impact studies provide some of the information needed for rational decision making. In order to carry out a comprehensive impact study, the involvement of stakeholders in the planning and execution of the study is seen as a necessary prerequisite for an acceptance of its conclusions by the broad public. One way to pursue such an involvement is through a scientist–stakeholder collaborative. Such a collaborative, for instance institutionalized through a joint scientist–stakeholder steering committee addressing issues related to mutual communication and the integration of individual study results, offers a number of additional advantages. The experience of local residents and the utilization of traditional knowledge may provide insight and expertise inaccessible to scientific investigations. Within the Barents Sea Impact Study, the involvement of stakeholders has been given significant weight early on. One of the main instruments employed in the stakeholder collaborative is the BASIS Information Office. However, given the diversity of backgrounds and interests of stakeholders from four different countries, scientist–stakeholder collaboration represents a significant challenge within BASIS. This notwithstanding, we consider the advantages gained worth the extra effort.

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Introduction

The possible adverse effects of global changes have been identified both by scientists and concerned citizens. The state of the global environment has long been part of the political agenda. The United Nations Conference on Environment and Development, the so-called Earth Summit in Rio de Janeiro, Brazil in 1992, and the resulting United Nations Framework Convention on Climate Change (UNFCCC) provide two prominent examples of activities on the political level addressing the issue of global warming. The UNFCCC is now part of international law committing more than 150 nations to action. However, while the proposed measures specified by the UNFCCC, which basically call for a stabilization and ultimately a reduction in the emission of carbon dioxide and other greenhouse gases by developed countries, are certainly to be welcomed, their implementation remains forthcoming. This can clearly be seen in the debates and discussions surrounding the UNFCCC process (e.g. during the Kyoto conference in 1997) and the reluctance by the parties of the Convention to stick to their initial commitments.

Scenarios of future climate change indicate a global mean temperature rise of between 1 to 3.5°C over the next 100 years (Houghton et al. 1990). A major characteristic of the trends between 1966 and 1995 (Fig. 1) is the marked sub-regional heterogeneity of temperature variations for the last thirty years. While large parts of Siberia have experienced significant warming, the southern and south-western surroundings of Greenland and parts of the eastern Canadian Arctic apparently experienced decreasing temperatures. It can be expected that such spatially

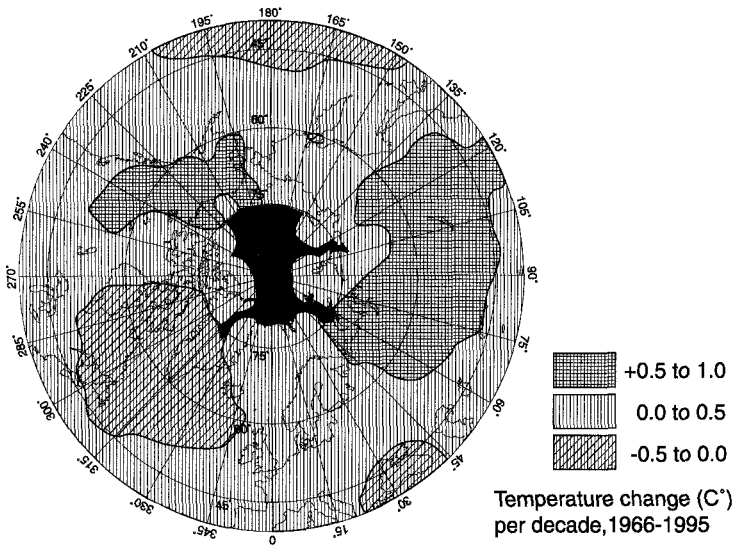

Fig. 1. Decadal temperature trends in the Arctic as derived from observations (Walsh, pers. comm.).

varied changes will result in equally distinct sub-regional to regional environmental impacts. Consequently, political and social consequences of temperature variations are likely to be similarly varied in their spatial distribution. This leads to an important conclusion: an assessment of global change impacts, to provide useful results, will have to be conducted on a regional to sub-regional scale. In this context, useful results of an impact study will enable specification of concrete consequences of climate changes, e.g. with regard to economic developments, the labour market, and changed weather patterns, that have direct implications for local residents. Studies that address global change impacts on a planetary scale will not achieve such information.

The lack of such information may be the major reason why political support for concrete actions is still largely lacking. Unless people have a clear vision of the direct impacts (consequences) of global changes for their daily lives, their willingness to commit themselves to a significant change in lifestyle will remain low. This problem is underlain by an even greater dilemma which can be illustrated by number of basic questions that ultimately need to be answered:

- Will global changes be "good" or "bad" (will there be winners or losers)?
- Should we do something about global changes (should we engage in mitigation measures)?
- What are the costs if nothing is done?
- Can pro-active adaptation reduce the costs that may be incurred by the impact of global changes?

While answers to some of these questions are starting to emerge (Maxwell 1998), there are still gaps that need to be filled. Moreover, it becomes clear that additional answers will not be found through scientific or academic exercises alone. The integrated regional and sub-regional impact studies, called for above, have to include consultation with individuals and institutions who have a personal or professional interest in the development of the region in which they reside, i.e. the stakeholders. This implies a completely different approach to research, an approach that not only strives to find scientifically sound answers to well-posed questions but also seeks new partnerships between stakeholders and scientists. Before addressing these issues, we will now turn to a few basic concepts.

Global change impacts and responses

When considering global changes and their impacts, Fig. 2 may provide useful guidelines. It depicts what could be called a systems theory approach to global changes and their impacts in a simplified format. The figure indicates that global changes will have a direct impact on the environment and societal systems (here called ecosystem and societal levels). Moreover, impacts on the

ecosystem level will have consequences for societal processes, which will lead to regulations and policies aimed to mitigate the causes or to initiate adaptations to the impacts of global change. These regulations and policies will affect the ecosystem level (e.g. through land use regulations, the protection of habitats, etc.) as well as the human/societal level (e.g. through emission reductions, regulations of resource use, etc.).

The assessment of global change impacts on both the ecosystem and the human/societal level is the subject of integrated assessments. According to the Intergovernmental Panel on Climate Change (IPCC) integrated assessments are understood as a modelling approach that enables stakeholders to make informed decisions about mitigation options (Carter et al. 1994). This definition by the IPCC underlines the current emphasis that is given to mitigation, i.e. to regulations that affect the causes of global changes, such as emission reductions, carbon dioxide taxes, tradable permits, etc. Furthermore, it apparently neglects possible additional methodologies that may lead to integrated assessments aside from modelling exercises (cf. Cohen 1997a).

The upper part of Fig. 3 illustrates pathways of responses that are partly similar to what is shown in Fig. 2. However, as can be seen, two alternative response strategies are indicated: mitigation and adaptation. Adaptation in this context refers to actions which minimize harmful consequences of these global change impacts on environmental and human systems in a region. The figure underlines that mitigation has a direct effect on the causes and an indirect effect on the impacts of global changes, and *vice versa* in the case of adaptation.

However, response strategies are not influenced by global change impacts alone. They evolve as a product of multiple political and economical considerations, many of which are entirely independent of climate or global change. The lower part of Fig. 3 illustrates this by outlining direct and indirect constraints on mitigation and adaptation options by a variety of factors. Public opinion, shaped by the collective perception and expectation of individuals in the region, will have a major influence on the design and ultimate acceptance of such measures. Another factor not to be overlooked are the experiences and traditional knowledge of people in a region; these will have to be taken into account when considering adaptation options.

Given these considerations, it becomes obvious that the future development of a region is prone to uncertainties caused by political and economical decisions and processes that are unrelated to climate change. This notwithstanding, global change impacts add a layer of uncertainty that can drastically alter the course of events. Integrated impact studies, which aim to reduce these uncertainties, could play a role that may prove far more important than first thought.

As briefly mentioned above, the response strategies to climate change have been mainly focused on mitigation and its costs (e.g. through the UNFCCC). This has led to less emphasis on the possible benefits of avoiding impacts, i.e. proactive adaptation and on considerations related to possible adaptation options. The specification of adaptation options is increasingly seen as an important subject of impact assessment studies (e.g. Cohen 1997a; Cohen et al. 1998). In this

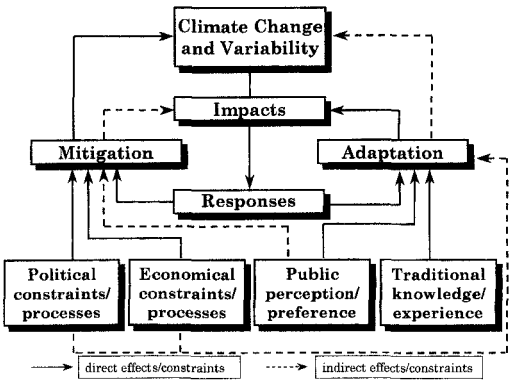

Fig. 3. A simplified depiction of possible pathways of responses to global change impacts in the context of other constraints (modified after Smit 1993).

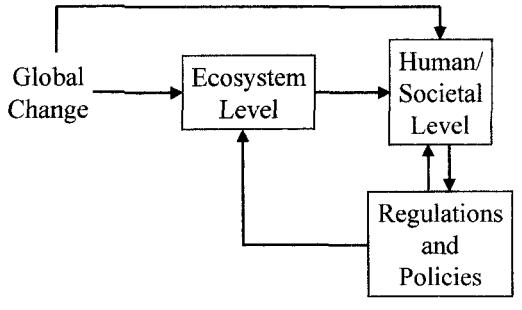

Fig. 2. A simplified, systems theory approach to global changes, their impacts and political responses.

context it is argued that mitigation and adaptation should at least be viewed as alternative, if not complementary, issues that deserve equal attention. However, defining adaptation measures requires close consultation with local and regional stakeholders. This brings us back to the point about stakeholder involvement raised above.

The role of the stakeholders

A major challenge of integrated impact studies lies in the specification of the economic and social costs of global change impacts and the benefits of adaptation measures. This is a task which clearly requires exchange and interaction with people and institutions who have a private or professional interest in a particular region, i.e. the stakeholders. Furthermore, the ultimate success of an integrated impact study will lie in its ability to provide guidelines and support for political decisions that are supported by a broad majority of the public in the region. Therefore, the design and specification of adaptation options and mitigation measures also require the participation of stakeholders in an integrated impact study.

Stakeholders in the circumpolar north include a number of groups:

- **Arctic residents**, including the general public with interest in the quality of life and the integrity of the environment, in economic development and the labour market and in education and training. This group also includes sectoral interest groups, e.g. those representing the fishing or the timber industry, but also those concerned with conservation, recreation and tourism. A group deserving particular attention are the indigenous communities and their representatives.
- **Resource managers**, i.e. individuals or groups of private industry involved in the utilization of natural resources of the circumpolar north. Economic sectors likely to be affected by global changes comprise:

a) Economic enterprises concerned with renewable natural resources, including particularly vulnerable areas such as fisheries, forestry, agriculture, herding and hunting.
b) The energy industry, mining, engineering (infrastructure), transport and services.
c) Tourism and its complex dependency on environmental conditions.

- The **global community** outside the Arctic, which may be affected by global changes in the Arctic, e.g. through sea level rise, changes in ocean circulation and large-scale weather patterns, altered migration routes of animal species, changed economic activities such as fisheries and forestry in the Arctic.
- **Policy makers** at the local (municipal governments in the north), regional (e.g. the Barents Euro-Arctic Council) and global level (the Arctic Council) represent stakeholders that are immediately concerned with global change impacts in the Arctic.

Each of these groups operates on different scales and, maybe more important, each has a different field of view or vision about the Arctic. The different views of these groups about the future contribute to the tensions that exist in the Arctic today. One issue worth considering is whether climate change may make a difference to these visions. How would climate change serve to "test" perceptions and beliefs of each group? In addition, could climate change help to elevate the importance of traditional knowledge as a complement to western science in monitoring climate related trends and in looking for "signals" of climate change and its impacts? In previous studies, i.e. the Mackenzie Basin Impact Study (MBIS), surveys were conducted to look at stakeholders' goals and their attainment (Yin & Cohen 1994; Yin 1997). However, these investigations were hampered by the fact that not all relevant stakeholder groups were involved. The challenge is to expand such work to include a larger cross section of Arctic interests. This implies that close ties to stakeholders be established and maintained throughout an assessment study.

In order to attain such an objective, stakeholder collaboration should be planned well in advance. Furthermore, this interaction should be institutionalized in order to maximize the mutual benefits of such an endeavour. One possible model is the stakeholder–scientist collaborative (Cohen 1997a), which may be implemented through a joint scientist–stakeholder steering committee. Such a committee has been set up in MBIS (Cohen 1997b) and is also part of ongoing studies on climate change impacts in the Bering Sea region, i.e. the Bering Sea Impact Study (BASIS) (Weller & Anderson 1998) and the Barents Sea region, i.e., the Barents Sea Impact Study (BASIS; see below).

The stakeholder–scientist steering committee may take on various responsibilities:

- The committee may oversee and guide the entire study throughout its execution.
- Another important function of the committee will be the facilitation of communication between different parties involved in the assessment.
- The committee will play an important role in the definition of expert judgements as one possible route towards integrated impact assessments. In particular, the utilisation of traditional knowledge may yield significant improvement of expert judgements (cf. Cohen 1997a, b) related to global change impacts in a given region.

The integration of various information or results of an impact study is one of the most important but also one of its particularly challenging activities. Stakeholders may contribute greatly to this process. This may come about mainly through their insight into the "workings" of their region, i.e. through knowledge about the many interactions and feedbacks between various sectors and elements on the socio-economic and the ecosystem levels, respectively (Cohen 1997a). However, this will require good communications planning, including a protocol for information sharing, especially with aboriginal peoples (Kruse 1998). Furthermore, stakeholders may provide insight into the indirect effects of global change impacts, which scientific studies alone will not be able to unravel. Furthermore, facilitating communication between scientists and stakeholders may contribute considerably to what is called vertical integration; communication between scientists of various disciplines may promote so-called horizontal integration (cf. Cohen 1997a, b).

The approach taken in MBIS was to bring stakeholders into the above-mentioned steering committee, to encourage them to participate in stakeholder panels and become involved in the research as much as possible despite their reluctance to become principle investigators of individual projects (Cohen 1997b). In addition, community-based studies attempted to incorporate traditional knowledge into the study, but MBIS was only be able to carry out opinion surveys. More time and effort will be needed to fully explore the potential of traditional knowledge in an integrated impact study. One way of communicating MBIS goals and results to the local residents was through newsletters and interim reports. However, personal contacts within the study area and presentations to various communities proved more efficient in reaching the stakeholders (Cohen 1997b).

Scientist–stakeholder collaboration offers a number of important advantages:

- Through such a collaborative stakeholders will gain ownership of the study and its results. This is a point of considerable importance as it will enable acceptance and understanding by the stakeholders for political measures that are guided by the results of impact studies.
- Another advantage lies in the fact that the involvement of stakeholders may encourage the development of an interdisciplinary research agenda. While this remains a constant challenge between the scientists, stakeholders may provide arguments that lie outside the usual scientific considerations that often hamper such cooperation.
- A scientist–stakeholder collaboration will provide common ground for linking scientific expertise and stakeholders' knowledge. It is only through the direct and personal exchange of views and ideas that such an exchange will be developed effectively.
- Finally such a collaboration may enable a better description of direct climate change implications, which will be driven by processes and constraints that are beyond the scientifically quantifiable realm and may considerably enhance the overall estimation of total cost for adaptation measures.

In the following, we will briefly outline some of the approaches taken towards a scientist–stakeholder collaborative in the framework of the ongoing Barents Sea Impact Study.

Stakeholder involvement within the Barents Sea Impact Study (BASIS)

The Barents Sea Impact Study (BASIS) is a core project of the International Arctic Science Committee (IASC) and is being funded by the Environment and Climate Programme of the European Commission (EC). BASIS aims at assessing the impacts of global changes on cultural and socio-economic systems which are dependent on renewable and non-renewable resources in the Barents Sea region (Lange 1997a, b; Lange & Kuhry 1997; Fig. 4). Pursuing such a goal, the importance of stakeholder collaboration within BASIS became obvious early on. As a conse-

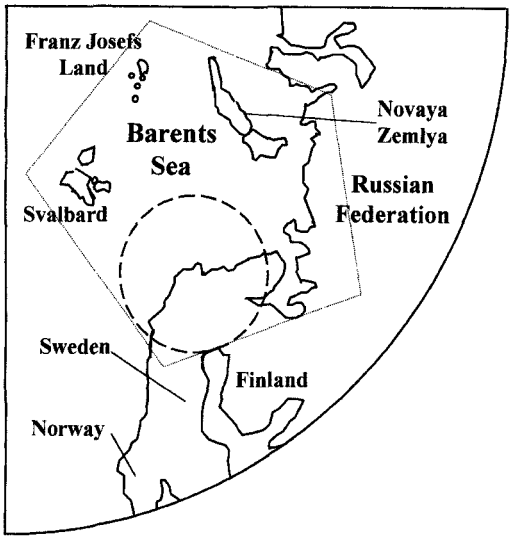

Fig. 4. Map showing the BASIS study area (pentagon) as well as the more specific study region for BASIS's first phase (circle).

quence, a steering committee of scientists and stakeholders, which was called the Review Committee, was formed prior to the implementation of the study. It was the Review Committee that evaluated Letters of Intent that were received from a large number of institutions interested in participating in BASIS. Based on this evaluation a selection of core projects was performed, these core projects now being sub-projects within the EC funded BASIS. The Review Committee has been updated on the development of the project and has provided guidance on the execution of BASIS ever since. Moreover, BASIS has periodically been reviewed by the IASC Council, and has been publicized in IASC publications, thus enjoying an opportunity for a wide dissemination of findings and results.

An important element of stakeholder involvement within BASIS is the BASIS Information Office at the Arctic Centre in Rovaniemi, Finland, which is largely financed by the EC grant mentioned above. The Information Office carries out a number of important functions:

- The publication of plain language reports in English, Finnish, Norwegian, Sámi, Swedish and Russian.
- The maintenance of an internet web site (www.urova.fi/home/arktinen/basis.htm).
- The consultation with the Regional Board of the Barents Euro-Arctic Council, a regional initiative of provinces and states of Finland, Norway, northwestern Russia and Sweden.
- The organization of stakeholder workshops in each of the four countries covered by BASIS. These workshops consist of presentations dealing with global change impact research in general and BASIS in particular by scientists in the local language. This is followed by opportunities for discussion with and between stakeholders and scientists. Stakeholder meetings have drawn significant interest by local and regional media.

However, collaboration between scientists and stakeholders in the framework of an integrated assessment study, and within BASIS in particular, presents a number of important challenges. In the case of BASIS, we are dealing with four different countries with widely different political, economic (cf. Finnish-Barents-Group 1996) and social conditions and traditions. Moreover, while the Russian part of the region is relatively densely populated, the Scandinavian parts have population densities that are more typical of other areas of the circumpolar north. This results in markedly different social and cultural structures which have to be taken into account. Finally, the northern provinces of Finland, Norway and Sweden have a long tradition of cooperation in the framework of the North Calotte Committee. Russia (or formerly the Soviet Union) has not or has only marginally participated in this cooperation. Only recently has this been improved, mainly through the membership of the Russian Federation in the Barents Euro-Arctic Co-operation (Barentssekretariatet 1994; Finnish-Barents-Group 1996).

Due to their different social, cultural, economical and political backgrounds, stakeholders in the BASIS study region have their own view of global change issues. While acknowledging and respecting these particular interests, ideas and concepts, care has been taken to integrate them into the study design for BASIS and to observe them in the execution of the project.

Conclusions

Global changes and their impacts require response strategies that aim to minimize adverse consequences to ecosystems and human systems in a given region. It has become increasingly clear that mitigation options should be complemented by

adaptation strategies. Integrated impact assessments have been designed to provide reliable information for the specification of policy options for mitigation and adaptation. In order to pursue a holistic approach, the involvement of stakeholders becomes a virtual necessity in integrated impact studies. Such involvement can be pursued through, among other options, a scientist–stakeholder collaborative which may be organized through a steering committee consisting of representatives of stakeholders and scientists involved in the study. Scientist–stakeholder collaboratives serve several purposes. They

- Facilitate interdisciplinary and intercultural sharing of information and perceptions;
- Enable interactions between researchers and decision makers at various scales; and
- Contribute to capacity-building in the Arctic in fields of study dealing with climate related issues, including renewable resource management and community-based monitoring of Arctic landscapes.

This last point is particularly important. Most climate impacts research in the Arctic is initiated by investigators from outside the Arctic. Capacity-building through national efforts and international programmes (e.g. IASC and EC programmes) provides an opportunity for local residents to become full participants in the research processes underway in their homelands.

Within the Barents Sea Impact Study, the importance of an appropriate involvement of stakeholders was recognized early on. A number of measures have been taken, including the creation of a Review Committee and the initiation of the BASIS Information Office. It is the Information Office that acts as the primary link between scientists within BASIS and local stakeholders in the study region. However, dealing with four different countries which comprise widely different political, economical and social systems remains a major challenge. Continued involvement and communication through plain language brochures, local workshops in different parts of the study region, as well as integration workshops that bring together stakeholders from different countries within the study region, are important elements of an effective scientist–stakeholder collaborative within BASIS. While it is acknowledged that this poses difficulties and challenges, such a collaborative remains a necessary and useful prerequisite for carrying out a reliable impact study that will be of value to the Barents Region and its inhabitants.

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