Summary Report on the Ninth Assessment Steering Committee (ASC) Meeting, 2 - 5 June 2002, Asker, Norway

Opening

ASC Chairman Bob Corell opened the Assessment Steering Committee (ASC) meeting at 8:30 a.m. in the Holmen fjordhotell on Sunday, 2 June 2002. He told the group that he had recently participated in a meeting of Senior Arctic Officials in Oulu, Finland. The Senior Arctic Officials have been allocated two hours at the World Summit on Sustainable Development in Johannesburg, South Africa, to tell about Arctic issues, including the work of the Arctic Climate Impact Assessment (ACIA). He regarded this as a tribute to what ACIA had accomplished to date, even though the study is not yet close to completion.

The draft agenda was approved without changes. It is Appendix 1 to this report.

Participants introduced themselves. They are listed in Appendix 2.

Progress reports

Bob Corell asked the lead chapter authors to briefly summarize the progress their writing teams have made to date, looking especially for linkages among the chapters.

Chapter 2 -- Arctic climate system and its global role Gordon McBean reported that his team of authors had met the previous week in Bergen, in tandem with teams dealing with marine systems (chapter 8) and marine fisheries (chapter 12). A large part of a first version of the chapter has been completed, but some parts still remain to be written. The authors of this chapter are concentrating on the physical climate system, what it was earlier and what it is now. They are stressing the connections between Arctic climate and the rest of the global system. As part of the following discussion, Gordon said that, among other things, chapter 2 will include sections on 20th century climate variability, greenhouse gases, the human signal superimposed on natural variability, and glacier mass balance issues. Odd Rogne noted the existence of a glacier mass balance database, and Margareta Johansson offered to provide a reference to it.

Chapter 3 -- Ozone processes and UV Increases in the Arctic region Petteri Taalas reported on the results of a recent workshop on ozone and UV scenarios. He said a first draft of chapter 3 is now complete. He pointed out that the baseline for UV scenarios

would be the one he published in 2000, updated to pay more attention to effects of cloudiness and albedo. As a result of a following discussion, Bob Corell urged authors who are concerned with UV effects on various ecosystems to meet separately on those topics.

Chapter 4 -- Modeling and scenarios for the Arctic region Vladimir Kattsov reported on a drafting meeting for this chapter held last April in Abisko. He said the authors of this chapter are using scenarios based on GCM runs. They intend to compare the A2 and B2 SRES scenarios, though B2 is the only one being used by ACIA. They plan to include a section on what can be done to improve future simulations. The steering committee then had an extended discussion on scenario usage. Gordon McBean suggested that the impacts chapters discuss the vulnerability of their systems, since the B2 scenario is no more or less likely than other future emission scenarios. Bob Corell asked Vladimir to lead a group that would attempt to sort out how scenario development specialists might better deliver information in a form that can be used by the authors of the impacts chapters.

The steering committee discussed the choice of 1981-2000 (two decades) as the baseline period, versus the 1961-1990 (three decades) period most commonly used to date. John Walsh replied that this shift in baseline does not actually make much difference to climate projections. An analysis of this change will be included in the chapter.

Vladimir Kattsov and Elizabeth Bush were asked to report back on the whereabouts of the IPCC guidelines document on scenario use. The relevant websites are http://ipcc-ddc.cru.uea.ac.uk/cru_data/cru_index.html and http://ipcc-ddc.cru.uea.ac.uk/cru_data/support/guidance.pdf. The first one takes you to a page that is part of the IPCC DDC, where you should click on the "New IPCC Scenario Guidelines" button. Once you are there, there is an option to download the pdf version of the guidelines document (the second url above) titled "Guidelines on the use of Scenario Data for Climate Impact and Adaptation Assessment." Authors should note that these guidelines are for people who intend to use the climate change scenarios in their research, not in an assessment of existing literature.

Chapter 5 -- The cryosphere and hydrologic variability John Walsh reported on a meeting of the writing team for this chapter in Austria a few months earlier. The chapter will present analyses of the outputs from the five ACIA models (i.e. the outputs generated by the five models with which ACIA has agreements, using the B2 emission scenario); but the authors also agreed that they would discuss some results from other models as well, since these are part of the published literature on the subject. They might also consider some additional models that are used by glaciologists. They are concerned about coordination with other chapters and also about chapter length. He promised that this chapter would have sections on permafrost and sea ice that should be useful to other chapters.

Chapter 6 -- Terrestrial ecosystems Terry Callaghan reported on the progress of this chapter to date, identification of problem areas, the desirability of feedback from ASC members, and some science highlights. Indigenous knowledge is being integrated throughout the chapter, with help from Dyanna Jolly-Reidlinger. Terry felt the chapter references were in good shape, but more attention was needed to select the most informative graphics. In the following discussion, Gunter Weller reminded the group that the impacts chapters should look at extremes as well as means of outputs from the five ACIA models, in three time slices and in four regions of the Arctic. Terry stressed that the approach they are taking is to use/interpret scenarios on a qualitative way, since the existing literature is not based on the B2 scenario.

Chapter 7 -- Arctic freshwater ecosystems Fred Wrona has taken over as lead author of this chapter since Jim Reist became ill. Terry Prowse of Environment Canada will serve as co-lead author. Fred Wrona reported that contributing and consulting authors had been identified, and that an authors meeting was scheduled to be held in Victoria in a couple of weeks. He said the chapter would look at three categories of fresh water systems: flowing, standing, and wetlands/peatlands. In each regime, they are looking at physical/chemical attributes, biotic components, and ecosystem functions and processes, and how these may change under different climatic forcing factors and changes in UV radiation. He thought the chapter should highlight some special case studies in different regions. They plan to treat inland subsistence fisheries and the importance of indigenous knowledge in this case. Dave Klein and Harold Loeng agreed to meet with Fred to discuss potential overlaps and gaps among their chapters, e.g. overwintering habitats and aquatic mammals.

Chapter 8 -- Marine systems Harold Loeng reported that his writing team had met the previous week in Bergen jointly with authors from chapters 2 and 12. They spent a lot of time working on scenarios, looking at extremes and well as inter-model mean outputs. They recognize that there will be overlap with chapter 2, but they agreed that each writing team would treat overlap areas from its own point of view. They are especially seeking additional information concerning sea ice from the authors of chapter 5, since there are many implications of changing sea ice conditions for marine ecosystems.

Chapter 9 -- Indigenous perspectives Henry Huntington reported that his writing team has several good case studies on how Arctic indigenous people experience climate change, but coverage is very uneven -- e.g. lots of information from Canada, none from Russia. This writing team has a matrix that should contribute to gathering relevant information. They are attempting to add items to the matrix, and suggestions from ASC members are welcome. Henry asked the authors of other chapters to examine indigenous perspectives to see how scientific knowledge and indigenous knowledge correspond to one another, with particular attention to where they differ. Steve Mills commented that he thought indigenous knowledge would correspond quite well with what scientists are learning.

Steve encouraged authors to keep items wherever they seem to fit throughout the ACIA reports and not attempt to collect them all in one place.

Chapter 10 -- Wildlife management and conservation Dave Klein said that the real topic of this chapter is the management of humans in their interactions with natural systems. The authors are using information on Canadian co-management systems, and they have material from Russia on harvest systems used there. Management of marine mammals and birds will be included in this chapter. Information on protected areas will be drawn from CAFF and WWF sources, among others. Dave called attention to the need for information on future demographics when discussing managed systems. Bob Corell asked Dave Klein to assemble a small group to discuss the treatment of marine mammals and marine birds.

Chapter 11 -- Hunting, fishing, herding, gathering Mark Nuttall reported that an initial draft of this chapter has been completed. The authors plan to have 10-12 case studies. The Chapter looks at animals, not just as economic things or as sources of food, but as beings that affect cultures, spiritual values, community dynamics, etc. This chapter has definite links to chapter 9. Mark asked for maps that show land use and occupancy at various times in history. Steve Mills responded that his organization is accumulating data that may be useful for creating such maps. Lars-Otto Reiersen said that some potentially useful maps are available from Grid-Arendal.

Chapter 12 -- Fisheries and aquaculture Hjalmar Vilhjalmsson reported that this chapter had a late start because it depends on input from other chapters. The authors met the previous week in Bergen together with authors of chapters 2 and 8. He is still in need of a Greenland biologist and a Russian economist. He said that this chapter would include sections on marine mammals as well as fish. He expects his writing team to have a first draft ready by mid-September. In a following discussion, Elizabeth Bush cautioned that we do not want to deal only with mean future temperatures and their impacts. Terry Fenge pointed out that there is a great deal of traditional knowledge on large marine mammals. Terry suggested that this chapter include a vignette on bowhead whales as a sidebar.

Chapter 13 -- Forests, land management and agriculture Glenn Juday outlined some reasons for paying attention to boreal forests. He reported that his writing team has been assembled and members of the team are producing useful material. His main job is to re-structure the material and produce a draft. This chapter will identify management options that deserve to be thought about. In a following discussion, Fred Wrona agreed to confer with Glenn on common topics, e.g. forests in wetlands.

Chapter 14 -- Human health Chris Furgal reported that the writing team for this chapter has been assembled from all parts of the Arctic, and that it heavily overlaps with the authors of the AMAP report on Arctic human health. Their last meeting was May 15-17

in Copenhagen. Much of the first draft is now complete. They are using current public health databases as their baseline for consideration of future change. They recognize that they must deal with the potential impacts of both warming and cooling, and both positive and negative impacts. A review meeting is scheduled for September 2002.

Chapter 15 -- Infrastructure Doug Goering reported on an authors' meeting the previous week in Trondheim. He said that the chapter has changed to some extent from what is in the operative outline on the ACIA website. Among other topics, they will treat the engineering implications of permafrost degradation. They want their product to be something engineers will believe and try to use. They intend to deal with the impacts of ice jams, flooding, strong winds, etc. Lev Khrustalev is contributing significant material on Russian engineering experience in Siberia. The chapter may include case studies as sidebars.

Chapter 17 -- Assessing vulnerabilities: A strategy for the Arctic Bob Corell reported that the Arctic Vulnerability Study will explore the vulnerability of Arctic social and ecological systems in the face of alterations in environmental and social conditions arising at global, regional and local levels. The investigators on this project will examine vulnerabilities in four Arctic communities from a number of perspectives: climate change/UV, contaminants in the environment, and trends in social and human development. They will use well-developed social science methods to gather peoples' knowledge and experience with past climate change and its impacts, and then their expectations for the future. The entire project is estimated to take three to five years to complete.

In a following discussion, concerns were expressed about the process for selecting the four communities, whether application of statistical downscaling at this time is premature, and how a chapter that presents an interim report on a long-term research program fits with other ACIA chapters. Some members of the steering committee pointed out that this kind of vulnerability approach could make a real contribution on how scientists can interact with Arctic communities. Bob stated that he sees the Arctic Vulnerability Study as a scoping exercise, something that would not be carried out in all four communities if things did not work out well in the first couple. Bob agreed to convey steering committee's concerns to the Arctic Vulnerability Study team and to report back to the ASC on a way forward. It remained unclear whether this will be the penultimate or ultimate chapter, and final acceptance of the chapter would depend on whether there is enough time to include results.

There were no reports at this time from chapters 1 and 16/17, but see the section on the Assessment Integration Team below.

World climate conference

Yuri Tsaturov announced that Russian President Vladimir Putin had proposed to hold a world climate conference in the last week of September 2003 in Moscow. This proposal was accepted by the leaders of the G-8 nations. An organizing committee has been set up under the leadership of the Russian Deputy Prime Minister, whose first deputy is Dr. Alexander I. Bedritsky, Chief of the Russian Federal Service for Hydrometeorology and Environmental Monitoring. Organizers expect the conference to attract 1500 to 2000 scientists, businessmen, social scientists, etc. Dr. Tsaturov expressed the hope that participants in ACIA, and indeed representatives of the entire Arctic Council, will attend and play an active role in the conference.

Scenario information

John Walsh reminded ASC members that they had earlier agreed to use both the Rossby Centre at the Swedish Meteorological and Hydrological Institute (SMHI) and the University of Alaska Fairbanks as centers for scenario development and information. So he suggested that requests for scenario information be sent to either of those institutions.

Lars Moen and Barry Broman, coordinators of the data center at SMHI, were present for part of the ASC meeting. They said their center is archiving data from all five ACIA models, though model outputs are in different formats and with different grids. They can produce graphs and maps in various formats. They asked authors to be as exact as possible in their requests for information and to interact with them on details. (Their contact information is in Appendix 2.) When asked about the availability of historical data, they thought it was probably best to go to the National Center for Atmospheric Research in Boulder, Colorado, or the National Climatic Data Center in Asheville, North Carolina. There will be a link to those institutions on the website maintained by John Walsh at http://zubov.atmos.uiuc.edu/ACIA/

Vladimir Kattsov reported that that the authors of chapter 4 recommended use of the years 1981-2000 as a climate baseline for ACIA. He said that a section in chapter 4 of the ACIA scientific report would compare this period with the period 1961-1990 that was used as a baseline by IPCC. The main reason for this difference is that B2 simulations for the period prior to 1981 have not been provided by all five modeling groups that agreed to contribute to the ACIA data archive. Additionally, the recommended ACIA climatological baseline period is more "current" than the previously used 1961-1990 one that is likely to be replaced by a new baseline in future assessments by IPCC and others. Both John Walsh and Vladimir Kattsov were of the opinion that the difference between the two time periods was not substantial. Bob Corell asked them to write an explanation of this change soon and to circulate it to ASC members by e-mail.

John Walsh noted that the climate models have significant differences in their initial conditions and in the values of their outputs. This means that chapter authors should pay more attention to changes in model outputs than in the absolute values of those outputs.

Several lead authors indicated that they have the model mean value outputs they need to do their work, but it was acknowledged that some authors would need slightly different outputs from the models and deviations from the B2 scenario. Bob Corell asked the lead authors of chapters 5 - 8 to do their best to come up with a common approach to scenario usage and to communicate it to John Walsh.

Bob Corell pointed out that use of only the B2 SRES scenario could create the impression that ACIA regards B2 as the best predictor of the future. This, of course, is not what a scenario is all about. He asked a group of authors from chapters 1, 2 and 4 to meet separately and arrive at a recommended approach on use of model output. Elizabeth Bush noted that IPCC authors had already developed guidelines on the correct use of scenarios, and she volunteered to join the ACIA authors who are looking into this question. The discussion also highlighted the need to include in the introductory chapter of the assessment report a description of and rationale for the approach to scenarios taken by the ACIA.

Harald Loeng briefly described the Bergen model that the authors of chapter 8 (marine systems) were using. The primary reason for use of this alternate model is that it gives ocean outputs (e.g. vertical ocean profiles) that are not available from the five ACIA models. He showed some of the outputs from this alternate model and said that they were generally comparable to the outputs from the five ACIA models. He asked ASC to approve continued use of this model. Hjalmar Vilhjalmsson remarked that this model could be helpful in the chapter on marine fisheries. The ASC agreed to provisionally accept use of this alternate model and asked the authors of chapter 4 (modeling and scenarios for the Arctic region) to look into the congruence of its outputs with the outputs from the five accepted ACIA models.

Lars-Otto Reiersen brought up the use of paleo-climate information in the ACIA scenario. He pointed out that the ASC had earlier agreed to use information on what had happened in the past in formulating scenarios. Some changes take place in a relatively short period (e.g. 50 years) that do not appear in the outputs from numerical models. There is evidence of such abrupt changes in ice cores, tree rings, etc. Abrupt changes of this kind may occur in the future. Terry Callaghan remarked that there is evidence of such abrupt changes in some terrestrial ecosystems. Glenn Juday said the possibility of abrupt changes is already built into his chapter. Snorri Baldursson agreed that ACIA should consider the paleo-climate record in addition to the outputs of numerical models, as had been acknowledged in earlier ASC meetings. Elizabeth Bush said that, if the ASC attempts to create a paleoclimatic scenario for use by all ACIA authors, it would

probably be necessary to secure external guidance or to add a new author to deal with these matters.

Timetable for ACIA

The Executive Committee met and developed a revised timetable for production, review and printing of all three ACIA documents: the scientific document, the overview document, and the policy document. This timetable will be posted on the ACIA website http://www.acia.uaf.edu/. An item of immediate concern is that first drafts of all chapters are to be submitted to the ACIA Secretariat, according to an agreed upon schedule, between September 3 and October 11, 2002. The new Assessment Integration Team (see below) will meet on 20 November 2002 at a site to be determined. The next ASC meeting will be a cross-fertilization or synthesis meeting of lead and contributing authors during 10-14 March or 17-21 March 2003 in the U.S.

Length of papers

Bob Corell said that ACIA would produce a scientific document and an overview document. A policy document based on ACIA will be produced by AMAP and CAFF. He expressed the hope that the scientific document would fit in one volume that would be published in limited numbers on paper and be available on the web. The overview document will pull together the essential elements of the scientific document. It will be written by Susan Hassol with graphics and layout by Paul Grabhorn, but with oversight by the steering committee. He asked the lead authors to estimate how long each chapter in the scientific document should be. The lead authors provided the following rough estimates, in pages of text and pages of figures and illustrations:

Chapter	Pages of text	Pages of figures
1	40	10
2	60	30
3	90	22
4	70	30
5	80	25
6	100	25
7	70	25
8	120	30
9	60	15
10	50	10
11	60	25
12	85	25

13	70	20
14	60	25
15	80	25
16	50	10
17	50	15
Total	1195	367

After further discussion, it was agreed by the steering committee that the numbers of pages listed above are only targets, with 10% leeway, and that everyone should strive to make cuts rather than adding more pages. Dave Klein urged authors to pay special attention to illustrations that might be useful in more than one chapter. When an illustration is referenced in multiple chapters, Paul Grabhorn recommended that authors put a small illustration in each chapter and reference a larger version elsewhere.

Lars-Otto Reiersen, reflecting his experience with AMAP publications, said that guidelines for authors are very important. He strongly recommended that authors follow the "ACIA Guidelines to Authors" available on the ACIA website, because this will reduce the work to be done by the editors.

Assessment Integration Team

Bob Corell reported that the Executive Committee had recommended establishment of an Assessment Integration Team (AIT) to guide preparation of the overview document. The AIT would also be responsible for guiding preparation of chapter 1 (the Arctic system) and chapter 16 (synthesis) in the scientific document. The AIT would consist of the Executive Committee plus two or three additional people chosen so as to achieve balance. The steering committee approved this recommendation to establish the AIT and assign it the proposed responsibilities.

At a subsequent meeting of the Executive Committee, it was proposed that Gordon McBean, Terry Callaghan and Elizabeth Bush be the additional members of the AIT. The steering committee approved this proposal. The point of contact for the AIT is the ACIA Secretariat. The editing/graphics team will join AIT whenever it meets.

Editorial and graphics help

Paul Grabhorn of Grabhorn Studio said that he will shortly set up a website where authors can put high resolution graphical material that may be used in their chapters. He urged the authors to send the most original material available and also include back-of-the-envelope sketches of what they may want in the final text. Paul said he preferred to work only with lead authors in preparation of the ACIA documents. He will see that his

guidelines are included as part of the ACIA publication guidelines. He told the lead authors to let him know what kinds of photographs might be useful; if a photographer is in the field for another reason, he might be able to help. He noted that digital camera photographs are not even close to publication quality. Bob Corell suggested that authors look at the U.S. National Assessment to see a fine example of Paul's work.

Susan Hassol asked authors to communicate frequently with her about editing of text. If any lead author wants a fine edit in place of a light edit, she will try to accommodate. Glenn Juday asked Susan to frankly indicate when things in the scientific text become unclear. Henry Huntington agreed with this point and asked Susan to tell authors if their material is too specialized or obscure.

Practical guidelines and definitions

Lars-Otto Reiersen summarized draft publication guidelines for ACIA that were based largely on guidelines established for AMAP. He said the guidelines will be posted on the ACIA website. Comments concerning improvements or additions are welcome. He emphasized the following points:

- Each draft should be clearly marked as draft, including date of composition
- Forget fancy formats and graphics; the publisher can put things together later
- Send suggestions on the guidelines to the ACIA Secretariat
- Try to put references in correct form right from the start
- ACIA reports need an appendix that lists the Latin and English names of biota

In the following discussion, it was agreed that ACIA needs a lexicon for such words as: very likely, likely, possible, unlikely, and very unlikely. Hanne Petersen was of the opinion that ACIA would need to have probability terms translated into each language used in the Arctic nations. Susan Hassol volunteered to help accomplish this task.

With regard to graphics, Paul Grabhorn said that the individual author should be the person who seeks permission to use something that has already been published. Gunter Weller noted that ACIA has a formal agreement with the Hadley Centre on what can be done with GCM outputs. Paul Grabhorn and Fred Wrona stated that it is preferable for ACIA authors to develop their own material, photographs, graphics, etc. and not have to obtain anyone else's approval to use these items.

Henry Huntington recommended that references be given at the end of each chapter. This will facilitate separate reproduction of each chapter as a stand-alone publication. He also recommended use of standard bibliographic software to handle references.

Data policy

The steering committee agreed that, since scientists may be asked to share data that have not yet been published, ACIA needs a data policy. Bob Corell said he would ask a small group to address the policy question and report back. Lars-Otto Reiersen said he would provide a copy of the AMAP data policy.

Bob Corell asked an ad hoc group consisting of Lars-Otto Reiersen, John Walsh and Vladimir Kattsov to discuss data policy and report back. In their subsequent report to the steering committee, Lars-Otto outlined the functions of the four AMAP data centers, but he acknowledged that they might not be relevant to ACIA. After some discussion, it was decided by the steering committee that, if a lead author finds he needs a data use agreement with a contributing or consulting author, he should contact the Secretariat for guidance.

Policy document

Lars-Otto Reiersen introduced a "Strategy for the preparation of the ACIA Policy Document," a revised version of which was approved at an AMAP working group meeting in Torshavn prior to the recent Senior Arctic Officials' meeting in Oulu. In its current form, the strategy says that AMAP, CAFF, other Arctic Council working groups that wish to participate and indigenous peoples groups will prepare the policy document, with the assistance of a professional writer. It also says there should be a clear linkage between the policy document and the ACIA scientific report, and that the Assessment Steering Committee will review the first draft of the policy document in order to control the validity of the science interpretations and science-related recommendations. Lars-Otto said the Senior Arctic Officials do not want to be directly involved in the drafting process, but they do want to be warned of potential complications well before delivery of the policy document to the Ministers in October 2004.

Bob Corell asked how the writing teams should go about bringing questions and outlining principal themes to the Senior Arctic Officials before presentation of the policy document in October 2004. Lars-Otto answered that an effective way would be to hold a workshop on this issue.

Terry Fenge told the steering committee that, from an Inuit perspective, policy could affect cultural survival. He thought ACIA should end up with a set of policy recommendations that are clear, detailed, and adequate. He believed the AMAP "State of the Arctic Environment Report" was a good example of how to accomplish this task. In that report, the participating scientists developed cogent policy recommendations. Terry wanted ACIA authors to play a similar initiating role in drafting policy recommendations.

Lars-Otto Reiersen agreed that the scientists involved in the first AMAP report developed initial policy recommendations without great difficulty. He believed the ACIA

steering committee could well act as a resource for suggesting things that might end up as policy recommendations.

Bob Corell noted that indigenous communities are well represented on the ASC. He pointed out that suggestions could be aired in steering committee meetings and then passed forward to AMAP and CAFF. But AMAP and CAFF would then be responsible for formulating policy recommendations, taking ASC and indigenous peoples' suggestions into account.

Gordon McBean noted that under the present process the policy recommendations would not be reviewed by the steering committee except for the first draft. In view of the sensitivity of wording of recommendations and the necessity of those being based on the good science that is characteristic of ACIA, he recommended that the steering committee be given the opportunity to comment on all phases in the preparation of recommendations.

John Calder pointed out that, according to the ACIA Implementation Plan, it was always planned that the scientific document would be separate from policy considerations. He was not in favor of attempting to change this approach which could turn the steering committee into something that was never intended. He thought, however, that the ASC should act as a reference group to make certain that AMAP and CAFF do not go astray on science. If the ACIA terms of reference are inadequate, then the steering committee must go to the Arctic Council to request a change.

Snorri Baldursson reminded meeting participants that it was never intended that AMAP and CAFF would work in isolation in drafting policy recommendations. It is supposed to be an interactive process. The ASC should clarify its role to show that it is somehow involved in every step of the policy development process.

Lars-Otto Reiersen said that ACIA had started with a scoping workshop in Washington. He suggested that the ACIA policy process start with a similar workshop to which policy makers and indigenous peoples' representatives would be invited.

Bob Corell thanked Terry Fenge for calling an important matter the committee's attention. The steering committee approved that Bob meet with representatives of AMAP and CAFF to work out the details of how the ASC will interact with those organizations in generation of policy recommendations. He thought the idea of a scoping workshop was something that should be explored.

New ASC members and authors

The steering committee approved Terry Prowse as co-leading author with Fred Wrona and Jim Reist of chapter 7 on Arctic freshwater systems.

Senior Arctic Officials at their last meeting instructed that a third Indigenous Peoples' representative be added to the ASC. The decision on membership was left to the Arctic Council's permanent participants and they decided that the Arctic Athabaskan Council (AAC) should fill the position. Since the AAC was unable to attend the Asker meeting, Stephen Mills of the Gwich'in Council International filled in.

The steering committee agreed that lead authors could add or subtract contributing and consulting authors for their chapters. Hanne Petersen pointed out that, in some cases, it is advisable to consult with funding sources before making personnel changes.

Bob Corell reminded lead authors that they should keep careful track of everyone who contributes to ACIA, either as contributing authors or as consulting authors. Every contributor must be acknowledged in the final reports.

When Elizabeth Bush inquired about her status, the steering committee welcomed her as an observer who had contributed much to the meeting. See the section on the Assessment Integration Team (above) concerning her role on that body.

Outreach: films, multimedia and translations

Lars-Otto Reiersen suggested that ACIA have a symposium when the reports are released in October 2004 -- something similar to the AMAP symposium planned for immediately before the Arctic Council Ministers' meeting in October 2002. If such an ACIA symposium is to be held, planning should start now, especially since it will be expensive.

Bob Corell responded that the Executive Committee would take responsibility for developing ideas on a symposium and for film production and bring its suggestions to the next steering committee meeting.

Other items

Gunter Weller and Patricia Anderson said that contributing authors can access everything that is on the ACIA website. Since lead authors control who are contributing authors, they also control who has access to the password-protected area of the website. She will see that Susan Hassol and Paul Grabhorn also have access to the entire website.

Bob Corell summarized ACIA's financial situation by saying that it appears to have adequate financial support for every step except actual printing and distribution of

reports. Gunter Weller noted that he had earlier been instructed to ask each Arctic government how much it is contributing to support ACIA. He distributed a draft letter that he proposed to send to the designated point of contact in each country asking about support of ACIA and also asking for an estimate of how many copies of ACIA reports he or she wished to order. The steering committee asked Gunter to approach the ACIA country representatives concerning national support of ACIA, but to delay trying to estimate the required number of copies until later.

Bob Corell said that ACIA cooperation with IPCC had been agreed to though an exchange of letters. Jim McCarthy is IPCC's designated point of contact to ACIA. Now the ozone committee of WMO wants a similar arrangement, with Dan Albritton being the point of contact. The Millennium Assessment also wants a similar cooperative relationship in order to avoid unnecessary overlap of activities. The steering committee approved that Bob should work out cooperative ties to both the Ozone Assessment and the Millennium Assessment by exchange of letters.

In the course of the steering committee meeting, Odd Rogne, Executive Secretary of the International Arctic Science Committee, hosted a tour of the Fram and refreshments on her main deck.

It was agreed that the Secretariat would assemble a list of independent expert reviewers for the chapters in the scientific document. Organizations that may be helpful in assembling this list include AMAP, CAFF, IASC, and the Indigenous Peoples' Secretariat. The list should be available by the time of the AIT meeting in November 2002.

One-day workshop: integration across chapters

Meeting participants divided into four groups for extended discussion of how to integrate various chapters of the ACIA science document:

Group 1: The Arctic as part of the global system
Chapters 2, 3 and 4
Convener: Gordon McBean

Group 2: Physical and biological systems
Chapters 5, 6, 7 and 8
Convener: Fred Wrona

Group 3: Impacts on humans
Chapters 9, 11 and 14

Convener: Henry Huntington

Group 4: Impacts on economic activities
Chapters 10, 12, 13 and 15
Convener: Glenn Juday

Brief summaries of their discussions are contained in Appendix 3 of this report.

Closing

Since Snorri Baldursson is scheduled to leave his current position as CAFF Executive Secretary, it was possible that this would be his last participation in a steering committee meeting. The committee expressed its gratitude for all his contributions to its work. Snorri assured meeting participants that he would try to continue his involvement with ACIA.

With sustained applause, the committee acknowledged the contributions of Pål Prestrud, Lars-Otto Reiersen, Odd Rogne and Inger Utne in arranging this meeting and handling all the practical details involved in it.

Assessment Integration Team Meeting

On 5 June 2002 there was a meeting of the Assessment Integration Team (AIT) plus other members of the ASC who were available. At that meeting, the following decisions were made:

- The AIT will oversee production of chapter 1 of the scientific document, working with Henry Huntington who will produce an outline of this chapter. Heney seeks contributions from the authors of other chapters.
- Synthesis chapter 16 will summarize the key findings of the entire scientific document.
- The Secretariat will start recruiting chapter reviewers with assistance from AMAP, CAFF, IASC, IPS, lead authors, etc. Each reviewer will be provided with a short topical outline of the entire study. Each reviewer will be asked to provide a curriculum vitae. Reviewers will not be paid.
- The Secretariat will produce a list of reviewer nominations by the time of the 20 November 2002 meeting of the AIT.
- Bob Corell will begin assembling a glossary of terms that are particularly important in the assessment.

- The cross-fertilization or synthesis meeting of lead and contributing authors will be about four days long and held in March 2003 in the U.S. Travel will be paid for as at other ASC meetings. The AIT will serve as a planning team.
- Likely venues for the 20 November 2002 meeting of the AIT are London and Stockholm.

Respectfully submitted.

Tom Murray

APPENDIX 1

ACIA
Assessment Steering Committee Meeting
2-4 June, 2002
Holmen fjordhotell, Asker, Norway

AGENDA

SATURDAY, 1 JUNE
17:00 Executive Committee Meeting

SUNDAY, 2 JUNE: Progress reports
08:30 - 17:30: Reports from lead authors

- Chapter reports (16 x 30 min. = 8 hours)

MONDAY, 3 JUNE
08:30 - 12:30: Help and information for authors

- Scenario information
  - GCM climate scenarios (J. Walsh, L. Moen)
  - Ocean model scenarios (H. Loeng)
  - Paleoclimate scenarios (E. Jansen)
- Editorial and graphics (P. Grabhorn/S. J. Hassol)
- Practical guidelines and definitions
- Discussion of length of papers
- Information on the protected website
- Discussion of how to achieve integration across chapters

13:30 - 17:30 Updates and future plans

- Timetable for ACIA (G. Weller)
- ACIA review process/white paper (R. Corell)
- Author credits/acknowledgments
- Synthesis report
- Policy document (AMAP/CAFF)
- New ASC members (indigenous persons, T. Prowse)
- Circumpolar biodiversity monitoring (CAFF)
- Johannesburg declaration (R. Corell)
- Outreach: films, multimedia and translations
- ACIA budget and finances by country
- ACIA Science Conference in 2004

- Next meeting (Nov. 02, UK, or Mar. 03, US ?)

TUESDAY, 4 JUNE: One-day workshop: Integration across chapters

- Integration of the chapters (gaps, overlap, etc.)
- Writing of the chapeaux (who?, what?, etc)
- Need for information from other chapters

Group 1: The Arctic as part of the global system
Lead authors for chapters 2 (climate), 3 (ozone), and 4 (scenarios)

Group 2: Physical and biological systems
Lead authors for chapters 5 (cryosphere), 6 (terrestrial), 7 (freshwater), and 8 (marine)

Group 3: Impacts on humans
Lead authors for chapters 9 (indigenous), 11 (hunting), and 14 (health)

Group 4: Impacts on economic activities
Lead authors for chapters 10 (wildlife), 12 (fisheries), 13 (forestry), and 15 (infrastructure)

13:30 - 17:30 Continued discussions in different groupings. For example, chapter 8 (marine) together with chapter 12 (fisheries), or chapter 10 (wildlife) with chapter 11 (hunting), etc. to be determined as needed.

WEDNESDAY, 5 JUNE
08:30 - 10:30 Meeting of small integration team

APPENDIX 2

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Asker, Norway, 2-4 June, 2002

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APPENDIX 3

Reports from four break-out groups during the one-day workshop on integration across chapters in ACIA

Group 1: The Arctic as part of the global system

Convener: Gordon McBean
Other participants: Petteri Taalas, Vladimir Kattsov

1. Chapter 2 will discuss and present information on tropospheric and stratospheric structure and climatological state and trends. Chapter 3 will discuss processes particularly as they relate to ozone.
2. Chapter 2 will include information on trends in cloudiness, snow cover and albedo. Snow cover will be coordinated with Chapter 5.
3. Taalas will provide some Finnish input on CO2 trends to go to chapter 2 section on GHG role of Arctic and history. He will also provide Finnish input on tree rings, lake sediments for paleo reconstructions.
4. Ozone scenarios needed for Chapter 4 will be provided through Petteri and Betsy Weatherhead.

Adhoc group – McBean, Wrona, Callaghan – discussion
Agreed that Terry will include peatlands, including methane as GHG, coordinated with Chapter 2, and Wrona.

1. Chapter 2 will include some human history information as boxes on its paleo record
2. Chapter two will help complete chapter 6 table on page 13`- information on % tundra during ice age maximum
3. Concern about who is dealing with coastlines – 20k bp, lowered sealevel led to more land for species, sea level rise will reduce land areas – how much – what are impacts – loss of coastal wetlands

Group 2: Physical and biological systems

Convener: Fred Wrona

Discussion of ACIA chapter 6, 7 (also 4, 2, 10, 13)

1. *Structure of the chapter*
   Similar structure is used for chapter 6 and 7, namely going from species level to ecosystem level.

2. *Overlap and gaps*
   We made a rough estimate and we planned the way forward. This will be further investigated in the future since some of the chapters are still at an early stage.

3. *Use of paleo-data*
   It was decided that in chapter 6 and 7 the paleo climate proxy data will be treated to a limited extent since it will be dealt with in chapter 2. Chapter 2 will link paleo climate to paleo ecosystem responses in the later chapter.

4. *Peat lands*
   It was discussed how peat lands should be presented in chapter 6 and 7. At the moment Terry Callaghan will concentrate on the biogeochemistry and Fred Wrona will deal with the influences of hydrology on peat lands.

5. *Scenarios*
   A. UV Scenarios
      The UV scenarios will be used to predict the timing by location for future responses by using already known data from experiments that use limited UV enhancement levels.
   B. Climate (precipitation, temperature, cloud cover) will be used in similar way to the UV scenarios.
   C. Chapter 6 and 7 will not do any new modelling

6. *Joint request for scenario output*
   Since it was discovered that many of the impact chapters and also chapter 13 would be interested in the same climate scenarios output, Margareta Johansson will make a table that will include the parameter, the area to cover, the resolution, the requested format etc. and will then send that to SMHI to check if the details in our request for information will be sufficient to process. The table will then be

circulated among the participants in the small impact group including Dave Klein and Glenn Juday. This matrix might be useful to have in the chapeau.

7. *The Arctic coast line in 100 years time, and 10 000 years ago*
   It is essential to estimate the percent change of the landmass in the Arctic in order to predict the future impacts of sea level rise on the biota compared with the past. Fred Wrona will look into the Russian abstracts that were presented at the Reykjavik meeting dealing with the erosion of coastline in the Russian Arctic and Margareta Johansson will investigate literature for the North American and European coastlines.

8. *Small mammals of fluvial areas and migrating birds*
   At this stage it is not well covered in either chapter 6 or 7. In chapter 6 a section about snow geese exists, although it is not very well developed. Fred Wrona will do the first move on mammals and he will send his request on migrating birds to Snorri Baldursson.

9. *Future communication*
   Margareta Johansson will communicate all of these discussions to Harald Loeng as soon as possible. It was decided that the impacts group would work very closely together in the near future in order to keep each other updated on the progress made. Apart from the impacts group, Dave Klein and Glenn Juday should also receive all the information that flows within the little group.

10. *Future joint meetings (chapter 5, 6, 7 and 8)*
    It was suggested that the group should meet between this meeting and the upcoming meeting in March next year. A possible venue is Abisko, since Fred Wrona passes Europe quite frequently.

Group 3: Impacts on humans

Convener: Henry Huntington

Indigenous Perspectives-Henry Huntington, Shari Fox
Hunting, Fishing and Gathering – Mark Nuttall
Human Health – Chris Furgal, Jim Berner

Organization
- integration issues between human chapters
- putting Hunting Fishing, Gathering, and Indigenous Perspectives and Human Health chapter together, after the four ‘economic’ chapters

- although we understand the original organization (with indigenous perspectives at the front of the human impacts chapters) as long as health is at the end of these chapters as we are using other chapter outcomes as sources of exposure for health issues (i.e. Lack of fish for fishing and gathering chapter, impacts to diet and health)
- however, the three are very much associated and this makes the writing of the chapeau easier and more logical (Hunting, Fishing, Gathering etc., is the link between the perspectives issues and health etc.)
- stuff that doesn`t fit into the health or herding, gathering chapter that is indigenous perspectives can always go in that (Indigenous perspectives) chapter as well

Chapeau
- socio-economic "scenarios", are they dead ? is it required and possible to discuss them in the chapeau, what context can we provide to these chapters
- idea of land and resources as a bank of choices for communities and climate change influencing this "reserve" of choices etc.

Integration
- there are not any problems with concern for integration and cross-exchange between these chapters as much of the information has the same line of logic, indigenous knowledge – hunting and gathering – individual health and well-being
- many impacts in the hunting, fishing chapter are starting points for health (provide further stress on health status)
- case studies, is it possible to have a few case studies among the chapters that are similar and add to each other – will look into this through reviewing each others' proposed case studies to review potential links, overlaps
- the development of a case study of case studies (integration of various cases that draw on others and pull together many impacts, different forms of knowledge etc.) – this could then go as an appendix to the human chapters or into the synthesis chapter as a large case study box

Case Studies
- selection for each chapter, coverage, cultures, etc.
- involvement of Gwichin, need for case studies and information from this region and group and how to get them

Issues of vulnerability and susceptibility and risk management or integrated assessment
- where to put these and highlight them as it provides the other side of the argument and puts the issue into context as far as consideration (does this fit in the human health chapter, or in the synthesis, or in the intro chapter)

Integration between Health and Infrastructure Chapters
- Infrastructure chapter can provide the basic structural design discussion on issues affecting public health in northern communities as well (through initial review of existing drafts and dialogue between lead authors)
- health chapter can then simply discuss health implications of problems with these systems induced by climatic changes (municipal waste, water systems)

Group 4: Impacts on economic activities

Convener: Glenn Juday (chapter 13)
Other participants: David Klein (chapter 10), Doug Goering (chapter 15)

1. Forest and Conservation Interactions
    A. Fennoscandia -- faces critical forest conservation issues, high proportion of species on Red databook list because of forest management, agriculture, and urban expansion activity; very few natural forests remaining have very high conservation value, *negative effects of climate change on natural forest remnants would represent major conservation problem.*
    B. Iceland -- virtually totally human-impacted or eliminated forest, national goal is for new forest to be established at rate of 1% of Iceland per decade for 4 decades largely on abandoned farm land, new forest primarily made up of 4 non-native species, significant potential carbon crop benefits.
    C. Northern Quebec and other E. Canada -- *potential expansion of trees into tundra caribou lichen ranges.*
    D. Central Canada
    E. Western Canada and Alaska -- large-scale forest preservation and diverse environments in Alaska makes *forest survival highly likely even with major climate changes and forest impacts that have already occurred,* western Canada has new and expanding forest products industry *with mixture of positive and negative effects of climate change (disruptive).*
    F. Central Siberia and Russian Far East -- important center of biodiversity in southern portion of Far East where timber cutting is expanding, *climate changes could lead to forest migration issues.*
    G. Northwest Russia (west of Urals) -- high conservation value of remnant intact natural forest as only intact boreal forest landscapes in Europe, *climate change impacts on natural forest may be mixture of positives and negatives* but some level of rare species should survive.
    H. Non-traditional forest products (NTFP) issues should be examined for climate change connection.
        1. Berry production enhanced by warm dry early spring weather.

2. Check for known/likely climate impacts on production of mushrooms, fuelwood, bark, birch sap, mosses, woven baskets, etc.

2. Forest and Infrastructure Interactions

A. Fennoscandia -- well developed infrastructure gives *good ability for implementation of forest management responses to climate change.*
B. Iceland -- extensive road access *provides adequate basis for afforestation program.*
C. Northern Quebec and other E. Canada -- *eventual opportunity for community tree-planting in marginal forests or tundra?*
D. Central and Western Canada -- road network continues to expand so *design and construction standards can be changed to adapt to future climates.*
E. Alaska -- limited land route access and large-scale allocation of landscapes to strict conservation allow *reliance on natural adaptative responses of forests to climate change.*
F. Central Siberia and Russian Far East -- expanded area of timber cutting in the Far East Region results in *stressed system with somewhat greater vulnerability to climate change impacts.*
G. Northwest Russia (west of Urals) -- accelerated timber removals from recent purchases and joint ventures with Nordic countries, *options for natural climate change resilience may be declining.*
H. Ice roads are important for low-cost & low impact logging access. Need Chapter 15 to perform calculations of freeze index scenarios for length-of-season of safe ice road operations under timber loads for rivers in the north under the 5 scenarios.
I. Areas of potential/likely new permanent infrastructure, especially roads, railroads, and ports, should be identified because of implication for agriculture and forest products production.
J. Examine interactions of climate change, forest fire ignition, forest fire spread, forest fire management policy. Consider long-term fire management goals vs. short-term fire management goals, community risk, infrastructure driving the need for fire suppression.

3. Wildlife/forestry interactions

A. Change in forest structure will affect wildlife, some wildlife species will experience short-term population increases that affect forests -- e.g. hares causing problems in tree regeneration.
B. Forests and roads and their impacts on forests and wildlife (deer moving north with changing forest structure following logging; the brain worm, carried by the deer, then has major debilitating effect on caribou and to a lesser extent on moose that are not adapted to it, wolves also increase as

the deer increase and threaten further decline of endangered populations of woodland caribou).

C. Need to develop the knowledge to successfully develop and manage agriculture in the far north as these areas become more suitable for agriculture and the scale of agriculture increases (cold regions soils, fertility, water quality).
D. Fire in winter lichen ranges of caribou and reindeer is important. Look at possibility of increases in forest fire in these specific areas.
E. Examine/comment on interaction loop of (A) climate change, (B) disturbance changes to forest structure, (C) wildlife population changes, (D) browsing impacts on forests, and (E) feedback to fire or other disturbances.
F. Examine/comment on interaction of climate change, forest structure change, biodiversity change (e.g. changes to passerine birds and insect predation).

4. Wildlife/infrastructure interactions

A. Water removals for constructing winter ice roads limits overwinter survival of fish requiring deep unfrozen water. Examine whether more or less water is available in petroleum areas and other relevant areas under climate change scenarios. Need Chapter 15 to perform calculations of freeze index scenarios for ice road construction that meets environmental standards. Identify the point at which permanent roads become necessary.
B. Examine elevated vs. buried pipelines under climate change scenarios as factors affecting wildlife movement.
C. Forests and roads and their impacts on forests and wildlife (deer moving north with changing forest structure following logging; the brain worm, carried by the deer, then has major debilitating effect on caribou and to a lesser extent on moose that are not adapted to it, wolves also increase as the deer increase and threaten further decline of endangered populations of woodland caribou).

Sub meeting of G. Juday (Ch 13), D. Klein (Ch 10), Fred Wrona (Ch 7), Terry Callaghan (Ch 6), John Walsh (scenario data)

5. Consolidated data request

A. Ecosystems (Ch 6), Freshwater (Ch 7) and Forests (Ch 13) agreed to seek a consolidated data request for wind data.
B. Forests (Ch 13) needs extreme wind event during the year as forest risk factor.
C. Pick three or 4 stations historical data, overlap period of scenario and recorded data, 5 scenario performance.