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Report of the Steering Group on Climate Change (SGCC)

11 June 2008

ICES Headquarters, Copenhagen, Denmark

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Contents

Executive Summary

SGCC met for the first time at the ICES Headquarters, Copenhagen, Denmark on 11 June 2008. The remit and responsibilities of the group was discussed and specified:

- Encouraging ICES member countries to provide relevant data for the study of climate change (e.g. historical data and data from long-term sampling sites),
- Identify appropriate methods of assessing information located in the ICES Data Centre and in non-searchable repositories,
- Identify functions and services that ICES can assume and provide in relation to climate change in the North Atlantic, provide added value to existing activities and so meet a demand of services and assessment presently not addressed,
- Advise ICES on the selection and preferred sequence of services that we can offer,
- Actively promote ICES services and assessment in climate change to potential users and stakeholders,
- Establish liaisons with international organizations, convention and panels with interest in the effects of climate changes in the oceans.

The geographical scope was discussed and SGCC concluded to cover the Arctic as part of the area under consideration. Relationships with IPCC and ways of how to contribute were identified, mainly through offering monitoring data from ICES time-series and through offering a review of ARs by an ICES Study Group.

Workshop will be an instrument of SGCC to achieve its goals and fulfil its tasks. A programme was established for the next 30 months. A main product of SGCC will be a ICES (white) position paper on climate change. SGCC will continue to work on a basis of two annual meetings. Membership will be dynamic, i.e. Chairs of other relevant ICES WGs may be invited to participate. SGCC will respond to the offer made by the 2009 international climate change conference, to be held in Copenhagen, Denmark within the remits of the 2009 Climate Summit.

1 Welcome

The Steering Group on Climate Change (SGCC) (Chair: Luis Valdés, Spain) met at the ICES Headquarters, Copenhagen, Denmark on 11 June 2008.

The ICES General Secretary welcomed participants and gave his best wishes for this first steering group meeting. The General Secretary was pleased to see this development taking place, which would help ICES increase its profile in the climate change area. V. Piil gave the logistics of the meeting.

The Chair, Luis Valdes, also welcomed the participants and introduced the rationale and preliminars about the creation of this group. The Chair was very pleased that the Council supports this group and funded it from the ICES Strategic Fund.

The first initiative had been to prepare a document, with a roadmap for this group, and the second was to make a selection of people to become the first members of this group. All ICES groups were analysed and a subjective selection was made. Clearly there are more people working within the climate change area within ICES, and the Chair encouraged the participants to inform the Chair of relevant persons missing.

The participants (see Annex 1) introduced themselves and gave a short account of their scientific interests within the field of climate change. Apologies had been received from M. Tasker, P. Petitgas, A. Rijnsdorp and Liam Fernand. The Chair suggested inviting the ICES Data Centre Manager, Neil Holdsworth, as a future member of the group.

2 Adoption of Agenda

The agenda (Annex 2) was adopted with the following additions:

- A brief update on the Science Structure and Science Plan was scheduled after the review of the roadmap (Agenda item 3) to give the participants an idea of how the roadmap would fit into the new science structure.
- A presentation by J. Alheit focusing on small pelagic fish was scheduled after Agenda Item 4.

A collection of background documents useful for the group are available at the ICES SGCC share point (http://groupnet.ices.dk/SGCC08/default.aspx), the following were incorporated:

- ICES response to the OSPAR Request on Climate Change "An assessment of the changes in the distribution and abundance of marine species in the OSPAR maritime area in relation to changes in hydrodynamics and sea temperature" (Adi Kellermann).
- Summary on "Climate change and fish communities" (Daniel Duplisea)

3 Review of SGCC proposal and roadmap

The Chair presented the work document "SGCC draft Plan" prepared in February (Annex 3) to be presented at the Bureau. This Plan contains a rationale for the group,

mission and objectives, responsibilities and task, recruitment and work procedure, benefits and products, roadmap, and financial and resources requirements.

The entire document was reviewed for new inputs and for a better understanding of the SGCC members. The comments raised during the discussion are grouped in the following subheadings:

Meetings and Reports

The Chair proposed that the group meet twice a year, once in Copenhagen (late March, early April) at ICES expenses, and once in connection with the ASC (September) at national expenses.

SGCC will report to Consultative Committee and the Bureau. SGCC will report by September to ConC during the Annual Science Conference.

Membership of SGCC

The SGCC is mainly made by chairs of EGs. The intention of having the Chairs as members was to ensure the bottom up science, another criterion had been performance in terms of contributions to the OSPAR Climate Request, and a third criterion was to provide equitable geographic and regional representation.

The ConC Chair raised the question of his membership with the new incoming Chair of ConC. He also questioned whether the SGCC membership would be rotating as Chairs of EGs are continuously changing, or whether the present members would be long-term members of the group to ensure continuity. The SGCC chair has no strong feelings on this, but feels perhaps not practical to change membership too often, as he considered that a rotation would jeopardise the efficiency of this group. Consensus in the group to keep the present composition to ensure continuity and after 3 years the group can evaluate the experience and decide in accordance.

In terms of geographic and regional representation, the group is quite balanced. J. Alheit will act as representative of the Baltic region.

In addition to the current members, it was suggested to reinforce the SGCC with the following expertise:

- An expert in climate science
- A member from the WGPBI
- Penny Holliday cannot assure her participation once that her mandate as chair of WGOH ends. To assure the continuity of the WGOH, Sarah Hughes will be invited to join the SGCC
- Chair of BEWG
- Head of ICES Data Centre, Neil Holdsworth

Responsibilities and tasks

The Chair outlined the proposed responsibilities and tasks of SGCC and the group asked to go through the bullets describing the responsibilities and tasks for SGCC and where necessary identify people to make more detailed comments for each point.

The full list of responsibilities and tasks is available in Annex 3.

About the **Responsibilities**, the points that needed clarification were:

> *Encouraging ICES countries to provide relevant data for the study of climate change (e.g. historical data and data from long-term sampling sites).* This was considered very general, could cover phytoplankton to oceanic hydrography. What is the mechanism for this? There was a suggestion to include a ToR for WGs to supply the relevant data. ConC Chair felt this would be a task for the WGDIM. WGOH has a ToR to advise ICES Data Centre on setting work priorities for physical data. The Chair of SGCC could write a letter of encouragement to the Delegates.

> *Identify appropriate methods of accessing information located in ICES data bank and non-searchable hardcopy*. Comment from J. Pederson: What happens to the data in connection with change of chairmanship? This is a large issue that should be discussed as part of our mandate. What happens to the data, looking after the data, important aspect that all ICES groups. Another aspect is what is the right information? ToR on what the data centre should provide?. The SGCC Chair suggested giving Neil Holdsworth the responsibility to identify the gaps we have.

> *Identify functions and services that ICES can assume and provide in relation to climate change in the North Atlantic, provide "added value" to existing activities and so meets a demand of services and assessment presently not addressed*. This bullet is addressing the need to make ICES more visible. This one relates to the position paper directly.

> *Advise ICES on the selection and preferred sequence of services that we can offer.* If OSPAR or any other requests advice from ICES, ICES will have to identify the services we can assume, and we have to add value to our work ensuring that ICES get accredited.

> *Actively promote ICES services and assessment in climate change to potential users and stakeholder*s. This one relates to the pro bono work self generated by the SGCC.

> *Establish liaisons with international organizations, convention and panels with interest in the effects of climate changes in the oceans*. Would be an excellent forum to promote ICES work and advice on climate issues. Might be an idea to link up to other organisation, such as PICES, IOC, FAO, CIESM, particularly considering that GLOBEC will finish next year. Try to fill the gap and replace in some ways the GLOBEC work. Need to have clear commitment between cooperating partners.

Among the main **Tasks** and immediate decisions for the steering group, the two which needed clarification were:

> *Determine how best to contribute to the IPCC processes*. The ICES President Joe Horwood had requested this bullet. Keith Brander is no longer with ICES, but has collaborated with IPCC. J. Horwood thinks that ICES should be a member of IPCC. A larger discussion on this bullet follows in Section 6.1.

> *Defining the geographic area to be covered* (Discussion on the Arctic)

One of the points to be clarified deals with the geographic area to be covered by this SGCC. The point that needed for a clarification was if the Arctic is considered to be part of the ICES area.

There are strong reasons to consider the Artic within the geographic coverage, as there is a close link between the arctic and the subarctic. ICES countries are bordering the Arctic Ocean. The arctic provides a good link for cooperation with PICES,

However there are also reasons to opposite, as the weak implication of ICES in the International Polar Year. Data available in ICES from Artic are scarce and fragmented. ICES does not have any groups engaged in the arctic. This is a region very sensible in terms of political decisions.

The ConC Chair had attended a meeting of the Sustaining Arctic Observing Networks (SAON) and recognised that ICES is not well known among climate people outside the ICES community.

At this stage, both positions were clear, but this was not and easy and trivial decision.

The discussion continued and many supported to include the Artic. Penny Holliday reminded that expertise exists with the WGOH with a good knowledge of the arctic and remarked the close link between arctic and subarctic. The same feeling was expressed by Astthor Gislason, who explained that local conditions in the Iceland Sea are very much influenced by the Arctic and the Atlantic, Iceland would always consider this influence, and therefore would be inclined to take this area in.

A. Kellermann told about a recent paper showing that there has been rapid decrease in ice coverage during the past years and that important changes were taking place in the Arctic that could have effects elsewhere. Even though we do not have people directly engaged, we need to follow the developments very closely. We have data from biological time-series.

The Chair concluded that there was general agreement to include the Arctic as part of the geographical area of SGCC.

Roadmap

The participants were asked to volunteer to attend the climate change related symposia listed in the draft SGCC plan. SGCC had received financial support from the Bureau and it is available for the members of this group to attend some of these meetings.

ICES/SGCC observers at meetings/symposia in 2008:

- Kick-off meeting (1st. annual meeting). ICES HQ, early June. (all SGCC members).
- ICES Symposium on Effects of climate change on the world's oceans. Gijón (Spain), 19–23 May. (Attended by Head of Science Programme and Chairs of OCC and ConC).
- International Symposium on Coping with global change in marine social-ecological systems. FAO Headquarters in Rome (Italy), 8-11 July. (Head of the Advisory Programme, Hans Lassen (tentative) and SGCC Chair, L. Valdes (tentative).
- 2nd annual meeting during the ICES ASC. Halifax (Canada). (All SGCC members). Not covered with funds from SGCC

- Symposium on the Ocean in a High-CO_2 World, Monaco (Monaco), 6-8 October. (Jan Helge Fosså, Norway).

The ConC Chair brought up an additional symposium, which would also touch on climate change:

- ICES Symposium on Linking Herring,. J. Alheit, Germany and ConC Chair, Harald Loeng, Norway (tentative).

Update on Science Plan and Structure

The ConC Chair, H. Loeng, gave an update on the restructuring of the science and advisory side of ICES. The restructuring of the advisory side had been given priority and was implemented this year.

The present structure has now been analysed, the process started in January 2007. ConC has concluded that it may not be the structure that is wrong, but the working procedure within the structure could be improved. We should try to maintain disciplinary committees, important to have a forum for people with the same scientific background. The committees might be slightly changed in the future. For political reasons, ConC is also in favour of maintaining the Baltic Committee, but there could also be other regional committees, for instance the North Sea.

Crosscutting groups (the term has not been fully agreed – programmes or steering groups) will be established for a four-six year period within the focus in the strategic topics identified in the ICES Science Plan. The working procedure will change / more responsibility will be handed to the committees and EGs.

In addition ConC suggests a science week every or every second year at ICES HQ of committee chairs and EG Chairs to meet (this will be a parallel to the advisory AMAWGC meeting). The committees will still have their autumn meeting.

Various options have been discussed for Consultative Committee. There has been some pressure to have national membership in ConC. This would be a very large group. The majority of ConC would like to maintain a small group, counting only the Chairs of Committees and Steering Group Chairs. There is also understanding for the "national representation" scenario which would empower ConC to speak on behalf of ICES.

A Bureau WG will meet in two weeks to discuss the new structure based on the suggestions made by ConC in May and hopefully this Bureau WG will prepare a solution that will be approved by Council in the autumn. ConC is convinced that disciplinary committees are worthwhile and that this is the best way of discussing science and feedback from EGs also support this idea. Next year is likely to be a transition year. The new setup will not be cost-neutral.

In parallel to the discussions on Science Structure, a council subgroup on Science Strategy met at ICES in January 2008 and came up with a first draft of the new Science Plan. Following a consultation process in the ICES science community, a second draft will be presented to the Bureau WG.

4 Review of the ICES/PICES/IOC International Symposium on the Effects of Climate Change on the World's Oceans

The Chair summarised the main findings/results of the Symposium on the Effects of Climate Change on the World's Oceans held in Gijón, Spain, from. 19–23 May 2008♦:

- There were 458 registered participants and the symposium had very good talks and presentations. Key findings in the summary of the Symposium Report prepared for ICES. For additional information participants were referred to the SGCC SharePoint site a compilation prepared by the Head of Science Programme.
- This was the first big international symposium on climate change.
- Three statements: the global warming trend and the increasing emissions of $CO_2$and other green house gases (GHG) are already affecting the environmental conditions and biota in the oceans at a global scale. Second, we do not know how large and deep these effects will be in the near future and that we do not understand the mechanism and processes converting the individual responses of single species into shifts in the functioning regime of marine ecosystems. Third main statement is that we need to maintain the existing time series, establish many more in some regions, do more experimental work, and develop more complex and finer models.
- There were no theme sessions on societal aspects of climate change, only the scientific aspects.
- The experts in CO_2 emissions revealed that the annual rate of increment of CO_2 in the atmosphere is now 4 ppm, instead 3 ppm as it was in the last decade. This acceleration confirms that the intermedium scenario in the Fourth Assessment Report of IPCC (IPCC AR4) is not the one we have to consider anymore and that future climate changes are likely to be much larger than what we have experienced so far. It was also confirmed that anthropogenic warming and sea level rise would continue for centuries, even if GHG concentrations were to be stabilized at or above today's levels.
- No conclusive data on changes to the global ocean circulation were presented.
- One main concern is the coral reefs, if they disappear, numerous species will disappear with them.
- Difficult to conclude on the relation to the population of fisheries. Many other effects and problems are related to the depletion of fisheries. One example of this is the migration of tuna, and changes in distribution of small pelagic fish.
- Important concern on lack of time-series in the Fourth Assessment Report of IPCC and this was highly criticised. Reference to publication in Science by Richardson. The best coverage of time-series is found in the North Atlantic and this should be highlighted.

♦ The Report on the ICES/PICES/IOC Symposium on the Effects of Climate Change on the World's Oceans is available at the ICES Symposium website at http://www.ices.dk/iceswork/symposia/SYMPOSIUM%20REPORT_ICES_Climate_Change_Symposium_2008.pdf

- In addition to the current work done in observing the oceans, the new challengers for the next 5–10 years include the study of non-linear effects on biological processes leading to shifts in ecosystems which are not understood, the decadal variability underlying the signal of climate change, the rate of melting in Greenland, the ocean acidification, the expansion of oligotrophic gyres (how the productivity in the oceans will be in the future), the depletion of intensity and changes in upwelling systems, species sensitivity to climate change, and the interaction of climate change with other human impacts and activities.
- These symposia should continue in the future. The conveners have initiated negotiations for the organization of the next International Symposium on the "Effects of Climate Change on the World's Oceans" to be held in Japan or in Australia in 2011 or 2012.

Comment from ConC Chair, H. Loeng, that an overlap with the proposed "Symposium on Hydrobiological and Ecosystem Variability in the ICES Area during the First Decade of the XXI century" scheduled for 2011 should be avoided and therefore 2012 would be preferable.

During the negotiations with Japan, the Chair would ensure that these two symposia would be held in separate years.

Presentation by Jürgen Alheit:

Linkages between climatic indices and changes in population dynamics of fish are weak, however some good relationships are being observed in small pelagic fisheries.

J. Alheit presented a detailed list of sardine and anchovy fisheries around the world and the relationships between the dynamics of populations with climatic indices such as ENSO, NAO and AMO. A good reason for focusing on small pelagics (herring, sprat, sardine, anchovy) is that they are better suited to stand the effects of climate change. They are lower in the food chain, they are short-lived. Comment that herring is a long-lived species, but herring also shows fast effects to climate change.

Regarding the ICES position paper the Chair pointed to the importance of finding relations between fisheries and climate. The Gijon symposium had not reported on many good relationships between demersal fisheries and climate. D. Duplisea also found that demersals are much harder to find (they change depth), but even if adult populations of demersal species are not affected by warming of deep water, there are examples showing that climate change is affecting spawning of Barents Sea cod.

Finally it was commented that the reasoning from climate change to climatic indices and to changes in biological processes are not well understood, however many scientist do an over use of these indices. The ICES position paper should include a chapter to explain what these indices mean.

5 Review of the ICES climate brochure

The ICES Climate Brochure is a direct mandate from the Bureau. The Head of Science Programme prepared the first draft. This was circulated among a reduced group of experts within ICES. Once that the comments and suggestions were incorporated the second draft was then circulated to a wider group, who also send new comments. The third draft was circulated among the ConC members and to the SGCC for comments on the scientific content. The version resulting after this long process should be

ready for approval at the Bureau meeting (last week of June) and then sent to print. It will distribute first during the 2008 ASC in Halifax.

An updated draft, incorporating the comments from ConC and SGCC members, had been prepared prior to the meeting and made available on the SGCC SharePoint site. The document was very well received and considered a valuable and positive initiative within ICES.

Comments made by the members of the SGCC are grouped in the following subheadings:

Target audience

- If the document is addressed to General public and scientific colleagues, the level of the content has to be high (it seems that the current redaction is appropriate).
- Some expressions and technical words need a definition and unification (e.g. IROC). It was suggested to include a list of terms at the end of the entire document with definitions or otherwise to have a text box that explained jargon such as "plankton", "meridional overturning circulation", etc.

Introduction

- Suggestions to add an opening paragraph summarising the main message of the brochure; what ICES is, what ICES is doing about climate change.

  We then felt that the original first paragraph would be improved if there was less emphasis on the greenhouse analogy, which we felt was already well enough understood by the potential readers to not need spelling out. E.g. of new wording: "There is high confidence within the scientific community that climate change is a reality. Global atmospheric concentrations of CO2, methane and nitrous oxide have increased as a result of fossil fuel use and agriculture. The increase in these greenhouse gases has caused warming of the atmosphere and ocean, rising sea level and changing wind patterns. As greenhouse gas emissions continue to rise, so will the global temperature, leading to further ice melting and rises in sea level. "

  (If you use this introduction paragraph then the following one can be edited slightly so as not to repeat the list of gases, but it follows nicely by giving detailed figures for the changes.)

- The sentence "acts like the glass" should be modified… the hot air rises and is mixed with cold air.

Figures and graphics

- Blurry graphics from pdf documents, will there be efforts to do this professionally?
- Figure SPM.1. Not sure whether this is the proper figure to have there, would be better to have one from IPCC or cars reminding you of CO2 emission. Other comments that this has some relevance. There are data on disappearing arctic sea ice, would that be better? Delete the third panel, and substitute with ice coverage in the North hemisphere, more relevant for the marine community and for ICES.

- The map of SST anomaly from 2006 could be replaced by the attached version for 2007 from the IROC 2007. And the Quote would need to be amended to read "The trend in the North Atlantic in the past decade (1997-2007) has been of warming and increasing salinity in the upper ocean" ICES Report on Ocean Climate 2007"
- Consensus to keep figure 5. Good to have one on cod, then delete the other one on fish. Retain 5; delete the figure on red mullet.
- It was considered that the figures on the distribution of Temora and on the distribution of Zenopsis both refer to the Bay of Biscay. It was suggested to delete one and Astthor considered that we should delete the one on Zenopsis (because there are too many figures with fishes).

Regime shifts

- Regime shifts/tipping points. It is not mentioned in the brochure, and it should be.
- Could the societal aspect – that this will change our lives our own regime shift! – be mentioned?

Circulation models

- Not sure whether people, i.e. the general public, will care about circulation models, unless it is better explained. Even if people are familiar with the meaning and limits of models, a good level of description is needed.

Plankton

- If this is meant to be for the general public, we should explain plankton. Could be included in text box linked to *Temora Stylifera.* Agreement to have a text box on this.

Closing the gaps

- At the end of the section it will be convenient to include a paragraph in the stile of "If we do not close the gaps we will loose..." and "It is important to continue with the existing time series and initiate new research in ...(list of items)".
- Before identifying the research add a sentence that describes what these research projects mean to the "stakeholder". E.g., why fisheries needs the research, etc.
- Take out reference to working groups, but retain the outputs and access to documents. Thus remove key groups but add outputs
- The list of symposia would be of little interest to most readers and would be better given as a few sentences explaining that ICES has a history of addressing climate change issues.

Finalising the brochure

All SGCC members were asked to send their comments directly to the HoS directly for incorporation and update of the brochure.

The comments received were many, but all valuable and positive. However it will be difficult to incorporate all of them and have the text ready in time to be circulated among the ConC before to present it at the Bureau for final approval (which was the plan traced during the last ConC meeting in May). So, Bureau

should be asked to give ConC the permission to approve the final draft, which should be printed prior to the ASC.

6 Discuss options for new actions

The Chair encouraged participants to provide ideas, comments and suggestions to advance in the Work Plan of SGCC, and reminded the group of the important future tasks for the group, i.e. to identify specific workshops, manner to influx in IPCC, produce a preliminary table of contents for the ICES position paper. For the last item, the group should aim to produce at least the index for the position paper and identify future *ad hoc* workshops.

6.1 Workshops

Workshops will an instrument for the SGCC. The SGCC will follow two approaches, first, to have advantage from the logistic of other programmes to produce workshops relevant for SGCC, and second, to produce *ad hoc* workshops within ICES structure to cover gaps and write contributions where we cannot have the adequate expertise. The SGCC must bear in mind that inflation of EGs within ICES structure is undesirable, so when possible the topics will be dealt with by existing EGs.

Whatever the workshops are convened, these must be product oriented, with background papers (circulated before the workshops takes place), and resulting in a citable volume with a general discussion.

Since the SGCC has a three-year lifetime (30 months in fact), we should have a workshop programme for the next 30 months. The aim for this meeting would be to prepare a tentative list to be elaborated at the next meeting in Halifax.

Among others, the following already on the way were mentioned:

- The WGCCC has prepared a five-year plan; they arrange workshops which (due to workshop membership rules) makes it easier to have the right expertise represented.
- 3rd GLOBEC Open Science meeting (June 2009). A workshop succeeded by three days with presentations and posters. A committee has been formed selecting topics for workshops. Deadline for presenting ideas is 1 September.
- Biennial Conference on Marine Science (August 2009). A letter to ICES requesting cosponsorship was (or is about to be) sent.
- "ICES/PICES Workshop on Small Pelagics maturity stages" has been planned and approved for this year. Alheit will attend.

Suggestions for *ad hoc* workshops:

- Climate indices and its meaning in a climate change context.
- Workshop on the influence of the NAO and the big changes in North Pacific the late 80s. Potential for joining forces with ICES and PICES. Alheit suggested merging with proposed workshop 1.
- Data Workshop. Extract data – have common data, easily available, this would be the first step. Have a data inventory and make it completely available. List of indicators, and check what data is already there. Along

- Circulation, what is happening with the Greenland ice cover and sea level rice within the next 50 years.
- Climatic evidences of bioinvasions in a changing world
- Shifts in marine ecosystems

Regarding the climate indices, it was mentioned that there is not need of a workshop to write a review; there is an awful lot of literature. The workshop will have more sense if focussed on what the indices represented in terms of atmospheric and/or oceanic processes, so that we can understand the mechanisms that link changes in physical conditions to changes in the marine ecosystem.

Finally it was also commented that there have been throughout time a lot of workshops related to climate change in ICES. The question is if we have an overview of all these workshops. Maybe we should have an overview (results, aim, outcomes) on these before we decide on new ones. Important not to repeat what already has been done.

Action: In order to create an overview of ICES work that has been done already, the Secretariat was tasked to prepare an overview of climate related workshops, including the main results and recommendations.

6.2 How to influx in the IPCC panel

ICES not actively contributing to IPCC. The reason is that IPCC is made up of a collection of individuals, not institutions, and ICES as an organisation cannot have a role in appointing people to IPCC.

Penny Hollyday mentioned that this lack of engagemnet between ICES and the IPCC is due to the lack of ICES publications on climate change. IPCC only consider peer reviewed articles and research programmes presenting "scientific consensus", so unreviewed, and indeed reviewed-but-controversial work is not given so much weight in their assessments. They will only hear about ICES through high profile papers. She would like to see the position paper as a reviewed article (and there was agreement from other members).

A discussion was opened to find the way to contribute to IPCC from ICES.

I t was mentioned that one of the weakest points of the Fourth Assessment Report of IPCC (IPCC AR4) report is the reduced number of time series and sampling sites used to assess and forecast with accuracy the trends in the different oceans and regional seas. Chapter 1 of Working Group II's report, lists only 30 marine data series (biological and physical) in the synthesis of climate impacts, compared with 622 series from the cryosphere and 527 series from terrestrial biological systems[♣]. Furthermore, only 4 out of 43 authors of this chapter were marine biologists, which results in a greater likelihood that documented changes in marine systems may be under represented. IPCC guidelines for inclusion in assessment reports demand that time series must be at least 20 years long and end in 1990 or later.

[♣] Richardson, A.J. and E.S. Poloczanska. 2008. Under-resourced, under threat. Science, 320: 1294-1295

However, we know that there are more than 30 time series from permanent sampling sites in the ICES area, and that this is the area with a best coverage in the world. A possible way to collaborate with IPCC and enhance transparency in the IPCC process would be to offer them the data from ICES monitoring programmes in the North Atlantic. This will allow the broader scientific community in IPCC to do better descriptions on observed changes and improve the quality of the assessment and make ICES visible.

The second way to collaborate is to establish an ICES study group to review the IPCC drafts in time report. But it will be necessary to know fist if the IPCC report is open to public review before publication.

6.3 List of contents for ICES position paper

At a medium term (end of 2010) the SGCC should prepare a white paper (or ICES Position Paper) detailing current knowledge about the effects of climate change on the physical oceanographic properties of the ICES ocean areas and lower and higher level trophic responses to change, and directions that research and education should proceed in order to better understand and anticipate climate change effects on the marine environment.

The aim for this meeting was to have 10 or 12 items to be addressed in this document, which will be 80-125 printed pages. It is important that we not repeat what others are doing, we should produce new things, relevant for the scientific knowledge and updated to the most.

As a starting point the chair presented a table of contents from the Marine Board document for comparison[♠]. The approach of the example is very geographical; which was considered not appropriate and was a general agreement that a entire view of the Atlantic is more adecuate to ICES. If Member countries might want to know what will happen in their region, this could be included in an apendice at a later stage.

It was considered that a good approach for us would be to make the paper tophic/theme basis. Otherwise we are just doing the same thing.

A brain storm was initiated to identify the list of items to be included in this position paper. The suggested title was: ICES Position on Future Research on Climate Change.

The preliminary list of items (the discussion will continue by email) was:

- Executive summary (what we know, gaps, future)
- Introduction: (a) Role of ICES in promoting marine science and in climate change, (b) global overview [zoom into the ices area, specifically describing what is happening in the ices area. It will be important to make that distinction].
- Warming in the North Atlantic. Interdecadal variability. Climatic indices and their meaning in a climate change context, mechanisms that link climatic indices with processes, other mechanisms linking climate with biological populations.

[♠] ESF. 2007. Impacts of Climate Change on the European Marine and Coastal Environment. Marine Board Position Paper 9, 82 pp

- Hot spots in climate change: the ice cover in ICES's region. Sea level rise. Coastal erosion.
- Circulation and changes in physical and chemical properties and processes
- Acidification and biogeochemistry (reference to deep sea corals).
- Chlorophyll in the North Atlantic (Atlantic gyre, upwelling regions, shelf seas). [Would be useful to show the Atlantic as one region. What happens if the primary production decreases? This topic can be addressed in 10 pages or so, would be really interesting].
- Trends in plankton communities (including jellyfish and harmful algal blooms).
- Benthos and phenology in coastal areas (because phenology is well traced in benthic species)
- Changes in migratory routes, geographic distribution of fish and effects in the fisheries
- Sensitivity of marine ecosystems to climate, variability and regime-shifts in marine ecosystems
- Climatic events and bioinvasions in a changing world
- Socioeconomic consequences of climate change in the Noth Atlantic (direct and indirect effects - opening of sea passages in the Artic, biogeochemistry changes in nutrients, carbon cycle, etc.)
- How models help us to understand climate change evolution in the near future
- Conclusions and ICES position in future research in Climate Change

Under each topic we have to say what we know and what it is we do not understand. We should include predictions or future research activities.

The need for using peer-reviewed papers was reinforced. We will synthesise in a review what is available and identify the gaps.

The HoS added that forecasts spanning more than 100 years, does not make much sense. Better to concentrate in short (5–10 years) and mid term (50–100 year) forecasts.

7 Schedule for the next 12 months

The SGCC will work on a basis of two annual meetings (one in spring and the other during the ICES ASC), but also will conduct its business via electronic communication and telecommunication.

Most urgent action is to provide feedback on the ICES Climate brochure to be sent to HoS. Draft will be sent to the Bureau, and the final responsibility will be with ConC. It must be printed and be ready for distribution at the ASC in Halifax.

In the mid term before the 2008 ICES ASC, the SGCC will discuss by email on the contents of the ICES position paper in order to be prepared to identify future *ad hoc* workshops in accordance with the content list. It should be also necessary to prepare the ToRs and draft resolutions for approval by ConC and Council.

The ICES Secretariat, HoS, will provide a list of ICES workshops relevant for SGCC during the last 10 years, and will maintain the SGCC sharepoint, where a collection of white and position papers on climate change will be available.

ICES has been offered the opportunity to present a summary of the major findings/conclusions from the Annual Science Conference at the conference entitled *Climate Change: Global Risks, Challenges and Decisions* to be held in Copenhagen from 10–12 March 2009 in the general framework of the climate summit. The SGCC will work on the content for this presentation.

In 12 months the SGCC will produce a list of topics where ICES should be reinforced in order to be an authorised voice in climate change in the scientific arena.

Next meeting, agreed by all participants, will be held on the Sunday 21 September before the ASC in Halifax (Canada). The chair will invite the new members.

8 Closing

Chair thanked the members for their active collaboration and the Secretariat for meeting preparations. J. Alheit expressed his enthusiasm for the SGCC work, this group has a great potential. Members thanked and applauded the Chair for a good meeting.

Annex 1: List of participants

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NAME	INSTITUTE	PHONE/FAX	EMAIL
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Annex 2: Agenda

SGCC/June 2008

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

Draft Agenda
STEERING GROUP ON CLIMATE CHANGE [SGCC]

Wednesday, 11th June 2008 ICES HQS, Copenhagen, 09:00–18:00

Agenda

1) Welcome
2) Adoption of Agenda
3) Review of SGCC proposal and roadmap (see attached doc)
4) Review of the ICES/PICES/IOC International Symposium on the Effects of Climate Change on the World's Oceans
5) Review of the ICES climate brochure
6) Prepare/discuss options for new actions (e.g. SGCC as a possible pilot for future science programmes, proposals for specific workshops, ICES position paper, etc)
7) Preparing the schedule for the next 12 months
8) AOB and Closing

Participants invited:

Jürgen Alheit, ex-chair of WKLTVSWE
Daniel Duplisea, Chair of WGFE
Liam Fernand, ex-chair of WKCpH
Astthor Gislason, Chair of WGZE
Penny Holliday, Chair of WGOH
Anders Jelmert, Chair of WGBOSV
Adi Kellermann, Head of Science Programme
Harald Loeng, Chair of ConC
Judith Pederson, Chair of WGITMO
Pierre Petitgas, Chair of LRC and WGLESP
Vivian Piil, Departmental Secretary, Science Programme
Adriaan Rijnsdorp*, Chair of SGWRECC
Joe Silke, Chair of WGHABD
Mark Tasker*, ACOM vice-Chair ex ACE
Luis Valdés, Chair of OCC

The group will meet **at council expenses**

Annex 3: SGCC Draft Plan

Background

ICES embraces a strategic region in the earth: the Gulf Stream, the ice cover of Greenland and the Artic, are simple examples of hot spots with relation to changes in climate. ICES has a better coverage in oceanographic observation in the NA that other councils or national institutions have in other regions of the world. ICES also represent a scientific community with good liaisons and a forum to interchange information. However, ICES efforts in climate change are disperse and represent a small fraction of ICES expert groups work. Comparing with other topics, not many Theme Sessions or Workshops aimed to discuss on the effects of climate change were produced in the past.

However, ICES is more and more frequently being asked to contribute to the evaluation of the effects of climate change on the marine environment and fisheries. Too often ICES is not given sufficient credit for the information provided to the outside sources when doing so. To more efficiently assemble and provide the information and to enhance ICES public image, a group needs to be created to assist ICES in preparing responses to outside queries.

The CONC therefore recommended after the ASC 2007 that ICES to create a cross-cutting multi-disciplinary steering group made up of members from a number of the existing committees to address issues of climate change that are brought to ICES from outside sources and to formulate appropriate responses to the issues. This proposal was well received by the ICES Council, which agreed, in its meeting of October 2007, that the chair of OCC will convene a Steering Group (SGCC) on the impact of climate change funded from the SIF.

Council encouraged the Chair of OCC to broaden the scope to encompass basin scale considerations that might *inter alia* feed into IPCC processes. Council approved funding (subject to a proposal to be made by the Chair of OCC) that will contribute to the establishment of this new Steering Group on Climate Change.

Mission and objectives

The mission of the SGCC is to develop and maintain ICES as an effective agent to provide information on sound management in Climate Change in concert with the emerging ICES Science Strategy.

The objectives of the Steering Group is to look at the research, services and operational issues, related to Climate Change supported by ICES in their expert groups, to assess the quality and adequacy of the assessment process, and to manage the start up transit of ICES toward the establishment of a programme in Climate Change.

Responsibilities and Tasks

The SGCC is responsible for:

- Providing continued guidance for the successful establishment of an ICES programme in Climate Change.
- Facilitating the mobilization of expertise from ICES expert groups.
- Encouraging ICES countries to provide relevant data for the study of climate change (e.g. historical data and data from long-term sampling sites).
- Identify appropriate methods of accessing information located in ICES data bank and non-searchable hardcopy.

- Identify functions and services that ICES can assume and provide in relation to climate change in the North Atlantic, provide "added value" to existing activities and so meets a demand of services and assessment presently not addressed.
- Advise ICES on the selection and preferred sequence of services that we can offer.
- Actively promote ICES services and assessment in climate change to potential users and stakeholders.
- Establish liaisons with international organizations, convention and panels with interest in the effects of climate changes in the oceans.
- Facilitate effective web links from the ICES site to other relevant initiatives in Climate change in marine ecosystems.
- Determine indicators for monitoring the effectiveness of each service such as number of times web site visited, number of countries and stakeholders that have obtained assistance.

Among the main tasks and immediate decisions for the steering group are:

- Defining the geographic area to be covered,
- Define what science we need to assess policy makers
- Determine how best to contribute to the IPCC processes
- Select the topics to develop in a three years term,
- Promote and participate in workshops to develop project ideas,
- Developing the documents requested by ICES and ICES stakeholders,
- Recruiting expertise and made recommendations for action.

The Chair person of the SGCC and the ICES Head of Science Programme will develop a provisional list of Terms of Reference (TOR) for the kick-off meting and the first year of work.

Recruitment and work procedure

The initial core of the SGCC may be composed by the chairs of CONC, ACOM, OCC and the chairs of ICES expert groups[♣] already given expertise in climate change. It should also recruit experts in specific topics not well addressed within ICES (e.g. pH and CO_2). It should also provide equitable geographic and regional representation.

Each member of the SGCC will serve for an initial term of 3 years. Then the SGCC will present a balance of results to ICES Council which will decide the future of the SGCC. If there is chances for subsequent terms, the membership will be decided by the SGCC based on the advice of the CONC and the Bureau.

The Chair person of the SGCC and the ICES Head of Science Programme will develop the proposed agenda for the kick-off meeting and teleconferences, if needed, in consultation with the members of the SGCC.

The SG will meet twice during the initial phase (3 years), one meeting in spring at ICES expenses and a second meting during the ASC at national expenses. The SG will also attempt to conduct its business via electronic communication and telecommunication.

[♣] Or a member of the EG if he/she is specialist in climate change and the chair of this given EG consider that it will be better represented in this way.

In addition to these, the Chair person of SGCC or an alternate will attend the relevant symposia on effects of climate change as an ICES observer.

The Steering Group will report back to ICES Bureau and CONC. The first report will be presented in autumn 2008 and so on in successive years.

Benefits and Products

The establishment of such a Steering Group on Climate Change will result in an immediate visibility of ICES in climate change at different levels. In **science** it will create both expertise and capacity. In terms of **strategy** it will result in a clear advantage for ICES regarding for instance the new EU marine strategy and policy. And in **societal**, it will deliver the knowledge and information needed and demanded by the general public and by the decision makers.

As a first task for the Steering Group on Climate Change (SGCC), the SGCC should help the chairs of CONC, Oceanography Committee and Head of Science Programme to prepare a popular document on climate variability and change research in ICES. The objective is to produce a divulgative glossy brochure of ~8 pages and give it an ample distribution in a short time.

At a medium term (end of 2010) the SGCC should prepare a white paper (or ICES Position Paper) detailing current knowledge about the effects of climate change on the physical oceanographic properties of the ICES ocean areas and lower and higher level trophic responses to change, and directions that research and education should proceed in order to better understand and anticipate climate change effects on the marine environment.

A third and immediate contribution of SGCC in assessment will be the supervision of the OSPAR request on climate change. This should be done in close collaboration with ACE.

Roadmap

2008:

- Kick-off meeting (1st. annual meeting) . ICES HQ, early June. ~15 ICES experts.
- ICES Symposium on Effects of climate change on the world's oceans. Gijón (Spain), 19–23 May. 1 ICES Observateur
- International Symposium on Coping with global change in marine social-ecological systems. FAO Headquarters in Rome (Italy), 8-11 July. 1 ICES Observateur.
- 2nd annual meeting during the ICES ASC. Halifax (Canada). ~20 ICES experts.
- Symposium on the Ocean in a High-CO_2 World, Monaco (Monaco), 6-8 October. 1 ICES Observateur.

2009:

- Spring meeting. ICES HQ, late April. ~20 ICES experts
- 4 expected *ad hoc* workshops
- 2nd annual meeting during the ICES ASC. Berlin (Germany). ~20 ICES experts.
- International Symposia. (2 to be decided)

2010:

- Spring meeting. ICES HQ, late April. ~20 ICES experts
- 4 expected *ad hoc* workshops

- 2nd annual meeting during the ICES ASC. Paris (France). ~20 ICES experts.
- Presentation of ICES Position Paper on Climate Change. ICES HQ (end of 2010, ideally during ICES Council).
- Decision on the future of the SGCC

The SG will also attempt to conduct its business via electronic communication and telecommunication.

The Steering Group will report on progress and lessons learned back to ICES Bureau and CONC. The first report will be presented in spring 2008 and so on in successive years.

Financial and Resources requirements:

The SGCC will be funded by the ICES SIF. The SG will meet twice during the initial phase (3 years), one meeting in spring at ICES expenses and a second meting during the ASC at national expenses.

ICES will cover also the expenses for attendance of one member of the SGCC at relevant international symposia on effects of climate change as ICES observateur.

ICES will cover the publication of a glossy brochure in Climate change by mid 2008, and a white paper (ICES Position Paper) by end of 2010.

Any other expenses related to participation and membership in the SGCC are to be financed by the members (e.g. *ad hoc* workshops).

BUDGET FOR 2008		
Travels and per diem	(kick-off meeting)	20,000 €
2 Inter. Symposia		5,000 €
Total (2008)		25,000 €

Budget for subsequent years will be requested in the draft resolution included in each annual report (approx. 600.000 DKK for the 3 years).

Copenhagen, February 21, 2008

ICES OCC chair

Annex 1: Supporting Information SGCC

PRIORITY:	High
SCIENTIFIC JUSTIFICATION	Climate change is the most important threat to the Earth. In the best of the IPCC scenarios, it is assumed that the warming will continue during decades and even if we stop the emissions of CO_2, sea level rise will continue for a century. Some direct effects of climate change at sea are visible (e.g. melting of ice in the Artic), but others still need to be stated with real data and observations. To assess climate change consequences in the world oceans has a high scientific and social relevance. ICES is concerned by the diverse effects of climate change in the North Atlantic and most ICES member Countries finance research programmes and research projects to observe and predict the effects of climate change in their regions. Although we are now beginning to compile quantitative documentation on the effects and consequences of climate change in the functioning of marine ecosystems, we lack of the complete vision at a global scale needed to assess and predict the effects on time and with confidence. The SGCC will allow ICES to play a proactive role to assess and anticipate the consequences of Climate Change in the ICES area.
RELATION TO STRATEGIC PLAN:	SGCC mission and objectives fulfil all the ICES scientific objectives, but especially 1, 2, 4 and 5. It will also serve to enhance communication and coordination with organizations actually leading research and assess in Climate change, which is an ICES institutional objective.
RESOURCE REQUIREMENTS:	There will be significant resource requirements, which will be covered by SIF. ICES is asked to cover the publication of a glossy brochure and a white paper on Climate Change.
MEMBERSHIP:	SGCC will recruit a multidisciplinary community of scientist from ICES, but also from other institutions and countries concerned by the diverse effects of climate change in the oceans in the *ad hoc* workshop that SGCC will promote.
SECRETARIAT FACILITIES:	The Secretariat will be involved as normal in general professional and secretariat support, and the Secretariat as usual should provide direct assistance during the meetings and preparation of reports.
FINANCIAL:	The SG will meet twice during the initial phase (3 years), one meeting in spring at ICES expenses and a second meting during the ASC at national expenses. ICES will cover also the expenses for attendance of one member of the SGCC at relevant international symposia on effects of climate change as ICES observateur. ICES will cover the publication of a glossy brochure in Climate change by mid 2008, and a white paper (ICES Position Paper) by end of 2010. Any other expenses related to participation and membership in the SGCC are to be borne by the members (e.g. *ad hoc* workshops). The expected budget for 2008 accounts for 44,000 €
LINKAGES TO ADVISORY COMMITTEES:	SGCC could benefit from synergies with ICES Advisory Committees such ACE, ACME and ACFM.
LINKAGES TO OTHER	SGCC could benefit from synergies with almost all ICES Committees

COMMITTEES OR GROUPS	which support expert groups related with climate change.
LINKAGES TO OTHER ORGANISATIONS:	SGCC will be proactive in promoting the activities of ICES in climate change, this task will allow ICES to establish collaborations with other international bodies and programmes with interest in the effects of climate change in marine ecosystems.