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SCAR report

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(GOSEAC)

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Published by the

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

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SCAR Group of Specialists on Environmental Affairs and Conservation GOSEAC

Report of GOSEAC XI Meeting Montevideo, Uruguay, 19-23 July 1999

Dr David Walton, Convenor, welcomed the members of the Group to Montevideo, and expressed his thanks to Rear Admiral Oscar Otero Izzi, President of Uruguayan Antarctic Institute, for the invitation to hold this meeting in Uruguay and to Captain Aldo Felici of the Institute for providing the excellent arrangements.

Captain A Felici apologized that Rear Admiral Oscar Otero Izzi was unable to be present and spoke on his behalf to welcome the members of GOSEAC to Montevideo. He said that Antarctica is no longer an isolated and unknown continent but a unique laboratory for the study of many natural phenomena. The almost pristine environment of Antarctica also has a magical attraction for tourism. He drew attention to the recent entry into force of the Protocol on Environmental Protection to the Antarctic Treaty and the consequent establishment of the Committee for Environmental Protection that provides an effective protective framework through environmental impact assessment, environmental monitoring and the protected area system. He referred to the important role of GOSEAC in contributing to the overall success of conservation and environmental protection in the Antarctic.

The following members of the Group were present: D W H Walton (Convenor), J M Acero, P J Barrett; E S E Fanta, M Fukuchi, J E Haugland, M C Kennicutt, H Miller, J Valencia.

Professor M Oehme was unable to attend and Dr M De Poorter (ASOC), who has been a regular observer at recent meetings was also unable to attend. Captain Felici, Environmental Officer for the Uruguayan Antarctic Institute, and C/C Albert Lluberas, head of the Uruguayan Glaciological Project, attended the meeting as observers. P D Clarkson (Executive Secretary) serviced the meeting. The address list of participants is given in Appendix 1.

1. Adoption of Agenda and appointment of Rapporteurs

The agenda for the meeting was adopted as given in Appendix 2. Rapporteurs were appointed from among the members as follows:

H Miller (1-2); M C Kennicutt (7); J Valencia (3-4); J M Acero (8); M Fukuchi (5); P J Barrett (9); P D Clarkson (6); E S E Fanta (10-12).

2. Membership of the Group and the future role of GOSEAC

2.1 Membership

The Convenor informed the Group that Professor K Birkenmajer had resigned after 10 years as a member of the Group. His expertise and advice had been invaluable in developing the role of GOSEAC in SCAR and the members expressed thanks for his important contribution. The Group needed to consider whether it still had the right breadth of expertise amongst the remaining members. After reviewing the individual expertise of members and their links to other relevant SCAR bodies it was felt that the basic composition of the Group was appropriate for its present tasks. However, it was agreed that, should the need arise for the discussion of specialized topics outside the current expertise, consideration should be given to co-opting appropriate experts for a single meeting. Such topics might be issues related to climate change or the introduction of diseases. Whereas questions regarding climate could easily be answered by contact with the GLOCHANT Group, the subject of introduced wildlife diseases needed further investigations and should be discussed by SCAR Executive.

2.2 Outputs over past 10 years

Following the decision at GOSEAC X to review how effective the Group had been the Convenor had prepared a list of GOSEAC activities and achievements which was tabled and discussed. The Group felt that it had had discussions on a much wider range of topics than mentioned in the list. It was agreed that before passing the list on to SCAR Executive and the Review Committee some explanatory text should be added to indicate the reasons for each particular activity and mention should be made of intersessional work. In addition papers written for the ATCM should be documented and places and dates for the workshops organized and held listed together with the publications and documents resulting from them. Analysis of linkages between SCAR initiatives arising from GOSEAC deliberations and the production of Working Papers and Resolutions at ATCMs would be valuable.

The Convenor will update and expand the list of activities accordingly and formulate it such that it can, together with the revised Terms of Reference for the Group,

be presented to the CEP as an Information Paper, if the Executive judged it to be appropriate. Members felt that it should also be put onto the SCAR web site because it would illustrate to various interested groups such as AEON and the Treaty the efforts SCAR had made in environmental management and conservation. The updated version is attached to this report.

2.3 Revised Terms of Reference

The present Terms of Reference, adopted at GOSEAC IV, were tabled and scrutinized to see if they were still valid and how closely the Group had answered its remit. There have been suggestions that GOSEAC will become obsolete once the CEP is firmly established. However, the Terms of Reference give a wider scope to the Group's work (i.e. Subantarctic Islands, see footnote) than just the CEP, as well as allowing discussion of the basic scientific foundations upon which decisions by the CEP can later be based. This scientific output should also help any Party in its EIA activities, which need to take into account the scientific evidence as well as other information in making decisions.

The work of the Group is considered to be sufficiently distinct from that of other groups such as AEON, COMNAP, SCALOP and CCAMLR as to warrant its continuation. These other groups are at present directly involved in the discussions of GOSEAC through cross membership and can directly draw upon the scientific expertise they need in operational work.

GOSEAC has also maintained links to international organizations such as IUCN and ASOC as evidenced by a number of joint workshops and the presence of IUCN and/or ASOC observers at GOSEAC meetings.

In summary it was felt that the basic Terms of Reference were still valid, but that some of the explanatory specifics should be reworded. The revised version follows:

Revised Terms of Reference

1. *To advise SCAR on scientific and related matters concerning environmental affairs and conservation in the SCAR area of interest¹, in particular:*
 - application of environmental criteria relating to research activities and associated logistic support, as well as relevant commercial activities, and development of best practice;
 - environmental impact assessment and monitoring;
 - protected areas;
 - future requirements in environmental management and conservation;
 - environmental education.

2. *Through SCAR Executive to maintain links with international organisations, with particular reference to CCAMLR and IUCN*
3. *To keep the relevant SCAR and COMNAP subsidiary groups informed and to take account of relevant developments in other parts of SCAR and COMNAP.*

2.4 Input to SCAR ad hoc Review Group

The scope of the SCAR review process was tabled and discussed. GOSEAC sees the way forward in streamlining procedural pathways within the SCAR structure, which originally was devised for 12 members and is proving inadequate now for 27 members. It was felt in particular that:

- ties need to be strengthened between the Working Groups, the Groups of Specialists and the SCAR Executive;
- that SCAR procedural rules become more relevant and effective;
- that at Delegates meetings adequate time is provided for the discussions of the work of GOSEAC (and the other Groups). Chief Officers should be present during the full Delegates Meeting in order to participate actively in the discussions of scientific issues and programs;
- Communication must be improved within SCAR.

It was agreed that the Convenor should transmit these points in a letter to the Review Group.

3. Matters arising from GOSEAC X

3.1 Vostok Lake

The SCAR Executive resolved to hold a third workshop to develop the science plan for Lake Vostok exploration. The Executive gratefully accepted the offer by the United Kingdom to host the meeting in Cambridge, 25–28 September 1999. An international Steering committee of seven scientists was established to determine the invitees, the structure and content of the workshop to build on the work of the previous workshops held in St Petersburg, Russia and Washington DC, United States. Scientists from eleven SCAR countries have been invited to participate.

The workshop will focus on science opportunities and science technologies that will make feasible the sampling of the water and the sediment in the lake. GOSEAC has already raised the question of how and when an international CEE will be undertaken for the project. The end product of the workshop will be an outline science strategy with a preliminary timetable for scientific, technological and logistical implementation. The deadline for production of the final report of the workshop is January 2000.

A copy of the report of the Washington workshop was available for inspection at the GOSEAC meeting.

¹ Extract from the SCAR Constitution

3.1 The geographic area of interest to SCAR is the Antarctic, defined as the geographic area that lies south of the Antarctic Convergence. In addition, the following sub-Antarctic islands and surrounding waters, which lie outside the Antarctic Convergence, may be included in SCAR's area of interest: Ile Amsterdam, Macquarie Island, Ile Crozet, Prince Edward Islands, Gough Island, Ile St Paul, Iles Kerguelen

3.2 Workshop on Wildlife Diseases

The meeting was informed about the proposal made by Australia to the CEP regarding monitoring, mitigation and response to the propagation of introduced diseases to Antarctic wildlife. Since the final report of the workshop on Antarctic Wildlife Diseases held in Hobart in 1998 was not available, the CEP had resolved that only after due consideration of the workshop report could an open-ended contact group be established to study measures to respond to the challenge of introduction of diseases to Antarctic wildlife.

GOSEAC members considered that these issues should be addressed by the Group of Specialists on Seals, the Bird Biology Subcommittee and the Working Group on Biology, as well as the SCAR Executive. It was suggested that SCAR may need to seek expert outside advice in this field. Some members noted the need to obtain more scientific evidence to support the contention that diseases of Antarctic wildlife were a problem and required the immediate use of the precautionary measures suggested. The possible role of migratory species in the introduction of wildlife diseases was also raised as a potential research area.

4. Report on XXIII ATCM

4.1 CEP Report

GOSEAC received the CEP report.

Review of the list of protected species

Taking into account the changes in population numbers of several Antarctic species, the CEP requested that SCAR review which species should be listed as protected species under Annex 2 of the Protocol. The Group suggested that the criteria and categories of IUCN in the Red Data Books be used to determine the status of conservation required for each species. Some members of GOSEAC questioned the need to apply these criteria in the light of the general text of Annex II of the Protocol that grants protection to all Antarctic wildlife. It was noted that Annex II apparently does not allow invertebrates to be designated as Specially Protected Species. Annex II does not define what "special protection" means. Questions were raised about the value of a protected species approach in terms of modern conservation practice. It was suggested that a better approach could be to examine the threats posed to species, and then consider measures to provide additional protection at a habitat or ecosystem level.

It was concluded that there are other SCAR groups that must examine this request in greater depth to provide the necessary advice to CEP. These are the Group of Specialists on Seals, the Bird Biology Subcommittee and the Working Group on Biology.

Frequency of CEP meetings

A proposal to the ATCPs to change the frequency of their meetings to every other year was considered likely to cause

problems for the CEP, especially with respect to the requirements for dealing with CEEs. The CEP therefore resolved that it needed to continue meeting every year in order to meet its obligations and maintain the impetus for the Protocol implementation.

The Chair of the CEP commented on the progress made on the application of Protocol requirements by different national initiatives. One of these was the successful removal of Filchner Station and subsequent clean up by AWI involving the removal of 170 tons of materials from iceberg A38b off the Ronne Ice Shelf. Also the joint German/ United Kingdom inspection team reported no breaches of the Protocol and their report commended the efforts of different station operators to comply with Protocol requirements.

4.2 ATCM Draft Report

GOSEAC received the draft XXIII ATCM Report and considered its contents for the discussions of several items of its agenda, such as protected areas management plans, waste disposal and CEEs.

The ATCPs approved Measure 1 (1999) containing the revised management plan for SSSI No 23 Svarthamaren.

5. Environmental monitoring

5.1 AEON Technical Handbook

A solicitation to identify a contractor to produce a technical handbook on standard methods for environmental monitoring was circulated to possible tenderers by COMNAP. From among a number of offers provided by various organizations, the Geochemical and Environmental Research Group (GERG), Texas A & M University, was chosen. GERG is led by M C Kennicutt and he briefed the group on the current status of the handbook, "Standard Monitoring Techniques for Antarctica". The draft table of contents was introduced and reviewed. Two items on data management and standard reference material have been added. These additions were requested by the Project Team at the XXIII ATCM in Lima. The indicators to be covered were agreed by the Project Team and were based on the selection of variables suggested by GOSEAC from the SCAR/ COMNAP workshops. The handbook will be self-contained and provide standard methodologies for the chosen parameters. The first draft will be presented and reviewed by the Project Team at the COMNAP meeting in Goa. Revision of the handbook will be completed and a final version will be produced by February 2000. The limited set of variables covered by this handbook was chosen to measure the first tier of disturbance expected to be associated with science and support activities at stations. In particular sewage discharge, contaminant release and physical disturbance are considered.

5.2 US Environmental Monitoring Programme

M C Kennicutt introduced reports of the US Antarctic Program's Environmental Monitoring at McMurdo Sound. The activities of the programme are summarized in four reports;

- Summary of Existing Environmental Data at McMurdo Station, Antarctica" (20 July 1998)
- Spatial and Temporal Scales of Monitoring (20 November 1998),
- System Attributes Amenable to Long Term Monitoring" (4 February 1999), and
- Long-term Monitoring at McMurdo Station, Antarctica: Pilot Project Design" (6 April 1999).

The four reports are available on the web site of Texas A & M University (<http://www.gerg.tamu.edu>) and summarize the United States implementation of the SCAR/COMNAP workshop recommendations. A 3-year pilot project will begin later this year. After the pilot project, the design will be revised and a long-term monitoring programme will be implemented. It is greatly appreciated that these planning documents are being made widely available by the National Science Foundation's Office of Polar Programs who financially supported the activities.

5.3 Radiological and biomonitoring

The Convenor introduced two items forwarded from the XXIII ATCM requesting advice and guidance (Working Papers 29 and 30, which were presented by Peru). WP-29 proposes establishment of a working group to monitor the fall out of artificial radionuclides in Antarctica. It was noted that a world-wide network of radionuclide monitoring stations is already being put in place under the International Test Ban Treaty programme. The Convenor will provide further information to Peru. Working Paper 30 proposes establishment of a working group on environmental biomonitoring, in particular the use of lichens. It is suggested that the use of lichens be considered within the context of the extensive ongoing development of monitoring programs and not as a separate issue.

6. Liability issues

The background to the proposed Annex on Environmental Liability and the developments at XXIII ATCM were described. In particular, the Group heard about the difficulties encountered during the legal discussions of Working Group I. The Group then turned to XXIII ATCM Resolution 5 (1999) that requested advice from SCAR (and COMNAP) on some specific issues in relation to liability.

Following the discussions of the specific issues it was decided that a draft text would be prepared for submission to the SCAR Executive Committee. After consideration of and addition to the text by COMNAP, this could form the basis of the Working Paper requested by XXIII ATCM.

6.1 Criteria used to determine if an impact causes harm

The Group felt that it was essential first to define an impact and chose to use the definition adopted by the SCAR-COMNAP Environmental Monitoring Workshops that states: "An impact is a change in the values or resources attributable to a human activity".

The Group then discussed possible ways of determining the point at which an impact could be considered as damage from a scientific stand-point. It was agreed that damage to a value would have occurred when the impact had a detrimental effect on the value – which implied the concept of a threshold level. The use of a threshold concept implies that for any variable there is an acceptable level of change (i.e. that below the threshold) within a system. The threshold level could be determined by scaling the impact in time and space in relation to certain parameters. For example, in the case of an animal, this would be in relation to the individual, the colony, the population or the species. It was agreed that the threshold level would be that level above which the impact would be considered unacceptable. Determining the threshold level was compared to setting catch limits for a marine species, such as fish, which is effectively setting an acceptable limit of impact for the stock under consideration.

It was agreed that the criteria used to determine whether or not damage had occurred should include a threshold level and scaling.

6.2 Scientific definition of "dependent and associated ecosystems"

The Group first considered three papers on this subject, by J Berguño, V Marin and G Benavides, that were presented at the RAPAL workshop on *The conceptual structure of "Associated and dependent ecosystems"*, held in Concepción, Chile, 23 July 1998. It was felt that all three papers made valid points but that none provided a definition suitable for use in the context of the liability annex. Returning to the history of the expression outlined in the paper by J Berguño, an examination of the text of CCAMLR revealed the first use of the expression but it did not produce a definition. A further search was made in later relevant CCAMLR documents to see if CCAMLR had found it necessary to define the expression subsequently.

6.3 Containment, mitigation, clean up and restoration

It was felt that these particular activities were aimed very largely at the action to be taken in cases of oil spills. As such, these come much more closely within the experience and expertise of operators and it was agreed that these should be referred to COMNAP for definition. As a fundamental scientific principle, it was agreed that following any detrimental impact on the environment, restoration of the environment to its original state is not possible. Restoration to an agreed state may be technically possible.

6.4 Scientific definition of irreparable

The Group then considered three definitions of different degrees of damage that had been presented to the Legal Expert Group Intersessional Meeting in Cambridge, United Kingdom, during 1996. These were considered to be a useful basis on which to proceed and, with one change in nomenclature, should be defined as "irreparable damage", "acceptable damage", and "unrepaired damage". It was agreed that these should be presented in the draft working paper with appropriate examples. It was also stressed that there should be a caveat on all definitions that they are defined with respect to current knowledge and best practice. This implied that all such definitions might be subject to later amendment as scientific knowledge and technological capabilities evolved and improved.

7. Protected and Managed Areas

7.1 Protected Areas Workshop at XXIII ATCM

A report of the second workshop on Antarctic protected areas held from May 22-23, 1999 shortly before the XXIII ATCM in Lima, Peru was tabled. The workshop provided five recommendations for consideration by the CEP which had decided to develop these using an inter-sessional contact group. After review of the document, it was concluded that it was important and prudent to assess the scientific content of each management plan submitted. The meeting concluded that this assessment is best performed by SCAR through GOSEAC and the appropriate Working Groups.

A review of Recommendation 5 suggesting a new method for reviewing plans raised several issues.

GOSEAC proposed that SCAR clarify the mechanism and procedure for such a SCAR scientific review if it was to differ from the existing procedure. It was suggested that a first review by GOSEAC should occur so that GOSEAC's input would be available when the plans were submitted to the Working Groups for comment. To allow for written comments from all interested parties, it was also suggested that protected area plans be posted to the SCAR web site in a timely manner although members reported that experience of using this form of consultation usually produced a very low rate of response. GOSEAC requested that the future interaction between SCAR and the CEP Contact Group be clarified. It is not clear what the form or timing of this interaction is to be. The proposed mechanisms for submission of plans appears to allow for designation of sites without SCAR review or comment. For example, the proposed scheme allows for submission of marine sites by CCAMLR directly to the CEP and for proponents to submit sites directly to the CEP or the ATCM. In recognition of the need for a scientific review, it is recommended that all submissions be reviewed by SCAR.

The GOSEAC membership indicated its willingness to assist and provide advice to the Intersessional Group.

7.2 Revision of existing SSSI and SPA management plans

The extensive comments by the members will be provided to the SCAR Executive Committee to be transmitted in due course to the Proponents. The following sections outline the more general points made.

7.2.1 Lynch Island

Specific changes to and deletions of text within the plan were recommended. It is recommended that an Environmental Impact Assessment (EIA) be performed in respect of the proposal to construct fences in the SPA before any action is taken. The proposed plan raises the more general issue of active management in ASPAs.

7.2.2 Yukidori Valley

It is recommended that the plan contents be re-numbered and re-ordered to comply with the standard layout used for previous plans. It is further recommended that the ATCM approved standard wording be used to replace various sections of the report. The group also recommends that the proponents consider the possible usage of recognizable geographic features in determining the Area's boundaries, in particular, utilization of the stream in Yatude Valley as a southern boundary. Restrictions of materials and organisms brought into the area should be reworded to use agreed standard wording related to proper handling of poultry products in the Area.

7.2.3 Clark Peninsula

It is recommended that the plan contents be re-ordered and re-numbered to comply with the standard layout for plans. Specific rewording and revision of the text is recommended along with standard agreed wording. It is also recommended that the maps be revised and a map showing features of the glacial and bedrock geology be added in line with the SCAR recommendation on this. It is further recommended that geological descriptions be reviewed for completeness and accuracy. Restrictions of materials and organisms brought into the area should use agreed standard wording related to proper handling of poultry products in the Area.

7.2.4 Lagotellerie Island

Specific revisions and deletions of text are recommended. The relevance of the aim to encourage scientific research to the management plan needs to be clarified or deleted. It is recommended that the proponents provide scientific justification that "sampling equipment or markers brought into the Area are cleaned or sterilized" (Section 7(ix).3) or delete this requirement. Restrictions of materials and organisms brought into the area should be reworded to use agreed standard wording related to proper handling of poultry products in the Area.

7.2.5 New College Valley

Specific text revisions are recommended. It is recommended that the number of maps be reduced by eliminating redundancy (delete Map A and C). It is recommended that the management activity to encourage cooperation among all of those countries operating in the area be adopted. It is recommended that the restrictions on materials and organisms which can be brought into the area be reworded to use agreed standard wording related to proper handling of poultry products in the Area.

7.2.6 Balleny Islands

It was recognized that the Balleny Island SPA is a complex proposal in that it encompasses a very large area and attempts to protect linked terrestrial and marine areas. In light of the uniqueness of the Area, the scientific justification for the boundaries needs to be carefully considered. The Area boundaries need to be clearly justified on relevant scientific knowledge. It was suggested that, due to the multiple uses to be managed, it might be more appropriate to develop an ASMA with embedded SPAs. In lieu of a change to an ASMA, the SPA as proposed needs more information including additional maps that detail all of the components of the Area including bathymetry of the sea floor, vegetation on the islands, preferred access routes to each island (including helicopter landing sites), and the resources to be protected. It appears possible that oversnow vehicles might be required at some point for scientific investigation of the ice cap. In recognition of the apparent conflict between protection and the proposal to permit recreation and tourism it is recommended that the proponents consider the possibility of excluding the locations of these latter activities from the SPA. It is also unclear how transiting of the area (especially by ships) will be permitted. It is recommended that the proponents consider the wording used in existing marine protected areas such as the Bransfield Strait and Dallman Bay. In addition, some restrictions such as those related to human waste disposal appear to be overly restrictive and need to be justified. Restrictions of materials and organisms brought into the Area should use agreed standard wording related to proper handling of poultry products in the Area. Prior activities in the Area, particularly related to marine resource harvesting, should be discussed in greater detail to aid in understanding the degree of alteration of the natural conditions in the Area. The issue of controls on fishing will need consideration by CCAMLR.

This proposal raises significant issues related to management, permitting, and protection that need careful consideration by SCAR and its Working Groups.

7.3 Annex V Article 5.3 (k)

It was decided to consider a paper submitted by C M Harris, "Prior Exchange of Information on Activities within

Antarctic Protected Areas" prior to consideration of revised management plans since it was relevant to the reviews. The paper raises the issue of information exchange in advance of activities taking place within protected areas. The Group concluded that current protocols are sufficient to preserve protected areas if management plans are properly constructed. The Group recommends that no additional required information exchanges are needed, and sees no advantage in the inclusion of 5.3(k) in the plans under examination.

7.4 Management plans for subantarctic islands

The Convenor provided information on the development of an environmental management plan for South Georgia. The plan would be published later this year and would provide important information on various approaches to management and conservation relevant to the Group. Published plans were still not available for Iles Kerguelen and Iles Crozet.

8. Tourism

The Convenor stated that the matters of interest for the Group are only those related to the possible impacts on the environment that the tourist activity could have in Antarctica.

In this regard it was noted that several initiatives are currently being developed or are going to be developed in the near future. For instance:

- Site inventory: this monitoring programme on landing sites has produced so far two handbooks, one for tourists and the other one for scientific purposes containing baseline data for different landing sites around Antarctica. The Group noted that it would be important for this programme that those countries which have information on any of these sites send it to Oceanites in order to improve data availability. The Convenor said that this programme is going to continue in the future.
- The German Environmental Agency is interested in giving financial support to research programmes on the impacts of tourism at Penguin Island and Hannah Point.
- There was discussion about a proposal to the ATCM by ASOC regarding the possibility of preparing Strategic EIAs with respect to tourism. The initiative for this was the announcement of tourist ships that are going to take more than 1,000 passengers to Antarctica.

Concerns expressed by ASOC about the lack of EIA for the construction of a new visitor centre in Arctowski Station had been clarified by a letter from Professor K Birkenmajer. He stated that an EIA was prepared in 1997 in relation to modifications that were done in Arctowski Station and the construction of the new visitor centre was considered in that EIA.

The Executive Secretary informed the Group about the 10th IAATO Meeting held in Hamburg, Germany in June 1999. He represented SCAR at the meeting and described to the Group some presentations of interest for SCAR during the meeting. The Group considered the participation of a SCAR representative in the IAATO meeting to be a positive feature and also expressed its desire that this be continued.

9. State of the Antarctic Environment Report scoping exercise

The Convenor reported that the CEP had accepted SCAR's offer to prepare a scoping study for presentation at CEP III. This was to include: describing the key environmental variables that should be considered in assessing the status of the Antarctic environment; identifying present and future threats to that environment; and indicating how these link with state of the environment reports for other parts

of the world. The Convenor referred to the "State of the Environment Reporting: Source Book of Methods and Approaches" (P C Rump. UNEP, Nairobi, 1996). The section "Characteristics of State of the Environment Reporting" had been distributed to members to provide some background for the discussion. The Convenor drew attention to the statement that "The value of SOER lies in the transformation of disparate data and information into meaningful and relevant material for awareness raising and decision-making."

Discussion began with a consideration of the objectives and outline of the Ross Sea State of the Environment Report at present being prepared by New Zealand. It was agreed that the primary objective of any SAER would be a review and synthesis of existing knowledge in selected fields, but noted that the data available would inevitably be unevenly spread and of variable quality. It was thought by some that attempting such a synthesis may be less important than narrower and

ISSUE	PRESSURE	KEY VARIABLES
Climate change (gas influence)	Greenhouse gas emissions	- greenhouse gas levels in regional atmosphere - local/regional temperature - related climate parameters such as radiation levels/cloudiness and wind speed/direction
Climate change (particulate influence)	Aerosols and microparticles largely from volcanic sources, but with some from anthropogenic sources	chemicals in regional atmosphere and in snow
Stratospheric ozone depletion	Release of fluorocarbons	- ozone measurements in stratosphere - ozone measurements from ground level - UV spectrum at ground level - UV biological effects
Sea-level change	Climate change	- mass balance - position of ice sheet margin - position of ice shelf limits - position of winter/summer sea ice limits
Chemical introductions	Industrial emissions from outside Antarctica	- metals - persistent organic compounds - artificial radioisotopes
Wildlife diseases	Natural and human-assisted distribution	viruses, bacteria
Human presence in Antarctica	Scientific, logistic and tourist activities	- waste management - local environmental quality - animal disturbance - scientific sampling
Marine protection	Harvesting	- stock size - ecosystem integrity
Biodiversity changes	Climate change, resource exploitation (eg fishing)	- species diversity - community structure - habitat change

Table 1. Issues relevant to the Antarctic region, used as a means of identifying key variables for which data should be assembled for a State of the Antarctic Environment Report.

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more focused investigations, but others observed that the sort of synthesis proposed should provide linkages and trends that would not be identified in any other way.

To advance the task of scoping, it was decided to review Table 5-4 of frequently suggested environmental issues, in the SOER Source Book selecting some and adding others that seemed of particular value for an Antarctic report. The pressures causing them to be considered as an issue and the key variables to be described are also listed. The result is presented as Table 1.

The meeting recognized that an issues-based approach had been taken, rather than an economic or environmental

process approach (Rump 1996). However, it was concluded that this had significant advantages, in that it raised awareness of emerging issues and was especially suitable when information availability is difficult. It has been a common approach for SOERs being carried out nationally as part of the UNEP global programme.

The issues-based approach requires some sort of ranking scheme to prioritise issues from the full range identified, and to help with this the scheme proposed by Bollen et al. (1994) was discussed (Table 2). The Group agreed that the time scales for reversibility would need further discussion.

CRITERIA	POSSIBLE WEIGHTING		
	1	2	3
Reversibility	Less than one year	Less than 25 years	More than 25 years
Spatial scale	Global	Antarctic-wide	Regional
Risk magnitude	Low	Medium	High
Scientific uncertainty	Low	Moderate	High
Public concern	Low	Moderate	High

Table 2. Criteria for environmental issue ranking (adapted from Bollen et al. (1994).

Discussion concluded with a consideration of the next steps that SCAR might take in developing the scoping study for presentation to CEP III. These were seen to involve:

- a review of the proposed variables and the extent of available data (Table 1) by other SCAR committees, perhaps by circulating to chief officers of Working Groups and other Groups of Specialists (especially GLOCHANT) for comment at the XXVI SCAR Meeting in Tokyo;
- writing to other relevant organizations seeking their comments (CCAMLR, WMO, IUCN/ASOC);
- perhaps making the document available on the SCAR web site to seek more general input.

SCAR Executive would need to decide as soon as possible how all this data will be synthesised into the Working Paper required for the CEP.

10. Reports

10.1 Relevant SCAR groups

The SCAR Executive Secretary reported briefly on the intersessional activities of SCAR groups that have some relevance to the work of GOSEAC.

The reports of the meetings and workshops are not yet all available. Nevertheless, H Miller pointed out that some will have importance not only for environmental conservation but also for the State of the Antarctic Environment Report such as the reports of the EASIZ workshop held in Bremerhaven, Germany, during June

1999, and the ANTEC meeting held in Wellington, New Zealand, during July 1999.

P Barrett commented on the 8th International Antarctic Earth Sciences Symposium held in Wellington, New Zealand, in July 1999, announcing that it will result in publication of a selected group of papers.

The progress on the tools for the loading of metadata entries and their inclusion in the Antarctic Master Directory, according to the JCADM meeting in Ottawa, Canada, was pointed out by M Fukuchi. Such data listings would be valuable for any SAER.

E Fanta tabled a report on the workshop on Evolutionary Biology of Antarctic Organisms held in Curitiba, Brazil, in May 1999, followed by a meeting of the Sub-Committee, and reported that the presentations of the workshop will be published in a special issue of Antarctic Science in September 2000.

10.2 CCAMLR

E Fanta tabled a report on the 17th meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR XVII) held in Hobart, Australia, in October 1998.

The status and trends of fisheries was reported. Concern about the serious consequences of the high level of illegal fishing on *Dissostichus* spp was expressed by GOSEAC as it will not only threaten the species, but will also affect dependent and associated populations or ecosystems.

The results of the data sets analysis undertaken at the workshop on Area 48 were commented on. These showed that general conclusions about land based predators for the entire Antarctic ecosystem could not be based on local observations. It has to be evaluated on a case by case basis. This is an important conclusion especially when it comes to further developments in the State of the Antarctic Environment issue, and has also to be taken into account when considering Antarctic Protected Areas.

The existence and new editions of the CEMP Standard Methods for monitoring populations were brought to the attention of GOSEAC, as they are useful when it comes to discuss monitoring methods within SCAR.

The planned Krill survey in area 48 at the year 2000 was announced and its importance recognised in getting new data for the area, including for birds and marine mammals.

The high levels of bird by-catch of long-line fisheries are of great concern to GOSEAC and have to be taken into account when biological monitoring or conservation measures are evaluated at GOSEAC.

Marine debris produced outside the Treaty Area but in the SCAR area of interest affect directly mainly birds and seals. Thus the reports on marine debris and the measures taken by CCAMLR to diminish these effects are considered of great importance.

A close interaction between GOSEAC and some of the CCAMLR groups, mainly the WG-EMM (Ecosystem Monitoring and Management) should be achieved, as there are common interests in environmental and population monitoring and on protected areas, as well as on environmental contamination caused by human activities and its effects on the biota.

11. Any other business

J Valencia suggested that as soon as there are relevant documents from the ATCM or the CEP meeting it would be helpful if they could be made available through e-mail or the Web. This was agreed by all members and the Convenor noted that this should happen for the next meeting. He pointed out that some intersessional work might be necessary, and will be done by the same means.

12. Time and place of next meeting

The Convenor noted that there is no date fixed for the meeting as it has to be held after the next CEP meeting, and the timing of this is not yet known.

Three offers to host the meeting have already been made: in Curitiba, Brazil, in College Station, United States and in Svalbard, Norway. The choice of venue would depend on the timing of the CEP meeting.

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REPORT OF GOSEAC XI MEETING, JULY 1999

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Appendix 2

Agenda

1. Adoption of Agenda and appointment of rapporteurs
2. Review of GOSEAC
 - 2.1 Membership
 - 2.2 Outputs over past 10 years
 - 2.3 Revised Terms of Reference
 - 2.4 Input to SCAR ad hoc Review Group
3. Matters arising from GOSEAC X
 - 3.1 Vostok Lake
 - 3.2 Workshop on Wildlife Diseases
4. Report on XXIII ATCM
 - 4.1 CEP Report
 - 4.2 ATCM Draft Report
5. Environmental monitoring
 - 5.1 AEON Technical Handbook
 - 5.2 US Environmental Monitoring Programme
 - 5.3 Radiological and biomonitoring
6. Liability issues
 - 6.1 Criteria used to determine if an impact causes harm
 - 6.2 Scientific definition of dependent and associated ecosystems
- 6.3 Containment, mitigation, clean up and restoration
- 6.4 Scientific definition of irreparable
7. Protected and Managed Areas
 - 7.1 Protected Areas Workshop at XXIII ATCM
 - 7.2 Revision of existing SSSI and SPA management plans
 - 7.2.1 Lynch Island
 - 7.2.2 Yukidori Valley
 - 7.2.3 Clark Peninsula
 - 7.2.4 Lagotellerie Island
 - 7.2.5 New College Valley
 - 7.2.6 Balleny Islands
 - 7.3 Annex V Article 5.3 (k)
 - 7.4 Management plans for subantarctic islands
8. Tourism
9. State of the Antarctic Environment Report scoping exercise
10. Reports
 - 10.1 Relevant SCAR groups
 - 10.2 CCAMLR
11. Any other business
12. Time and place of next meeting

Appendix 3

List of Acronyms and Abbreviations

AEON	Antarctic Environmental Officers Network	GLOCHANT	Group of Specialists on Global Change and the Antarctic
ANTEC	Group of Specialists on Antarctic Neotectonics	GOSEAC	Group of Specialists on Environmental Affairs and Conservation
ASMA	Antarctic Specially Managed Area	IAATO	International Association of Antarctica Tour Operators
ASOC	Antarctic and Southern Ocean Coalition	IUCN	International Union for the Conservation of Nature (World Conservation Union)
ASPA	Antarctic Specially Protected Area	JCADM	Joint Committee on Antarctic Data Management
ATCM	Antarctic Treaty Consultative Meeting	RAPAL	Réunion de Administradores de Programas Antárticos Latinoamericanos
ATCP	Antarctic Treaty Consultative Party	SAER	State of the Antarctic Environment Report
AWI	Alfred-Wegener-Institut für Polar- und Meeresforschung	SCALOP	Standing Committee on Antarctic Logistics and Operations
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources	SCAR	Scientific Committee on Antarctic Research
CEE	Comprehensive Environmental Evaluation	SOER	State of Environment Reporting
CEMP	CCAMLR Ecosystem Monitoring Programme	SPA	Specially Protected Area
CEP	Committee for Environmental Protection	SSSI	Site of Special Scientific Interest
COMNAP	Council of Managers of National Antarctic Programmes	UNEP	United Nations Environment Programme
EASIZ	Ecology of the Antarctic Sea-Ice Zone	UV	Ultra-Violet
EIA	Environmental Impact Assessment	WG	Working Group
EMM	Ecosystem Monitoring and Management	WMO	World Meteorological Organization
GERG	Geochemical and Environmental Research Group		

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SCAR Report

SCAR Report is an irregular series of publications, started in 1986 to complement *SCAR Bulletin*. Its purpose is to provide SCAR National Committees and other directly involved in the work of SCAR with the full texts of reports of SCAR Working Group and Group of Specialists meetings, that had become too extensive to be published in the *Bulletin*, and with more comprehensive material from Antarctic Treaty meetings.

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SCAR Bulletin, a quarterly publication of the Scientific Committee on Antarctic Research, is published on behalf of SCAR by Polar Publications, at the Scott Polar Research Institute, Cambridge. It carries reports of SCAR meetings, short summaries of SCAR Working Group and Group of Specialists meetings, notes, reviews, and articles, and material from Antarctic Treaty Consultative Meetings, considered to be of interest to a wide readership. Selections are reprinted as part of *Polar Record*, the journal of SPRI, and a Spanish translation is published by Instituto Antártico Argentino, Buenos Aires, Argentina.

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