International Council for Science

SCAR report

No 17
August 1999

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SCAR Group of Specialists on Environmental Affairs and Conservation GOSEAC

Report of the ninth meeting, GOSEAC IX, held in Bremerhaven, Germany, 7–11 July 1997.

Participants at the ninth meeting were: DW H Walton (Convenor), K Birkenmajer, E S E Fanta, M Fukuchi, M C Kennicutt II, H Miller, M Oehme, and J Valencia. M De Poorter (ASOC) and J Plötz (Environmental Officer, Alfred-Wegener-Institut) attended as Observers. G Kleinschmidt (Chairman of the German National Committee for SCAR) attended the first day of the meeting. P D Clarkson (Executive Secretary, SCAR) acted as Secretary to GOSEAC. Apologies were received from J M Acero and P J Barrett. A list of addresses of GOSEAC members and observers is given in Appendix 2.

Professor Dr Max Tilzer, Director of Alfred-Wegener-Institut für Polar- und Meeresforschung welcomed the participants to Bremerhaven. He spoke of the importance of the Antarctic environment and highlighted the extensive clean-up operation undertaken by Germany in the Schirmacher Hills. Professor Dr Georg Kleinschmidt, Chairman of the German National Committee for SCAR, then spoke of his own pleasure to welcome the SCAR Group to Germany and wished the Group a very successful meeting.

1. Adoption of the agenda and appointment of rapporteurs

The revised agenda (see Appendix 1) was adopted. Rapporteurs were appointed for the following agenda items:

D W H Walton (1–3); K Birkenmajer (4.1–4.4.3); M C Kennicutt (4.4.4–4.6); H Miller (5); M Oehme (6); E S E Fanta (7); J Valencia (8); M De Poorter (9–11).

2. Matters arising

The Convenor advised that a number of items arising from GOSEAC VIII were already listed as agenda items.

2.1 Membership of GOSEAC

The Convenor reported on changes to membership of the Group, following a review by the Executive Committee at XXIV SCAR. M Manzoni would retire and P Trehen had resigned. M C Kennicutt (previously Co-opted Member) and M Fukuchi become members of the Group. J C A Sayers had resigned from the Group shortly before the meeting due to starting his new appointment as the Executive Secretary of the Council of Managers of National Antarctic Programmes (COMNAP). The Convenor welcomed the new members to the Group and recalled with gratitude the valuable contributions that the departing members had made over several years, noting particularly the link with the Standing Committee on Antarctic Logistics and Operations (SCALOP). He hoped that this invaluable link would be maintained in the future.

2.2 Pristine areas

H Miller reported that the Working Group on Glaciology had discussed the possibility of identifying pristine areas on two occasions and had sought advice from COMNAP on records of human activities in such areas. COMNAP had concluded that reports of much of the early phase of activities inland had been poorly documented and it was now impossible to be certain that any area had remained unvisited. The Working Group had pointed out that the record of any activity was restricted to a single annual layer of snow, and that in some instances such activity had been valuable as a time marker for investigations of previous climate patterns. It was concluded that it was not possible to designate any pristine areas although annual snow fall produced a new pristine surface each year It might still be considered useful to provide protection to an area in order to limit human activities but the purpose of such an area would need to be carefully defined.

Some members raised the question of whether Forlidas and Davis Ponds (SPA 23) could be considered as a pristine area. Subglacial lakes were considered to be pristine areas and the Group considered that, in view of the present discussions on Vostok Lake, SCAR should raise the question with the Antarctic Treaty Consultative Meeting (ATCM) as to whether some could be designated as Antarctic Specially Protected Areas (ASPAs).

2.3 Discussions with NGOs

The Convenor reported on the outcome of discussions amongst Chief Officers concerning the production of a video on Antarctic science jointly with the NGOs. It was considered to be a considerable task and no individual had been prepared to accept the role of co-ordinator There was therefore no progress.

3. Report of XXI ATCM

3.1 TEWG and WG II

The Convenor tabled the draft report of the Treaty Meeting and provided some general comments on the meeting. The facilities and support had been exceptionally well organized in Christchurch.

Revised rules of procedure were agreed for the ATCM and new rules of procedure were drafted for the Committee on Environmental Protection (CEP). Japan was expected to complete ratification before the end of 1997 thus bringing the Protocol into force. This would mean that at the next meeting in Tromsø the Transitional Environmental Working Group (TEWG) would be replaced by the CEP.

Despite attempts by various Parties to limit the number of papers there were still more than 170 papers tabled.

The TEWG was at its most efficient with O Orheim as Chairman. All of the protected area plans commented on by GOSEAC - the new plans for Botany Bay and Lewis Bay and the revised plans for Canada Glacier, Cierva Point, Potter Peninsula and Harmony Point - were accepted with virtually no changes. A paper from the United Kingdom took up suggestions raised originally by the SCAR/IUCN Workshop on Protected Areas. The ATCM agreed to hold a workshop prior to the Tromsø meeting to consider gaps in the present system, the SCAR ecosystem classification matrix and the procedures for reviewing management plans. SCAR, along with Australia, Chile, Norway and the World Conservation Union (IUCN), was asked to organize this.

The draft Guide for the Preparation of Management Plans for Specially Protected Areas tabled by SCAR was considered by some Parties to require further improvements. It was agreed that SCAR would incorporate any amendments received and then the United Kingdom would co-ordinate any further intersessional work to develop an improved draft for XXII ATCM.

Papers tabled by Argentina, and by New Zealand, on the interpretation of environmental impact assessment procedures incorporated many of the ideas developed by GOSEAC over the last two years. TEWG agreed to intersessional consultations, co-ordinated by Australia, to analyse the usefulness of existing EIA procedure guidelines with a view to discussing possible improvements at XXII ATCM. The report of the IUCN workshop on cumulative impacts was welcomed as a basis on which the CEP could consider this difficult area. IUCN was recommended to develop the material further with interested Parties and SCAR and contribute a further paper to XXII ATCM.

The joint SCAR/COMNAP paper on environmental monitoring was welcomed by all the Parties. The report on the two workshops had been circulated to all Parties before the meeting. The ATCM was happy to endorse the production by COMNAP of a technical handbook on techniques, with advice from SCAR, and that SCAR undertake a review of key research issues, that data management be considered by the SCAR/COMNAP Data Management Group and that COMNAP should develop methods for co-ordinating monitoring activities. The SCAR paper on the State of the Antarctic Environment Report (SAER), together with one from New Zealand, generated a great deal of discussion and the participation of almost all the countries represented at TEWG. Parties saw the utility of this approach but had concerns about the scope, cost and management of the production of the SAER. New Zealand's intention to prepare a Ross Sea Region State of the Environment Report was seen as complementary to the continent-wide study but it was agreed that the two projects should not be coupled together It was agreed that SCAR would need to play a major role in the preparation of the scientific sections of the report but that policy and recommendations would be the concern of the CEP. To develop the proposal, from the basis provided by SCAR, it was agreed that New Zealand would co-ordinate intersessional activities between all interested Parties, observers and experts. The objectives of the consultation would be to develop clear objectives, recommend whether the report should be summary or comprehensive, consider the report framework, propose a time frame, and consider the resources necessary to produce the report and where they might be obtained. All those wishing to take part were required to indicate their interest to New Zealand by the end of June 1997. SCAR had indicated that it wished to be included in the consultations.

WG II welcomed the implementation of the SCAR/COMNAP Antarctic Master Directory.

There was considerable discussion of Vostok Lake and the current proposals for investigating the water and sediment in the lake. Russia reported on further geophysical work using bore hole tools loaned by Germany. Interest had been expressed by the National Aeronautical and Space Administration (NASA) in using Vostok Lake as a trial for equipment designed to sample beneath the ice cover on Europa, one of the moons of Jupiter. In response to concern expressed by SCAR and others about the penetration of the lake, Russia stated that there would be no penetration until the project had been fully assessed by the international scientific community and subjected to full environmental assessment.

H Miller noted that the SCAR position had always been that equipment and methods should be tested on other subglacial lakes first. Interest in the project had also been expressed by the European Polar Board. He considered that a primary stage could be the use of a "Philbert-type" probe which would melt its way into the lake resealing the hole behind it to limit contamination.

The UK tabled a paper based on key recommendations of the SCAR/IUCN Workshop on Environmental Education and Training. It was agreed that Australia would co-ordinate the production of a document for the public describing the operation and achievements of the Antarctic Treaty System, whilst COMNAP and the International Association of Antarctic Tour Operators (IAATO) agreed to collect information on education and training schemes used by national operators and tour operators. Chile offered to host a workshop on education and training of people going to the Antarctic and this will be held in conjunction with the SCAR/COMNAP meeting in Concepción in July 1998. New Zealand announced it would be tabling a "Layperson's Guide to the Protocol" next year.

3.2 Liability

There was some progress but the activities are coming to a standstill. The next intersessional meeting will prepare a paper for XXII ATCM summarising the present position and seeking guidance on the next steps.

3.3 Tourism

There was considerable discussion of exactly what was required from tourist operators in terms of reports on activities. A standard form was agreed and will be tested next season. The site survey project, supported jointly by the United States and the United Kingdom and undertaken by R Naveen was discussed as an important step in assessing possible impacts on these sites. IAATO drew attention to the support its members had provided to national operators in the last season and encouraged national operators to request support for both science and logistic activities on a co-operative basis.

IAATO presented a paper on terms of reference for an Initial Environmental Evaluation (IEE) of ship-based activities around the Antarctic Peninsula. IAATO noted that its members were concerned about how to ensure that all appropriate Parties were informed about the proposed activities. Parties agreed that differing legislative requirements could make a single IEE difficult but noted that wide circulation could help in providing information towards possible cumulative impacts.

4. Protected and Managed Areas

4.1 Handbook

During the GOSEAC VIII meeting, the Group critically examined the draft of this handbook. The final version was circulated to SCAR National Committees and Chief Officers for comment. Comments and corrigenda received were incorporated into a final draft version that was re-titled "Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas" and was tabled by SCAR at XXI ATCM as a Working Paper (XXI ATCM/ WP18) under Agenda Item 6.f. In general, the "Guide" was well-received but some Delegations felt that some further revision was required. The offer by United Kingdom Delegation to undertake this work and to present a revised version at XXII ATCM was accepted.

4.2 List of Protected Areas

The Convenor introduced a "List of Protected Areas in Antarctica", published by the United Kingdom Foreign and Commonwealth Office (London) in collaboration with the British Antarctic Survey (BAS), that was tabled at XXI ATCM (IP66). The Group commended this publication as a very valuable and useful document and hoped that it would be made widely available. The opinion was expressed that the content of the volume should be made available on the Internet. It was recognized that a new version of the "List" would be necessary when the protected areas are re-numbered following the entry into force of the Protocol on Environmental Protection to the Antarctic Treaty and the establishment of the Committee on Environmental Protection (CEP). At present, the "List" is an excellent source of information, particularly for tour operators. The Convenor and his colleagues were congratulated on this publication.

4.3 Agenda for proposed workshop on Protected Areas

The Convenor reported that this workshop was proposed at XXI ATCM as a one-day workshop to be held immediately prior to the start of XXII ATCM. The Agenda for the proposed workshop will be based on the Terms of Reference given in the Draft Final Report of XXI ATCM (paragraph 73):

i. compare the protected areas currently designated against the categories of areas set out in Article 3(2) of Annex V in order to identify gaps in the existing system;
ii. examine the SCAR ecosystem classification matrix for protected areas to identify the changes that are needed so that the matrix better incorporates the categories of areas set out in Article 3(2) of Annex V;
iii. identify, where possible, areas which might be designated to fill any gaps found in the existing system; and
iv. examine, and where possible identify ways to improve, the procedure for developing and reviewing proposals for ASPAs.

In the ensuing discussion, the Group proposed that the following points should be considered by the Workshop Steering Committee when constructing the agenda:

i. wilderness and aesthetic values; representative examples of the most important ecosystems (benthic ecosystems seem to be poorly represented at present); type locations of species; on-going and planned research; outstanding geological/ geomorphological features (to be discussed with the Chief Officer of the Working Group on Geology). The matter of outstanding glaciological features, including ice-streams, blue-ice areas and subglacial lakes, was discussed at some length but no conclusion was reached on whether such features need special protection and, if so, how this could be achieved. The definition of marine areas for protection was regarded as requiring the advice of CCAMLR to evaluate the scientific priorities versus the commercial priorities. It was noted that XXI ATCM had provided a definition of "significant marine area" to determine more precisely which plans would need review by CCAMLR. Finally the basis on which the boundaries to protected areas should be defined needs further discussion.
ii. The SCAR ecosystem classification matrix for protected areas could be broadened by including some new aspects, such as fossils, meteorites, ventifacts, and outstanding geological and geomorphological features. It was noted that aesthetic and wilderness values are not included.
iii. The geographical distribution of protected areas is very uneven in the Antarctic. This is a function of the paucity and uneven distribution of ice-free ground (approximately 0.4% of the continent), the distribution of scientific stations and the areas of tourist interest. When considering the gaps in the existing geographical distribution, special consideration should given to protecting those outstanding features identified above (see section (i)).

iv. The current procedures for the review process of management plans are necessarily slow, because of the requirements for adequate consultation, and are critically dependent on existing schedules: GOSEAC meets annually; SCAR meets biennially but the SCAR Executive Committee meets once between SCAR meetings; ATCPs meet annually at the ATCM and presumably the CEP will also meet annually; CCAMLR also needs to be involved in the consultations for those areas with significant marine components. These schedules may change when the CEP and an Antarctic Treaty Secretariat are established and then the roles of GOSEAC and SCAR will need to be discussed in relation to a changed situation.

4.4 Management plans

4.4.1 New College Valley, Cape Bird, Ross Island (SPA no 20)

A new Management Plan for a Specially Protected Area (SPA), prepared by New Zealand, was tabled. This Plan includes the previous Site of Special Scientific Interest (SSSI) no 10 (Caughley Beach) and the previous SPA no 20 (New College Valley).

The Group appraised the content of the proposal and indicated some parts that could be clarified or supplemented: the lack of a general geological description of the Area; the lack of any indication on the map of the distribution of moss patches; the unclear identification on the ground of some boundaries of the Area.

The Group recommended that the Plan should be returned to the originator with suggestions for changes.

4.4.2 Cape Royds, Ross Island (new SPA)

This Management Plan, prepared by New Zealand, is for a proposed new SPA to protect Historic Site no 15. The Area includes the hut built for Sir Ernest Shackleton's 1907–09 Nimrod expedition.

The Group recommended that this Plan should be accepted, subject to minor modifications, including a change of name to avoid confusion with SSSI no 1.

4.4.3 Cape Adare (new SPA)

This Management Plan, prepared by New Zealand, is for a proposed new SPA to protect Historic Site no 22. The Area includes the huts built for Carsten Borchgrevink's 1898–99 Southern Cross expedition and for the northern party of Captain R F Scott's 1910_13 Terra Nova expedition.

The Group recommended that this Plan should be accepted, subject to minor modifications.

4.4.4 Western Shore of Admiralty Bay, King George Island, South Shetland Islands (SSSI no 8)

This Management Plan, prepared by Poland, is a new Plan for existing SSSI no 8.

It was unclear whether other countries with an interest in the Area had been fully consulted in the drafting process and the originator should be urged to consult all interested parties before the Plan is submitted to the ATCM. Specific comments were made concerning the maps, including the naming of features, and the clarification of contour units and intervals. It was noted that all permits should be issued for a finite period and this should be indicated in the Plan. The agreed wording for reporting requirements needs to be inserted.

The Convenor will provide the originator with an annotated copy of the Plan with suggested revisions.

4.4.5 Lion's Rump, King George Island, South Shetland Islands (SSSI no 34)

This Management Plan, prepared by Poland, is a new Plan for existing SSSI no 34.

The Group suggested that this Plan should be submitted as a SPA, rather than a SSSI, because there are no long-term scientific studies in progress or planned and it is a representative example of the terrestrial, limnological and littoral habitats of the maritime Antarctic. In this respect, improved descriptions of the sublittoral areas and of the terrestrial vegetation are needed. The maps need to be up-dated, improved and standardized. It was suggested that access to the Area from the sea should be from a landing beach outside the Area. Finally, the originator should be advised that, because the Area includes a marine component, the Plan may need to be reviewed by CCAMLR before submission to the ATCM.

The Convenor will provide the originator with an annotated copy of the Plan with suggested revisions.

4.4.6 Hut Point, Ross Island (new SPA)

This Management Plan, prepared by New Zealand, is for a proposed new SPA to protect Historic Site no 18. At present the Area comprises the hut built for Captain R F Scott's 1901–04 Discovery expedition.

The Group agreed that this Plan should be accepted, subject to modifications, including the suggestion that the Area should be larger than the hut itself to provide a buffer zone.

The Convenor will provide the originator with an annotated copy of the Plan.

4.5 Environmental Code of Conduct for the Dry Valleys

"An Environmental Code of Conduct for the McMurdo Dry Valleys", (XXI ATCM/IP56) submitted by New Zealand, was tabled. The Group discussed whether this Code of Conduct could be generalized and applied to other areas of the Antarctic. The general concept of a code of conduct was supported and it was suggested that the various existing guides and codes of conduct for visitors to the Antarctic could be surveyed and the common practices could be summarized into a general guide to provide a degree of conformity. This survey would be most appropriately undertaken in conjunction with the workshop on Education and Training (see item 7).

4.6 Management of the Dry Valleys

No further progress on the proposed Management Plan for an ASMA for the Dry Valleys of Victoria Land was known to the Group. Such a management plan was regarded by the Group as being very important and it was agreed that those national programmes concerned should be encouraged to proceed with the development of a plan.

5. Environmental monitoring

5.1 Technical handbook

GOSEAC had been asked by COMNAP for advice on good environmental monitoring practice. This was extensively discussed at both environmental monitoring workshops. Key research areas have also been identified. Relevant lists can be found in the workshop proceedings which include a wide range of parameters that may be useful at individual sites. There remain, however, open questions, eg which type of protocol to use for monitoring purposes. Here the Antarctic Environmental Officers Network (AEON) will be asked to develop appropriate protocols with the assistance of GOSEAC.

It seems that, for measurements of certain chemical parameters, it would be good practice to follow the existing Arctic Monitoring and Assessment Programme (AMAP) as guidelines where appropriate. No such agreed international procedures exist for biological monitoring.

In discussion it was pointed out that care needs to be taken to document the quality standards which measurements of parameters were undertaken. The technical handbook must address this issue and contain details on sampling and processing techniques. Recognizing that only a finite number of measurements can be done, GOSEAC recommends that a few key parameters be monitored, but then to the accepted quality standards.

Choice of a parameter needs to encompass practical decisions on the expected relationship to the impact, its importance in the ecosystem, and the practicality of making the measurement. The value of the measurement is the extent to which it guides management decisions. In general, since exact baseline information is usually missing against which absolute change could be determined, it seems advisable that attempts are made to measure gradients with distance from the source.

To monitor station impact on the local environment it is recommended to AEON that they should at least:

i. monitor sewage outflow effects;

   Sewage is a good indicator of human activities with high biological significance. (Current practice suggests that, for stations with personnel numbers exceeding 50, sewage treatment should be considered.) For both cases, monitoring the waste water for nitrate, phosphate, chloride, total organic carbon, temperature, and particulate load should be undertaken. Possibly coliform counts should also be undertaken. To monitor effects, changes in the biological communities at the end of the pipe should be observed in comparison to a suitable control area or along a gradient. The observed number of amphipods/m^2 could be used as one indicator.

ii. monitor total petroleum hydrocarbons in soil and snow;

   Standard methods (also for field use) are easily available and provide a good indication of the quality of fuel management.

iii. monitor noise from station and vehicle movement (where applicable);

   It has been shown that birds and seals are disturbed by constant and/or sudden noise. Therefore noise abatement procedures should be introduced at stations in the vicinity of bird and seal colonies and procedures for flight operations developed minimizing impact.

iv. monitor physical surface disturbance and debris. Techniques for this need to be assessed.

It is recognized that more detailed measurements of particular organic or inorganic contaminants may be required at particular sites.

M C Kennicutt informed the Meeting that his group has been tasked with defining within the next year the ways in which the recommendations from the Environmental Monitoring Workshops could be implemented within the US Antarctic Program. Appropriate standards and rules will be drawn up and areas of future research efforts identified. GOSEAC will use this as a basis for possible further deliberations on the subject.

5.2 Data availability

With regard to data availability COMNAP had prepared an Information Paper (XXI ATCM/IP67) containing presently available information on:

- Existing human impact monitoring work
- Relevant publications
- Research on baseline levels of pollutants

All members were asked to examine this paper carefully and to report any other monitoring activities to try to ensure completeness. The Convenor offered to look at the possibility of providing an Internet-accessible listing of appropriate literature.

5.3 Research questions

The Group examined the report of the Monitoring Workshops and recognized that there was a wide range of important research issues identified there but which had yet to be adequately described. It was agreed that the report could be used as a basis for the preparation of three discussion papers for GOSEAC X as follows:

- physiological and biochemical monitoring (E S E Fanta)
- monitoring responses of birds and seals to disturbance (J Valencia)
- monitoring organic and inorganic pollutants (M C Kennicutt)

5.4 Workshop on cumulative impacts

M De Poorter reported on the IUCN-convened workshop on "Cumulative Environmental Impacts in Antarctica: minimisation and management", held in Washington DC, 18–21 September, 1996. A copy of the proceedings was distributed to participants. Based on that workshop, an information paper to XXI ATCM (XXI ATCM/IP61) had been prepared and was also tabled for GOSEAC.

The Workshop was devoted to cumulative effects, a subject which needed particular attention, given the increase in activities at many sites and the present lack of detailed information about relevant processes. The workshop reached a definition of cumulative impact in the Antarctic context. It also concluded that wherever obligations regarding environmental impact are identified, this should be taken to include cumulative impacts. The workshop identified the value of programmatic EIAs (although there was formally no proviso in the relevant paragraphs of the Protocol). In identifying potential cumulative impacts, the concept of ASMAs/ASPAs was recognized as an effective tool to manage cumulative impacts. However, areas should be larger and more marine areas are needed. The workshop found problems in precisely defining intrinsic values, such as aesthetic and wilderness values.

GOSEAC then discussed in detail the 23 recommendations from the workshop and comments were made on the following:

Recommendation 4.

Consideration should be given to a review of the Specially Protected Species in Appendix A to Annex II [of the Protocol on Environmental Protection to the Antarctic Treaty] with a view to examining its utility for the protection of species whose decline may be the consequence of, inter alia, *cumulative impact (eg southern giant petrel,* Macronectes giganteus).

The Bird Biology Subcommittee should consider cumulative impacts on certain bird species and should forward to the Treaty a list of species to be protected. A connection to CCAMLR should be established because of the particular nature of the problem.

Recommendation 8.

Pristine" areas should be identified for a site register, and consideration should be given to the use of designations under Annex V [of the Protocol on Environmental Protection to the Antarctic Treaty] to achieve the appropriate level of protection(which could include exclusion of activities) of such sites where appropriate.

This recommendation should be raised at XXII ATCM

Recommendation 9.

Antarctic Treaty Parties should review elements of information exchange under the ATS to see whether the format, timeliness and content of current exchanges are adequate to meet the obligations under Annex I of the Protocol [on Environmental Protection to the Antarctic Treaty] to consider cumulative impacts in environmental impact assessment. Particular emphasis should be placed on geographic precision and standardised reporting.

It is recognized the present exchange of information system needs to be revised.

Recommendation 14.

The development of common databases containing comprehensive data on all activities and other relevant variables should be considered in multiple operator areas.

Recommendation 15.

COMNAP and SCAR should examine the feasibility and means of including references to operational databases in the ADDS.

Recommendation 16.

Data or other information should where possible be provided with lat/long coordinates (using GPS).

Data bases and related information are being implemented on the COMNAP-Network. Some countries make this information available publicly on servers already

Recommendation 18.

Any non-treaty Party operator in the Antarctic should be encouraged to conduct activities in accordance with Antarctic Treaty System procedures and practices, including exchanging information with other operators, to allow cumulative impacts to be addressed.

This is being realized practically, eg in air flight manuals.

Recommendation 22.

Suitable control areas [should] be established relevant to stations or other activities as a tool for determining the impact of those activities.

ASPAs could be used as control areas.

E Fanta introduced her paper on protected and managed areas as useful tools for avoidance or minimisation of cumulative impacts. It was a useful review of the ASMA and ASPA systems and their key features as well as how activities should be coordinated to reduce cumulative impacts.

5.5 Environmental impact assessment

At XXI ATCM the terms "minor" and "transitory" were again discussed and several papers from ATCM relevant to the subject of Environmental Impact Assessment (EIA) were tabled for information.

i. A paper (XXI ATCM/IP38) from Norway listed EIAs produced in 1996. A paper (XXI ATCM/IP57) from the United Kingdom gave a full list of (EIAs) since 1988.
ii. New Zealand prepared a paper (XXI ATCM/IP36) reporting on intersessional work led by New Zealand on understanding the EIA process. A survey of Parties was undertaken giving a number of standardized questions and responses were evaluated. There seems to be a wish amongst Parties to move from an individual to a programme-based assessment.

There was agreement that each ATCM host country should up-date this survey.

Argentina submitted a paper (XXI ATCM/IP55) (containing many of the elements discussed within GOSEAC) on "Elements for the Interpretation of Environmental Impact Assessment Procedures established in Annex I of the Madrid Protocol". The paper was particularly well-received at the ATCM.

New Zealand has undertaken to work towards a better understanding of the terms "minor" and "transitory" for the Treaty Parties, who are unwilling to accept a prescriptive list of what the terms really constitute. GOSEAC will discontinue its own formal discussion on the terms. However, the assessment matrix developed at GOSEAC could be introduced as a discussion paper for the AEON workshop on EIA methodology.

Other papers tabled included those on follow-up changes required for the Cape Roberts Project Comprehensive Environmental Evaluation (CEE) which were necessitated by unforeseen circumstances. This was strongly endorsed by GOSEAC because it was felt to demonstrate a commitment to both the spirit and the implementation of the EIA process in a dynamic and transparent way.

Treaty papers contain much information useful to those in the Antarctic science and logistic communities. The question was raised on where and how Treaty papers would be available to interested persons. It was suggested that posting a list of the titles of Treaty papers on a suitable server could be a first step. A full record of Treaty recommendations can be found in the SCAR Bulletin, published in Polar Record. In most countries, Treaty papers are not easily accessible.

5.6 Certified Antarctic Reference Material

The Convenor reported that a first batch of 300 vials has been prepared by S Caroli (Italy) containing dried, powdered krill for the purpose of an international standardization programme on heavy metals.

6. State of the Antarctic Environment Report

The Convenor informed the meeting that the draft structure for this report, developed at GOSEAC VIII, had been discussed first by Delegates at XXIV SCAR and subsequently by Delegates at XXI ATCM. The comments of the ATCPs are included in the draft final report of XXI ATCM (paragraphs 149–160). The ATCM considered that the proposed time-schedule for developing the report was probably too optimistic and that funding of the development would certainly be essential if the scheduled deadlines were to be met. The Convenor also reported that the offer from the New Zealand Delegation at XXI ATCM to coordinate intersessional activities had been accepted (see item 3.1). A draft set of objectives had been prepared by New Zealand and this was tabled for the Group to consider.

These objectives were discussed and, with the inclusion of some modifications, was found to be generally suitable for further progress. A copy of the report on "The State of the European Arctic Environment" was tabled as an example of an alternative approach. However, the Group agreed that the European approach was not really appropriate to the Antarctic as it was focused on sustainable development and not on scientific values. The Group concluded that the original draft structure developed at GOSEAC VIII contained all the necessary elements as given in the draft objectives of the SAER. Some minor refinements to the original structure were proposed. The new draft structure has also been annotated to indicate those subject areas expected to be covered under individual headings and sub-headings.

7. Education and training initiatives

The published report of the SCAR-IUCN workshop "Opportunities for Antarctic Environmental Education and Training" received very little discussion at XIX ATCM so that SCAR submitted an Information Paper "Environmental Education and Training" (XX ATCM/INF 70 Rev 1) to XX ATCM. The United Kingdom Delegation developed some of the ideas given in the SCAR paper and tabled a Working Paper "Proposals for Education and Training in Antarctica" (XXI ATCM/WP14) at XXI ATCM. As a result, the Delegates at XXI ATCM agreed the following:

i. there is a need to make better information about the Antarctic and its environmental protection more readily available to the public;
ii. COMNAP was asked to survey existing education and training programmes for Antarctic personnel;
iii. a checklist for training programmes should be developed;
iv. a workshop on education and training for Antarctic personnel will be held in Concepción, Chile, 17–18 July 1998, and will be organized jointly by Chile and New Zealand in conjunction with XXV SCAR / COMNAP IX.

The Group proposed that SCAR should seek to include the following topics on the workshop agenda:

- how to transmit the regulations of the Protocol to scientists, support staff and other visitors to Antarctica;
- the inclusion of scientists in training programmes to illustrate the Antarctic environment and those aspects that should be protected;
- the need for feedback from personnel returning from Antarctica to assess the effectiveness of the educational/ training programmes;
- setting minimum standards for training expedition leaders.

The Group agreed on the importance of providing lay guides to the Antarctic Treaty System and the Environmental Protocol for visitors of all kinds and noted that several national programmes and organizations, such as IAATO, have already developed their own material. It was also considered that a uniform guide, or set of guides, approved by the ATCM would be a more acceptable approach.

8. Reports from other Relevant Groups

8.1 SCAR groups

The Convenor reported that the first meeting of the new SCAR-COMNAP Joint Committee on Antarctic Data Management (JCADM) had been held in Christchurch, New Zealand, 20–23 June 1997, and that a presentation had been made to XXI ATCM. The objectives of the Antarctic Data Directory System are to disseminate knowledge about Antarctic scientific programmes, facilitate interdisciplinary research, encourage effective cooperation between national Antarctic programmes, and to provide a decision-making tool for Antarctic operators and scientists.

Dr Manfred Reinke of the Alfred-Wegener-Institut, a member of JCADM, made a short presentation to the meeting of the main features of the Antarctic Master Directory (AMD), the role and responsibilities of JCADM, the establishment of the infrastructure for the collection of data sets, and the interactions between the National Antarctic Data Centres (NADCs) and other directory systems, such as GLOCHANT and CCAMLR. The Group discussed the types of information and data that could assist the work of GOSEAC and that JCADM might encourage.

E Fanta advised that the Subcommittee on Evolutionary Biology of Antarctic Organisms would meet in Padua, Italy, 6–8 October 1997, to identify principal research areas, possible collaborative research programmes and an agenda for a proposed workshop.

The Convenor noted that First Circulars had been distributed for the following meetings:

- International Symposium on Polar Aspects of Global Change, Tromsø, Norway , 24–28 August 1998
- VII International Antarctic Biology Symposium, Christchurch, New Zealand, 31 August – 4 September 1998
- Sixth International Symposium on Antarctic Glaciology (ISAG-6), Lanzhou, People's Republic of China, 5–9 September 1998

K Birkenmajer advised that the Centenary of the "Belgica" Expedition (1897–99) would be celebrated at the following events:

- Centenary of the "Belgica" Expedition, Columbus, Ohio, USA, 5–6 September 1997.
- Commemoration of E Racovitza, Bucharest, Romania, 5 November 1997
- Belgica" Expedition Symposium, Brussels, Belgium, 14–16 May 1998
- Commemoration of H Arctowski and A B Dobrowolski, Warsaw, Poland, September 1998

The Convenor also referred to the planned Workshop on Area Protection in the Antarctic, to be held in Tromsø, Norway, 23 May 1998, immediately prior to XXII ATCM, 25 May – 5 June 1998.

8.2 Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

E Fanta reported on CCAMLR activities relevant to GOSEAC. The Scientific Committee of CCAMLR supported the suggestions of the Working Group on Environmental Monitoring and Management (WG-EMM) in Bergen, Norway, and accepted the need for biological studies of Antarctic petrels, such as chick diets, population sizes, breeding success and adult survival, and noted the lack of data on cape petrel breeding chronology. The Working Group considered the improvement of monitoring methods, including the collection of toxicological and pathological samples of selected species.

The book "Fish the sea, not the sky" will be translated into the four official CCAMLR languages to help to avoid further incidental mortality of sea birds associated with fishing activities. Concerns about the fluctuations and reductions in sea bird populations should be referred to the SCAR Bird Biology Subcommittee of the Working Group on Biology.

The issue of marine debris derived from the South Ocean fishing industry, causing entanglement and wounds to sea birds and marine mammals, was discussed. It was suggested that SCAR should recommend Antarctic Treaty nations to remove marine debris.

The Group suggested that there should be closer links between SCAR and the Scientific Committee of CCAMLR to consider issues of environmental protection and monitoring in the Antarctic. There were particular common interests shared by GOSEAC and WG-EMM.

The Convenor thanked E Fanta for her report.

8.3 The World Conservation Union (IUCN)

J Valencia summarized the main IUCN concerns regarding the Antarctic environment, including the continuing growth of tourism and its possible impacts; and the safety of operations, especially with large ships. There is interest in establishing minimum safety standards and maximum passenger capacities for ships. A related issue is the possible use of ASMAs as a tool for the management of frequently visited sites. IUCN recognized the role of environmental education and training in the process of implementation of the Protocol on Environmental Protection.

IUCN also has a continuing interest in environmental protection of sub-Antarctic islands. The Convenor reported on the production of management plans for the following islands:

- Macquarie and Heard islands (published by Australia)
- all New Zealand sub-Antarctic islands (published by New Zealand)
- Gough Island (published by United Kingdom)
- Iles Kerguelen, Crozet and Amsterdam (in draft) France
- South Georgia (in preparation) United Kingdom

IUCN has expressed the hope that, in spite of increasing fishing pressure in the CCAMLR area, the existing prohibition around Iles Crozet would be mentioned in the definitive management legislation.

8.4 Antarctic and Southern Ocean Coalition (ASOC)

M De Poorter gave a summary of the main ASOC environmental concerns. These include the ratification of the Protocol on Environmental Protection; the establishment of an Antarctic Treaty Secretariat; compliance with Antarctic Treaty regulations by non-consultative Parties such as Bulgaria, Canada and Ukraine; the development of global climate change research, including the disappearance of the ice shelf connection between James Ross Island and the Antarctic Peninsula; the increase of illegal fishing within the CCAMLR area; bird by-catches in the Southern Ocean; and understanding the benefits of an Annex on Environmental Liability to the Protocol for the protection of scientific research n the Antarctic.

After an exchange of ideas about these environmental issues and consideration of possible actions by SCAR, the Convenor thanked M De Poorter for her report.

8.5 Antarctic Environmental Officers Network (AEON)

J M Acero sent a written report of the activities of the Antarctic Environmental Officers Network (AEON), following its establishment at COMNAP VIII in August 1996. The AEON Steering Group comprises E Waterhouse (Co-ordinator), J M Acero, J Jatko and B Njästad. A World Wide Web home page <http://earth.agu.org/amen/aeonhome.html> was established in October 1996. In April 1997, AEON completed updating the information on monitoring activities in the Antarctic. A summary was provided to XXI ATCM by COMNAP (XXI ATCM/IP67). AEON also participated in developing two Working Papers, co-ordinated by New Zealand, on defining the terms minor and transitory impact, and on EIA procedures, that were presented at XXI ATCM. Current AEON activities include organizing the Antarctic Oil Spill Pollution Course, preparing a comprehensive environmental protection plan for Antarctica, and closer co-operation among the Environmental Officers of Finland, Sweden and Norway. Future activities will include cooperation with SCAR and COMNAP in the preparation of the Handbook on Environmental Monitoring in Antarctica, and continuing discussions on EIA methodology.

The Group considered these activities of AEON to be a positive step towards the implementation of environmental protection of the Antarctic.

9. Any Other Business

The Group received a paper by Dr R I Lewis-Smith entitled "Introduced Biota in Antarctica". The paper drew attention to current examples of pet animals and introduced plants growing in imported soil at a number of stations. The Group expressed grave concern at these occurrences and proposed that a Working Paper be submitted to XXII ATCM, stressing the threats posed by deliberate and accidental introductions and the need for improved management.

Attention was also drawn to the United Nations Expert Conference on alien species that had highlighted the threat of alien introductions to native communities. It was agreed that this was a greater concern in the Antarctic because of the naturally low biodiversity in the region.

10. Agenda items for XXII ATCM

The Group examined the draft Agenda for XXII ATCM to consider those items under which SCAR might make contributions. The following proposals were suggested:

- Introductions of alien species Working Paper
- Research possibilities on Vostok Lake Working Paper
- A discussion paper on protected areas and related issues should be contributed to the planned workshop in Tromsø.

11. Recommendations to SCAR Executive Committee

GOSEAC recommends to the SCAR Executive Committee that:

1. A new member of GOSEAC be appointed to provide the important linkage with SCALOP.
2. After suggested revisions have been undertaken by appropriate national committees, the Management Plans for the following protected areas be endorsed and forwarded to XXII ATCM:
   - New College Valley, Cape Bird, Ross Island (SPA no 20)
   - Cape Royds, Ross Island (new SPA)
   - Cape Adare (new SPA)
   - Western Shore of Admiralty Bay, King George Island (SSSI no 8)
   - Lion's Rump, King George Island (SSSI no 34)
   - Hut Point, Ross Island (new SPA).
3. A Working Paper on introduced animals and plants be prepared for XXII ATCM.
4. A paper on the protected area system, with particular reference to:
   - identifying geological and geomorphological sites for protection;
   - the possibility that Vostok Lake or other subglacial lakes may be considered for protection as ASPAs; and
   - the conclusion that "pristine" areas could not be defined;

   be developed for presentation at the workshop to be held immediately preceding XXII ATCM.
5. Scientific advice on station monitoring be provided to COMNAP/AEON.

6. SCAR should participate in the intersessional development of the SAER.
7. SCAR should encourage relevant National Committees to develop management plans for the Dry Valleys.
8. A paper on education and training for Antarctic personnel be prepared for presentation at the workshop to be held in Concepción, Chile, 17–18 July 1998, in conjunction with XXV SCAR / COMNAP IX.
9. Consideration be given to determine how links to CCAMLR could be improved.

12. Time and place of next meeting

M Oehme confirmed his earlier invitation to host the GOSEAC X meeting in Basel, Switzerland, 21–25 September 1998. The Convenor expressed his thanks for this offer. E S E Fanta offered to host the following meeting, GOSEAC XI, in Brazil during 1999, at Curitiba or an alternative venue.

Finally, the Convenor, on behalf of all the participants, thanked Professor Heinz Miller for hosting a very successful and most enjoyable meeting in the Alfred-Wegener-Institut.

Appendix 1

GOSEAC IX
Bremerhaven, Germany, 7–12 July 1997

Agenda

1. Adoption of the agenda and appointment of rapporteurs

2. Matters arising

- *2.1 Membership of GOSEAC*
- *2.2 Pristine areas*
- *2.3 Discussions with NGOs*

3. Report of XXI ATCM

- *3.1 TEWG and WG II*
- *3.2 Liability*
- *3.3 Tourism*

4. Protected and Managed Areas

- *4.1 Handbook*
- *4.2 List of Protected Areas*
- *4.3 Agenda for proposed workshop on Protected Areas*
- *4.4 Management plans*
  - 4.4.1 New College Valley, Cape Bird, Ross Island (SPA no 20)
  - 4.4.2 Cape Royds, Ross Island (new SPA)
  - 4.4.3 Cape Adare (new SPA)
  - 4.4.4 Western Shore of Admiralty Bay, King George Island (SSSI no 8)
  - 4.4.5 Lion's Rump, King George Island (SSSI no 34)
  - 4.4.6 Hut Point, Ross Island (new SPA)
- *4.5 Environmental Code of Conduct for the Dry Valleys*
- *4.6 Management of the Dry Valleys*

5. Environmental monitoring

- *5.1 Technical handbook*
- *5.2 Data availability*
- *5.3 Research questions*
- *5.4 Workshop on cumulative impacts*
- *5.5 Environmental Impact Assessment*
- *5.6 Certified Antarctic Reference Material*

6. State of the Antarctic Environment Report

7. Education and training initiatives

8. Reports from other Relevant Groups

- *8.1 SCAR groups*
- *8.2 CCAMLR*
- *8.3 IUCN*
- *8.4 ASOC*
- *8.5 AEON*

9. Any Other Business

10. Agenda items for XXII ATCM

11. Recommendations to SCAR

12. Time and place of next meeting

Appendix 2

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Appendix 3

State of the Antarctic Environment Report
Draft Structure of the Report

Executive Summary

1. Introduction
- 1.1 Development of SAER
- 1.2 Objectives
- 1.3 Institutional framework

2. Status and Trends
- 2.1 Terrestrial and aquatic systems
  - 2.1.1 Ice sheets and ice shelves
  - 2.1.2 Ice-free areas
  - 2.1.3 Lakes and streams
  - 2.1.4 Biota
  - 2.1.5 Ecosystem dynamics and functioning
- 2.2 Marine systems
  - 2.2.1 Oceanic systems
  - 2.2.2 Sea ice
  - 2.2.3 Deep sea floor
  - 2.2.4 Continental shelf
  - 2.2.5 Biota
  - 2.2.6 Ecosystem dynamics and functioning
- 2.3 The Atmosphere
  - 2.3.1 Atmosphere dynamics - features and circulation
  - 2.3.2 Chemistry - trace gases
  - 2.3.3 Radiation and effects on the biosphere

3. Pressures on the Environment
- 3.1 Science and support activities
- 3.2 Fishing
- 3.3 Tourism
- 3.4 Long-range pollutants
- 3.5 Cumulative pressures
- 3.6 Other potential threats (minerals?)

4. Conclusions, Outlook and Responses
- 4.1 Key environmental pressures and impacts
- 4.2 Status of scientific values
- 4.3 Status of aesthetic and wilderness values
- [4.4 Future research and monitoring, identification of key indicators]
- [4.5 Policy implications and recommendations]

Appendices

Text of the Antarctic Treaty

Text of Convention for the Conservation of Antarctic Seals

Text of Convention for the Conservation of Antarctic Marine Living Resources

Text of Protocol on Environmental Protection to the Antarctic Treaty and its Annexes

Appendix 4

List of Acronyms and Abbreviations

ADDS	Antarctic Data Directory System
AEON	Antarctic Environmental Officers Network
AMAP	Arctic Monitoring and Assessment Programme
AMD	Antarctic Master Directory
ASMA	Antarctic Specially Managed Area
ASOC	Antarctic and southern Ocean Coalition
ASPA	Antarctic Specially Protected Area
ATCM	Antarctic Treaty Consultative Meeting
ATCP	Antarctic Treaty Consultative Party
ATS	Antarctic Treaty System
BAS	British Antarctic Survey
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEP	Committee on Environmental Protection
COMNAP	Council of Managers of National Antarctic Programmes
CEE	Comprehensive Environmental Evaluation
EIA	Environmental Impact Assessment
GLOCHANT	Group of Specialists on Global Change and the Antarctic
GOSEAC	Group of Specialists on Environmental Affairs and Conservation
GPS	Global Positioning System
IAATO	International Association of Antarctic Tour Operators
IEE	Initial Environmental Evaluation
INF	Information Paper (XX ATCM)
IP	Information Paper (XXI ATCM)
IUCN	International Union for the Conservation of Nature (World Conservation Union)
JCADM	SCAR-COMNAP Joint Committee on Antarctic Data Management
NADC	National Antarctic Data Centre
NASA	National Aeronautical and Space Administration
NGO	Non-Governmental Organization
SAER	State of the Antarctic Environment Report
SCALOP	Standing Committee on Antarctic Logistics and Operations
SCAR	Scientific Committee on Antarctic Research
SPA	Specially Protected Area
SSSI	Site of Special Scientific Interest
TEWG	Transitional Environmental Working Group
UK	United Kingdom
US	United States of America
WG II	Working Group II
WG-EMM	Working Group on Environmental Monitoring and Management

SCAR Group of Specialists on Environmental Affairs and Conservation GOSEAC

Report of the tenth meeting, GOSEAC X, held in Bad Schauenburg, Switzerland, 21–25 September 1998.

Dr David Walton, Convenor, welcomed the members of the Group to Bad Schauenburg, especially Jan Erling Haugland as a new member in succession to Jack Sayers who is now the Executive Secretary of COMNAP. He noted that all members of the Group would be present at this tenth meeting of GOSEAC.

Participants were: D W H Walton (Convenor), J M Acero, P J Barrett, K Birkenmajer, E S E Fanta, M Fukuchi, J E Haugland, M C Kennicutt, H Miller, M Oehme, J Valencia, P D Clarkson (Executive Secretary)

There would be no observers at this meeting but Mrs Evelyne Gerber of the Swiss Federal Department of Foreign Affairs would be visiting the Group on Tuesday morning. He also thanked Professor Michael Oehme and his wife Dorothea for hosting the meeting in such a delightful setting.

1. Adoption of Agenda and appointment of Rapporteurs

The agenda for the meeting was adopted as given in Appendix 1.

Rapporteurs were appointed from among the members (see Appendix 2) as follows:

K Birkenmajer	1–3	M Fukuchi	6.3.3
P D Clarkson	4	P J Barrett	6.4
J Valencia	5	J M Acero	7
D W H Walton	6.1–6.2	M C Kennicutt	8
M Oehme	6.3.1	H Miller	9–12
E S E Fanta	6.3.2		

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

The Convenor reported on the views of the SCAR Executive Committee concerning the size of Groups of Specialists in general, the length and frequency of their meetings, and the consequent costs of supporting Groups of Specialists. He asked the members to think about these points during the meeting and to bear them in mind when discussing the current and future operation of the Group.

In the light of the establishment of the Committee for Environmental Protection (CEP) at the Twenty-second Antarctic Treaty Consultative Meeting (XXII ATCM), the Convenor suggested that the Group should review the role of GOSEAC. The declared intention of the CEP to organize for itself some environmental activities previously undertaken by SCAR meant that certain burdens, such as the editorial effort in the drafting of protected area management plans, would no longer need to be done by GOSEAC. However, there are still many areas for which independent scientific advice is needed.

In a wide-ranging discussion, the Group attempted to identify the short- and medium-term roles that SCAR might be expected to play in providing environmental advice. In so doing, it became clear that there was an opportunity for this to be linked to an assessment of how advice had been provided in the past and how effective this had been at the Treaty level. This amounted to a requirement for an audit of the contribution made by GOSEAC over the past 10 years. The Group wished to undertake this and to forward the result separately to the SCAR Executive Committee.

In looking to the requirements for environmental advice in the immediate future, the Group agreed with most of the principal areas of interest identified by the CEP in which there is a wide variety of problems that had not yet been satisfactorily resolved. These are specifically:

- environmental monitoring;
- protected areas;
- State of the Antarctic Environment Report (SAER); and
- environmental impact assessment procedures.

In addition, the Group recognized the value of providing oversight on developments such as the increased interest in wildlife diseases; the linkage between CEMP sites and ASPAs; and a forum for the discussion of multi-disciplinary science areas such as Vostok Lake. Should there be any further development of the Liability Annex, SCAR was likely to be asked for advice on various aspects of environmental damage and the potential for remediation.

There may be several equally effective ways of providing scientific input to these areas at the Treaty in the future. However, the Group, having several members who had attended the last CEP meeting, noted that a large committee, such as the CEP, with at least 26 members and no chosen balance of expertise, had found it difficult to address adequately the detailed technical and scientific problems but that it was better able to deal with policy implications arising from such problems. In contrast, SCAR has the advantage of being able to choose the required balance of expertise and to organize it in small and effective committees which are more conducive to detailed scientific discussions. This complements the CEP at present and is an advantage that the Group felt should continue to be developed. It was considered essential to ensure that independent scientific advice continued to be available to complement that provided by national delegations at the CEP.

3. Matters arising from GOSEAC IX

3.1 Vostok Lake

H Miller gave a concise description of Vostok Lake, the subglacial lake beneath Vostok Station, and outlined the history of discovery of the lake. The body of water covers an area of approximately 230 km by 50–70 km and is about 600 m deep. The ice–water interface is about 3,750 m below the surface at Vostok Station. The current drilling programme was stopped at 3,623 m below the ice surface, about 130 m above the ice–water interface.

He described briefly the programmes of research that had been undertaken and the results of several workshops that had been organized by SCAR and NASA since 1995. A specific result had been the close attention paid to drilling conditions and parameters that will avoid contamination in any attempt to enter and sample the lake water and underlying sediment. GOSEAC endorsed the need for biological representation from SCAR at any future workshops.

3.2 Introduced biota

The Convenor presented the paper by IUCN that was tabled at XXII ATCM (XXII ATCM/ IP53) entitled *"Introduction of non-native species in the Antarctic area: an increasing problem"*. In the past 40 years, in spite of increasing intensity of research and numbers of visitors, no significant introductions have been recorded which threaten the biodiversity or integrity of Antarctic ecosystems.

In the discussion that followed, many aspects raised by the paper were taken into account, eg the problem of background observation (usually insufficient in terms of time); visitors as agents of introduced/alien biota dispersal; pets and house plants on visiting ships and stations; agents transporting microbes/micro-organisms (seals, birds, wind, visitors); problems of pathogens of birds and seals; practicability of prevention/controlling; deliberate or accidental introductions. Of particular concern was that most of the data were anecdotal and therefore difficult to verify and evaluate.

The need for further research to identify the threats or potential threats to the existing environment was stressed. In particular it was emphasized that:

a. rigorous implementation of Annex II of the Protocol would minimize the potential for anthropogenic introductions; it was essential to remember that introductions might be effected by natural agencies, especially in areas with migrating birds.
b. despite the apparent requirement in Annex II, article 4, to remove all apparently alien biota immediately, there were scientific concerns about doing this. It would be valuable to study such unintentional introductions of alien biota to determine how the introductions occurred and how they affect, if at all, the biodiversity;
c. accidental introductions should be reported and monitored;
d. zero tolerance was not seen as a practical solution, especially because of micro-organisms.

3.3 State of the Antarctic Environment Report

The Convenor introduced the paper prepared by Anders Modig for the CEP intersessional group on the SAER. SCAR is included in this group and the SCAR Executive had asked GOSEAC to provide comment and input for the Executive to forward as appropriate. GOSEAC listed the following points for inclusion:

The SAER will only justify the resource cost if:

- it will be a useful information source for scientific programmes and management purposes;
- it will be a synthesis of data;
- it will be prepared on a continent-wide basis
- it will not entail new research but will use existing data with an appropriate time-scale depending on particular problems (eg biodiversity, pollution, etc);
- it will indicate where the data can be found;
- it will indicate linkages between the existing and future scientific programmes and research trends;
- it will be readily available on a web site; and
- it can be prepared as both a comprehensive version and a summary or concise version, each being addressed to a different audience;
- adequate resources and proper project management need to be identified in advance of any commitment.

3.4 Environmental Impact Assessment

J M Acero introduced a paper entitled "Guidelines for the Implementation of EIA" (draft version 1) circulated for the CEP intersessional group on EIA. The intentions of the paper were, among others:

- to provide guidance on the appropriate level of EIA to be conducted;
- to enhance the effectiveness of the EIA process;
- to provide Parties with a framework against which to comment on draft CEEs; and
- to provide advice to operators other than ATCPs.

There was wide discussion on the subjects addressed in the paper and a number of changes and introductions were suggested for SCAR to forward to the CEP intersessional group. The author was commended for this very useful contribution.

4. Reports on XXII ATCM and on XXV SCAR

4.1 CEP Report

The Convenor introduced the report of the Committee on Environmental Protection (CEP) by describing what had taken place during XXII ATCM in Tromsø, Norway, during May 1998. The CEP had held its inaugural meeting during XXII ATCM under the chairmanship of Professor Olav Orheim (Norway). Although the wording of the CEP report indicates the primacy of the CEP in providing advice to the ATCM on environmental issues, the report also make it clear that advice from SCAR would also be valuable. It

was noted that GOSEAC, as a small and expert group selected from a balanced range of scientific and environmental expertise, was well-placed to provide useful advice to SCAR in responding on these issues to the CEP.

The CEP had established two intersessional, open-ended contact groups to study Environmental Impact Assessment (EIA) (see also item 3.4) and the State of the Antarctic Environment Report SAER) (see also item 3.3). A workshop on the protected area system would be held immediately prior to XXIII ATCM, before the next meeting of the CEP (see also item 4.4). The system of open-ended contact groups working intersessionally by e-mail and workshops to be held in conjunction with ATCMs, in addition to the meeting of the CEP held during the ATCM, would currently form the *modus operandi* of the CEP; formal intersessional meetings would not be held because they would require simultaneous translation and would thus be prohibitively expensive.

There was a request that the Delegates to the CEP should have a background in Antarctic science and there was a general expectation that, in due course, the CEP should have a range of competence and expertise to provide a parallel to the Scientific Committee of CCAMLR. In this case, the role of SCAR, as mentioned earlier, could be expected to undergo changes. The Convenor said that GOSEAC should consider how its role might change as a result and should advise the SCAR Executive Committee. A particular point for SCAR to note is that all Working Papers for the CEP need to be submitted 75 days in advance of the meeting at which they are to be tabled. It should also be noted that papers can be submitted in electronic form only. Working Papers for the ATCM need to be submitted only 60 days prior to the ATCM so that it would appear that there will, in future, be two sets of Working and Information papers that will be submitted to each ATCM depending upon their target group at the meeting. Therefore, SCAR should ensure that matters for discussion are correctly and separately addressed.

In the past, SCAR has received some draft IEEs and CEEs for information and comment but there was no requirement for this. There was discussion at the CEP meeting regarding whether or not the CEP has to review all CEEs. A particular concern for SCAR will be the draft CEE for the proposal to drill into the subglacial lake beneath Vostok Station that the Russian Federation announced would be submitted to XXIII ATCM. The Group felt that it was important that SCAR should have the opportunity to see and review the scientific content of CEEs.

The CEP Report requested COMNAP to develop a handbook on monitoring techniques and SCAR has been asked to provide scientific advice on this (see item 6).

The CEP considered the paper submitted by the United States(XXII ATCM/IP 28) proposing that the national Annual Reports to SCAR should be amalgamated with the national Annual Exchanges of Information between the ATCPs. The Report of the CEP (paragraph 56) recommended that this be further considered by XXII ATCM (see items 4.2 and 4.4).

4.2 Matters arising from draft Final Report of XXII ATCM

Paragraph (67) of the Report notes the desirability of the ATCM to receive the advice of the CEPand other sources, including SCAR, on practical aspects of the liability issue. SCAR may be asked to identify the loss of scientific values associated with environmental damage by providing examples of facts and data related to possible impacts.

Appendix 2 of the Report refers to the agenda of Working Group II that includes operational safety, tourism and NGO activities, inspections, and operational, scientific and educational issues. SCAR needs to consider what papers it will table (see items 4.4 and 4.5).

4.3 Matters arising from Working Group on Biology

The Working Group had made a recommendation to XXV SCAR concerning protection of the microbiological and limnological properties of the subglacial Vostok Lake during any proposed drilling operation to sample the lake. This recommendation had been subsumed into a SCAR recommendation (see also items 3.1 and 4.5).

The Working Group recalled earlier SCAR recommendations on the introduction of non-indigenous organisms, especially micro-organisms, into the Antarctic Treaty area and suggested that a paper on this matter could be tabled at XXIII ATCM (see item 4.5).

Communication within SCAR was also discussed and the Working Group suggested that more use be made of the World Wide Web and the SCAR web site, In particular, posting draft management plans for protected areas on the SCAR web site would provide improved opportunities for all SCAR groups to comment on these. The SCAR Secretariat should scan those plans that are not received electronically so that all plans could be made available on the web site. In addition, it was recommended that the *"Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas"* should be published by SCAR to make it generally available to the scientific community. In this respect, GOSEAC noted that the CEP has established a web site and will post there all relevant materials, including draft management plans.

The Working Group planned to hold a workshop prior to the next SCAR Biology Symposium to allow the community to develop new scientific programmes. The Working Group identified research on environmental protection, conservation and management as a priority area.

4.4 Matters arising from SCAR Delegates Meeting

Delegates discussed SCAR communication in general and agreed that the SCAR web site needs to be developed and much greater use made of this facility.

The Delegates also noted the Workshop on Antarctic Protected Areas to be held immediately prior to XXIII ATCM (see item 4.1). SCAR had been invited to be

represented on the Steering Committee that will be chaired by J Valencia. The Executive Committee welcomed this approach and agreed that SCAR should represented. The Steering Committee had already met twice during XXII ATCM to draft a programme and will continue to work intersessionally by electronic mail.

The Delegates also noted the two open-ended contact groups (on Environmental Impact Assessment (EIA) procedures, and on the State of the Antarctic Environment Report (SAER)) of the CEP that plan to work intersessionally by electronic mail before XXIII ATCM (see item 4.1). It was agreed that the SCAR Secretariat should be the SCAR contact point for these two groups and should keep the Executive Committee informed.

4.5 SCAR papers for XXIII ATCM, Lima, Peru, 1999

The SCAR Executive Committee agreed that the SCAR papers to XXIII ATCM should address the following matters.

- SCAR Report to XXIII ATCM
- Highlights of SCAR scientific research
- Programme on Antarctic Pack Ice Seals (APIS)
- Report on the "Symposium on Polar Aspects of Global Change", Tromsø, 1998
- Introduction of non-indigenous organisms to the Antarctic
- Re-introduction of indigenous species to the Antarctic
- Biological prospecting
- Antarctic Data Management (joint with COMNAP)
- Environmental Monitoring in the Antarctic (joint with COMNAP)

The SCAR Secretariat would be inviting contributions from relevant SCAR groups so that the papers could be assembled in time to meet the deadlines for submission to the ATCM and the CEP. GOSEAC will contribute to several of these as appropriate.

5. Commercial exploitation of biological resources

At its last meeting in Concepción, the Working Group on Biology addressed the question of biological prospecting in Antarctica. It was noted that the Antarctic Treaty System had no provision for dealing with commercial exploitation of biological resources and that, recently, collections of Antarctic organisms have been made for pharmaceutical purposes. It was considered very likely that commercial exploitation of biological resources will develop rapidly in the near future.

Some of the problems that may arise from such activities are:

- detrimental effects on Antarctic communities
- lack of regulations for patenting gene sequences of Antarctic organisms for commercial use
- lack of legislation under the Antarctic Treaty System focused on "ownership" or control of commercial exploitation.

GOSEAC noted in this respect that terrestrial biota are protected under the Protocol (Article 3 of Annex III) and that harvesting of marine organisms are protected under CCAMLR. Commercial exploitation of terrestrial organisms appears not to be covered by existing legislation and genetic exploitation of any organism is not included in any ATS legislation.

The Working Group on Biology recommended that SCAR should submit a Working Paper to XXIII ATCM on the implications of biological prospecting in Antarctica.

The Convenor will send the outcome of these discussions to the Chairman of the Working Group on Biology for further consultation.

6. Environmental monitoring

After consideration of the possible research areas, Antarctic-specific problems in monitoring programmes were discussed. One such was the role of environmental officers, appointed by the manager of each national Antarctic programme, in developing monitoring programmes. Many of these officers are not scientists and may have some difficulty in understanding and implementing new monitoring techniques. The role of the environmental officers and their Antarctic Environmental Officers Network (AEON) and its relation to SCAR and GOSEAC was also discussed. P D Clarkson recalled the relationships between SCAR-GOSEAC, COMNAP-AEON, and ATCM–TEWG (now CEP), described in the Report of XXIV SCAR Delegates meeting as follows:

- SCAR-GOSEAC: provision of scientific and technical advice to ATCM
- ATCM–CEP: proposing rules and regulations to ATCM
- COMNAP-AEON: practical implementation of ATCM resolutions and measures.

The Convenor stated the Terms of Reference of AEON:

- exchange of information and ideas about practical and technical environmental issues in Antarctica
- promote the mutual understanding and practical application of the Environmental Protocol
- respond to requests from COMNAP for advice on environmental issues.

J M Acero alluded to the limited responses within AEON as a common problem for the efficient functioning of the network. This may be due partly to communication problems within each country and also to the different roles of environmental officers in each country.

6.1 AEON Technical Handbook for Station Monitoring

The Group discussed a list of potential monitoring variables compiled by AEON from the Report of the SCAR-COMNAP environmental monitoring workshops *(Monitoring of Environmental Impacts from Science and Operations in Antarctica)*. Bearing in mind the requirement of focus, for the first edition of the handbook, on key variables useful to managers for reducing the impacts of Antarctic stations, the meeting recommended that the handbook contain monitoring protocols for the parameters tabulated below (Table 1).

	waste water	soil	marine sediments	snow	freshwater/ sea water
Suspended solids	x				x
BOD	x				x
DO	x				x
pH	x				x
Conductivity	x				x
Nutrients (N, P, Si)	x				x
Temperature	x				x
Coliform bacteria	x				x
Grain size		x	x		
TOC		x	x		
TIC		x	x		
Trace metals		x	x	x	
Hydrocarbons		x	x	x	
PAH		x	x		
Particulates				x	
Phytoplankton					x

Table 1: Parameters for monitoring protocols

A survey of existing data on air monitoring had shown them to be less valuable for decision-making than monitoring variables in waste water, soil, snow and sediments. It was, therefore, not included in this list at this stage.

It was recognized that acceptable methods exist for a much wider range of variables but many of these were seen as a second tier of monitoring, undertaken when the primary measurements had identified a problem

In addition to process measurements, the Group recognized the value of inventory measurements in providing both comparative data between stations and indications of trends in potential impacts on the environment. Chief amongst these were:

- fuel types and consumption
- waste incineration
- records of hydrocarbon spills
- waste water production
- area of station

M C Kennicutt provided the Group with an overview on progress with the NSF Office of Polar Programs contract on environmental monitoring at McMurdo Station. The Group felt that the results of this work would have much wider value than simply one station and would welcome the opportunity to use the final contract reports to develop recommendations of wider applicability to the scientific and logistic communities.

Biological monitoring posed particular problems both for measurement and interpretation. At present, only two measurements, using phytoplankton to identify nutrient enhancement, and coliform bacteria to identify efficiency of sewage treatment are proposed. The Group intended to examine other measurement systems in detail and seek further specialist advice before recommending any other biological protocols for general use.

6.2 Existing research data and activities

The valuable information paper (ATCM XXII/WP54) prepared by AEON had been circulated to members. The group welcomed this as a major step forward in identifying both existing monitoring projects and published sources of data. Only 16 countries from the 27 ATCPs had responded with information and it was known that a substantive amount of information was therefore missing. The group felt the initiative should be further developed and made generally available. Group members from countries which had no entry agreed to provide data to improve the coverage for Brazil, Norway and Poland. M Oehme offered to provide details from his bibliography on air monitoring in the Antarctic while the Convenor offered to implement a search of the US Library of Congress Cold Regions Database to improve the listing. It was agreed that contact would be made with E Waterhouse in New Zealand to offer each assistance and suggest that the enhanced information should be made more widely available by mounting on the Web and providing the necessary metadata entries. The Group wished to develop closer links to the COMNAP Environmental Management Group to ensure scientific assistance and advice can be provided as appropriate.

6.3 Research requirements

6.3.1 Physiological and biochemical monitoring

E S E Fanta tabled a paper summarizing the important effects that human activities in Antarctica might have on the different components of the biota. In the individual, the first effects from a low level of impact are perceived

at the cellular level and can be monitored by biochemical and molecular biological techniques. The consequences are physiological and a great variety of measurements can be made to characterize them. They are also manifested by changes in the behaviour of the organisms, another aspect that can be monitored. The effects can be lethal, sub-lethal or chronic, and can have consequences at population or ecological levels.

There is a high level of individual and species specific variation in the sensibility to the impact and the type and intensity of the reaction. Therefore, the normality of the organisms under consideration must be known. Taking all these factors into consideration, the following monitoring techniques can be suggested:

- biochemical monitoring through enzyme activity and blood analysis;
- physiological monitoring by respiratory metabolism and heart rate;
- behavioural monitoring by movement, colour, posture, aggressiveness, feeding, and others;

The aspect to be monitored will depend on the interaction under consideration. Biochemical and behavioural monitoring are recommended and standard techniques are available for most of the organisms. Bioassays and tests under controlled laboratory conditions should be recommended where possible.

The main goals of bio-monitoring were considered to be: minimizing the impact of anthropogenic activities on the biosphere; and obtaining important information to allow improvement of environmental management. The group agreed that future research should be directed towards the establishment of baselines and the detection of early biological changes at low levels of pollutants. It is now more than 2 years since the report *(Monitoring of Environmental Impacts from Science and Operations in Antarctica)* of the environmental monitoring workshops was published and during this time, a substantial amount of new knowledge has become available. Therefore, it was decided to request EASIZ, the Group of Specialists on Seals and the Subcommittee on Bird Biology to update and, if possible, to complete the matrices on biological monitoring methodologies summarized in table 9.1 of the report. The need for a selection of species useful for monitoring was emphasized and, in this respect, benthic systems were considered to be more useful than pelagic ones.

6.3.2 Monitoring responses of birds and seals to disturbance

J Valencia reported on two aspects of human intervention in the Antarctic environment:

1. the responses of birds and seals to human intervention and
2. what are the possibilities to monitor the changes introduced by that intervention.

Human disturbances on birds and seals can occur at the level of individuals, populations or metapopulations. They can occur for a short term, long term or be permanent. The main problem is that human activities during the Antarctic summer often take place at those sites that are used by birds and seals for breeding, and during the reproductive season.

The literature is scarce and contradictory on the results about human interference in penguin colonies. Results are conflicting as penguin populations have increased in some places close to stations while in other areas that are undisturbed they have decreased. Many times it seems that penguins and seals have become habituated to visitors.

One can conclude that there are certainly different stressors of the environment that can cause natural fluctuations in the population as consequence of food availability, climatic factors or ice cover. In different stages of development the vulnerability to environmental stressors or to human interference varies and different species of birds have different susceptibilities and reactions to human proximity or actions and that generalizations cannot be made on the basis of existing data.

Less information is available in the literature about human interference on the six species of seals that occur in Antarctica. Increase in the heart rate, respiration rate, changes in the body temperature and pup abandonment have been reported.

Discussions also took place about the significance of helicopter over-flights on bird colonies, the altitude, the noise and the type of aircraft, about mortality caused by egg cooling versus increase of predation of the eggs by skuas when the parents leave the nest. The Group will enquire of the Subcommittee on Bird Biology what data are available on egg cooling and loss of vitality.

It was concluded that: birds and seals are not adequate indicators for monitoring purposes as variability in the reactions to human presence is high;

- more research is needed as there is not enough information available about the natural fluctuation in the populations of birds and seals;
- breeding success alone is not a reliable indicator;
- even considering the long-term monitoring done by CEMP, more research on the different species of birds and seals populations should be encouraged;
- based on limited available scientific data, the code of conduct of visitors should be revised on a precautionary basis;

6.3.3 Monitoring organic and inorganic pollutants

M C Kennicutt distributed a paper entitled *"Research in support of improved monitoring techniques: chemical contamination"* and summarized three research areas related to the monitoring of chemical contamination in general. The first area is the development of simple cost-effective techniques of initial screening, which are semi-quantitative or quantitative in nature. Initial screening is quite useful to decide whether further high-cost analyses, such as gas-chromatography, are warranted. Simple and cost-effective immuno-assay techniques for organic contaminants are commercially available. The second area

is a requirement for continuous or near-continuous measurements. Buoys and moorings are routinely used in the oceanographic field to measure relevant environmental variables. New sensors that are more applicable to monitoring need to be developed. The third area is to develop a better understanding of the linkages between levels of contaminants and the consequent biological effects.

6.4 Inventories of past activities

The Convenor drew attention to Article 8.3 of Annex III of the Protocol (on Waste Disposal and Management) which states:

3. *Each such Party shall, as far as is practicable, also prepare an inventory of locations of past activities (such as traverses, field depots, field bases, crashed aircraft) before the information is lost, so that such locations can be taken into account in planning future scientific programmes (such as snow chemistry, pollutants in lichens or ice core drilling).*

It was observed that to gain any value from this activity, the information gathered would need to be disseminated beyond national programmes. It was agreed that SCAR should be asked to discuss with COMNAP:

a. progress on efforts to prepare national inventories:
b. means for making the information available to the scientific community.

7. Environmental impact of visitors

7.1 Codes of conduct

There is limited agreement among the different codes of conduct issued by various organizations that attempt to provide guidelines for visitor behaviour in Antarctica.

Although Antarctic ornithologists have given some indications of minimum distances which should be used for approaching some bird species (mainly Adélie penguins), the Antarctic Treaty Recommendation (XVIII-1) is more general and could be interpreted by visitors in different ways. Differences due to species-specific behaviour or breeding patterns were not reflected in current codes.

Two new papers by Melissa Giese were tabled concerning visitor impacts on Adélie penguins. Her recommendations, based on physiological measurements, were for 30 m for a precautionary approach distance to Adélie penguin breeding groups to avoid disturbance.

One problem noted by the Group is that most of the existing literature concerns Adélie penguins, and the data do not even show coherence between different colonies for this species. The Group noted that there is not sufficient scientific evidence to establish a generic code of conduct for people approaching birds in Antarctica. It was also noted that there could be merit in avoiding visits to the bird colonies during breeding periods. It was suggested that the most sensitive breeding periods should be identified by the SCAR Subcommittee on Bird Biology Meanwhile, a precautionary proposal was to keep 30 m distant from bird colonies because there is some agreement in this respect in most of the published literature on penguins.

For helicopter over-flights of bird colonies in the Antarctic, the CEMP had proposed a lower limit of 800 m. However, it seemed difficult to make generalizations because different helicopter types and different environmental conditions produce different effects. The Group agreed to seek advice from the SCAR subcommittee on Bird Biology.

The Convenor tabled the United States "Code of Conduct for the McMurdo Dry Valleys" and the Group agreed that it provided a good example of management of scientific field activities for this area. The Group considered that there could be a strong case for a SCAR code of conduct for field work. The Group also considered that the model management programme presented by Dr Snyder at the First Antarctic Environmental Management in Denver, USA, 1998 was a useful initiative in the field of tourist management.

7.2 Cumulative impacts

It was noted that the only meeting on this matter in the Antarctic was that held by IUCN in 1996.

It was considered that, in order to evaluate the possible cumulative impacts at any site, all visits to the site need to be considered as a single activity to be evaluated in the EIA process, but there is at present no mechanism to ensure this.

The Group suggested that the management plan for the Brazil–Poland ASMA in Admiralty Bay, King George Island, could be used to evaluate cumulative impacts as a pilot study. E S E Fanta agreed to take this further.

8. Report from the Hobart Workshop on the Introduction of Diseases to Antarctic Wildlife

At XXII ATCM in Tromsø, the Australian Delegation announced its intention to host a workshop on "Diseases of Antarctic Wildlife". This was held in Hobart, Tasmania, 25–28 August 1998. The intention of the Workshop was to develop a report and to transmit recommendations to XXIII ATCM. The full report of the Workshop was not available and thus the Group was not able to form an opinion on the reliability of the data used by the Workshop. However, a poster summarizing the Workshop conclusions was tabled for the Group. The Group considered that the natural pathways of introduction of diseases to Antarctic wildlife are probably underestimated and that the workshop over-emphasized anthropogenic introductions. The risk of such introductions was considered to be low, especially in the context of documented historical introductions. Most recommendations of this workshop related to prevention, response and monitoring, and these were considered to be excessive in the light of the perceived risk.

The Group considered that, as with most preventive approaches; "zero tolerance" is not warranted and is considered to be unattainable. Prevention measures such as quarantine and "gateway state" assumption of responsibility were judged to be extreme. More realistic preventative measures were considered to be covered by existing Treaty and Protocol requirements. In the workshop conclusions, various responses were proposed both prior to and during a postulated mortality event. The proposed response activities were judged to be excessive at this stage and would entail commitment of significant resources that would not be commensurate with the known risks. It was also considered that the response mechanisms were not in agreement with conservation of wildlife practices and the known intensity of human presence. Proposed monitoring activities were also considered to be excessive in the light of the perceived risk and to entail a significant commitment of resources. Identification of indigenous or natural infestations were believed to have been underestimated.

Investigation of causes of mass mortalities was encouraged and would aid in providing more compelling information related to the risks associated with possible anthropogenic introductions of diseases. It is also clear that these recommendations have wide-ranging implications for all scientific activities in Antarctica, well beyond just biology, that need to be considered. The Convenor will provide a more detailed report, listing the various concerns, for consideration by the SCAR Working Group on Biology.

9. Protected and Managed Areas

9.1 Protected Areas Workshops at XXII ATCM and XXIII ATCM

The Report of the Tromsø Workshop (XXII ATCM/WP26) was tabled together with the SCAR paper "Developing the Protected Area System in Antarctica" (XXII ATCM/WP27). The Convenor reported that comments from various sources suggested that the outcome from this workshop was not entirely satisfactory. Therefore GOSEAC should look critically at this issue and, at the same time, if possible provide advice to the SCAR Executive Committee on the organization and structure of the Protected Areas Workshop to be held at XXIII ATCM in Lima. J Valencia reported on two preparatory meetings for that workshop and tabled the presently planned structure, themes and suggested keynote speakers for that workshop. A further paper was tabled by J M Acero listing existing SPAs and SSSIs against requirements laid down in Annex V - Article 3, as a useful working document.

After thorough discussion the following points can be summarized

- GAP analysis is not necessarily the best possible tool to help in the development of the Protected Area system, because identifying Protected Areas mechanistically (filling gaps) may not result in scientifically adequate system; it was noted that the Working Group on biology had suggested more sophisticated analytical tools for this.
- The terms of reference for the Lima Workshop offer opportunities to highlight the present Protected Area system and show inconsistencies with the objectives laid down in Annex V. However it may be difficult for the appropriate experts to attend this workshop in the absence of adequate funding; it was proposed that SCAR should approach the CEP Chairman to consider this problem.
- There is a marked difference in objectives between SPAs and SSSIs which confuses their amalgamation into a single category. Whereas SPAs were designated primarily for their conservation values, SSSIs were designated to protect one or more special scientific values. Since Annex V does not make such a distinction except in the management plan, the present approach to rationalizing the system appears to favour only the conservation aspect.
- The Working Group on Glaciology does not envisage the possibility of designating a site for its outstanding glaciological features because of their inherently transient nature.
- The Working Group on Geology does not believe that there is a need to create ASPAs for geological reasons except in areas where fossiliferous outcrops, which may be at risk, can be policed.
- Classification schemes and management schemes should be put in-line with existing definitions for protected areas elsewhere.
- Papers need to be developed to address the failures of matrix management as a useful conservation tool, the lack of criteria for identifying the conservation value of a site and the relative weightings to be attached to different criteria when assessing site importance.

It was further agreed that the Convenor would develop some of the ideas raised during discussion and will circulate this to members of GOSEAC for comment. The outcome will be presented to SCAR Executive Committee.

9.2 Revision of existing SSSI and SPA management plans

9.2.1 Guide for the preparation of Management Plans for ASPAs

XXII ATCM/WP5 was tabled for information (see also item 4.3).

9.2.2 Svarthamaren SSSI 23

The draft management plan was tabled and the Convenor noted that this had already been seen by the Working Group on Biology. This had resulted in some proposals for changes that were discussed and further developed. Specifically it was noted that

- Map C is not on a large enough scale to utilize effectively in the field, nor does it show clearly the distribution of bird colonies;
- Elevations need to be put on the maps;
- Boundaries should be reconfigured to follow natural features such that the nunatak minus the area of the field hut be designated as the Protected Area and that maps and relevant wordings in Section 6 be adapted accordingly.

The Convenor will bring these and a range of other scientific points to the attention of the proponents.

A discussion ensued about the necessity for the prohibition of the introduction of poultry products. In particular the scientific basis for that restriction is in question. The origins of this need closer examination in the light of the current understanding of wildlife diseases.

9.3 RAPAL Meeting on "associated and dependent ecosystems"

A document was tabled by J Valencia who reported on this meeting organized by South American COMNAP members at Concepción. It was deemed a timely and important meeting. A full report will be available. Both scientific and legal aspects were discussed in plenary and in working groups. From a scientific point of view there is a difficult problem because, according to ecological theory, ecosystems are dimensionless in time and space and dependencies and associations cannot be defined. Questions of management must therefore be purely legalistic and questions such as management of activities within legally defined areas and their linkages to the outside (ie national areas vs international areas) must be solved through international laws or rules.

Defining Codes of Conduct may be the way forward. E S E Fanta reported on a booklet produced by CCAMLR which explains, in simple layman's language, mitigation procedures for longline fishing. This has been translated in various languages and is used for educating fishermen. It will be effective at least in Brazilian waters. The Group was reminded that CCAMLR has an extensive monitoring programme on associated and dependent species.

This general question will need further discussion between scientists and legal experts to develop future solutions.

9.4 Report on the operation of the Admiralty Bay ASMA

E S E Fanta tabled a paper on the implementation of the Admiralty Bay management in which she reported on the management and inspection activities carried out by the Brazilian programme, which at present is the responsible agency for management. Overall the management plans seem to be working well although areas for improvement were identified. In particular, the need for adequate information and education of every Party operating in the Area was recognized in order to ensure compliance with the established Code of Conduct. Brazil has attempted, together with Peru, to elaborate a document pointing to improvement of the Area's management.

The Group felt this to be an excellent example of good management practice and commended Brazil for its positive role. It seems important that such activities be summarized in information papers to the Treaty in order to ensure future plans for Managed Areas are based on best practice.

9.5 Management plans for subantarctic islands

The Convenor reported that Management Plan for South Georgia will be ready in Spring 1999 and a Management Plan for Iles Kerguelen has been prepared but is not yet available.

10. Reports

10.1 Relevant SCAR groups

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

All the SCAR Working Groups, except the Working Group on Glaciology, met at XXV SCAR, together with the Group of Specialists on Seals. The Working Group on Glaciology met in Lanzhou, China, during September 1998, and the Group of Specialists on Global Change and the Antarctic (GLOCHANT) met in Cambridge, United Kingdom, during April 1998.

Matters raised by the Working Group on Biology are discussed at item 4.3.

The Working Group on Geodesy and Geographic Information have three on-going projects of universal interest:

a. the Antarctic Digital Database (ADD) that provides a digital topographic map of the Antarctic and associated information is being revised and will be published on the World Wide Web;
b. the SCAR Gazetteer of Antarctic Place-Names was distributed in its first edition at XXV SCAR and is available on the World Wide Web. A second, annotated edition is being prepared.
c. the SCAR Catalogue of Antarctic Maps and Charts is being revised and a new edition is planned for presentation at XXVI SCAR.

The Working Group on Geology re-instated its recommendation (SCAR XXIV-6) that management plans for protected areas with specific geological interest should include a geological map as appropriate.

10.2 CCAMLR

A report on CCAMLR XVI was tabled by E S E Fanta.

Of particular concern to CCAMLR is the fact that illegal fishing may be depleting stocks of particular species to such a level that recovery may become impossible. In particular the total catches of Patagonian toothfish of 130,000 tons are more than 10 times the maximum sustainable yield.

Much emphasis is put on the question of marine debris and monitoring studies are continuing on this matter under CCAMLR auspices.

Krill census is continuing as well as CEMP site monitoring

In general GOSEAC activities are well-received at CCAMLR and in the areas of overlap good coordination and cooperation is achieved. The CCAMLR group on Ecosystem Monitoring and Management is interested in closer ties between the groups.

11. Any other business

E S E Fanta reported that a Workshop on Evolutionary Biology of Antarctic Organisms will be held in Curitiba, Brazil, 11–15 May 1999 to discuss the state of the art in adaptation, gene flow, evolution, biodiversity and new techniques, in order to establish trends and requirements of groups within SCAR and CCAMLR. This is brought to the attention of GOSEAC because it will discuss matters on biodiversity, gene flow and population distributions that are considered for monitoring and conservation purposes and for the development of integrated programmes.

J Valencia reported on an International Symposium on Antarctic and Arctic issues to be held in Punta Arenas, Chile, 1–5 November 1998. This symposium is organized with the collaboration of Chile and Canada. The programme covers a wide range of topics and is geared to make comparisons between and to draw on experience from both polar regions.

A workshop has been held in the Czech Republic to prepare for an engagement in the Antarctic and to define a research program. A wide range of scientific research is envisaged from studies of the periglacial environment to terrestrial ecology from a small field station alongside Lions Rump. It is expected that field activity will begin in November 1998.

12. Time and Place of Next Meeting

The Convenor noted that there is no fixed venue yet for the meeting. He is looking into various possibilities. The time frame should be around the middle of July 1999 in order to fit other schedules.

GOSEAC Recommendations to the SCAR Executive Committee

GOSEAC *recommends*:

1. That a microbiologist is supported by SCAR to attend all Vostok Lake workshops.
2. That a SCAR paper is prepared for XXII ATCM dealing with introduced organisms in general and the recommendations from the Hobart Workshop on diseases in particular.
3. That the Executive considers the potential scientific value of a State of the Antarctic Environment report.
4. That SCAR continues to contribute to discussions on the development of Environmental Impact Assessment.
5. That SCAR should review the scientific content of CEEs whenever they are reviewed by the CEP.
6. That GOSEAC prepares a draft working paper for SCAR on Environmental Monitoring for agreement with COMNAP.
7. That the Executive Secretary pass the recommendations on monitoring variables to AEON for inclusion in the Technical Handbook for Station Monitoring.
8. That SCAR discuss with COMNAP how details of national inventories of previous activities could be made available to the scientific community.
9. That SCAR Executive consider if it would be advantageous to draw up a Code of Conduct for Scientific Research in Antarctica.
10. That SCAR forward to the Norwegian National Committee on Polar Research the comments from the Working Group on Biology and GOSEAC on the revised management plan for SSSI no 23, Svarthamaren, Mühlig-Hofmannfjella, Dronning Maud Land.

In addition it was agreed that two other items would be prepared for the SCAR Executive:

1. A revised Terms of Reference for GOSEAC together with a critical review of outputs and their value over the past 10 years.
2. Recommendations on possible SCAR contributions to the Protected Areas Workshop in Lima immediately prior to XXIII ATCM.

Appendix 1

Agenda

1. **Adoption of Agenda and appointment of Rapporteurs**
2. **Membership of the Group and the future role of GOSEAC**
3. **Matters arising from GOSEAC IX**
   - *3.1 Vostok Lake*
   - *3.2 Introduced biota*
   - *3.3 State of the Antarctic Environment Report*
   - *3.4 Environmental Impact Assessment*
4. **Report on XXII ATCM and XXV SCAR**
   - *4.1 CEP Report*
   - *4.2 Matters arising from draft Final Report of XXII ATCM*
   - *4.3 Matters arising from Working Group on Biology*
   - *4.4 Matters arising from SCAR Delegates Meeting*
   - *4.5 SCAR papers for XXIII ATCM, Lima, 1999*
5. **Commercial exploitation of biological resources**
6. **Environmental monitoring**
   - *6.1 AEON Technical Handbook for Station Monitoring*
   - *6.2 Existing research data and activities*
   - *6.3 Research requirements*
     - 6.3.1 Physiological and biochemical monitoring
     - 6.3.2 Monitoring responses of birds and seals to disturbance
     - 6.3.3 Monitoring organic and inorganic pollutants
   - *6.4 Inventories of past activities*
7. **Environmental impact of visitors**
   - *7.1 Codes of conduct*
   - *7.2 Cumulative impacts*
8. **Report from the Hobart Workshop on the Introduction of Diseases to Antarctic Wildlife**
9. **Protected and Managed Areas**
   - *9.1 Protected Areas Workshops at XXII ATCM and XXIII ATCM*
   - *9.2 Revision of existing SSSI and SPA management plans*
     - 9.2.1 Guide for the preparation of Management Plans for ASPAs
     - 9.2.2 Svarthamaren SSSI 23
   - *9.3 RAPAL Meeting on "associated and dependent ecosystems"*
   - *9.4 Report on the operation of the Admiralty Bay ASMA*
   - *9.5 Management plans for subantarctic islands*
10. **Reports**
    - *10.1 Relevant SCAR groups*
    - *10.2 CCAMLR*
11. **Any other business**
12. **Time and Place of Next Meeting**

Appendix 2

Address List of Participants at GOSEAC X

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Mrs Evelyne Gerber, Swiss Federal Department of Foreign Affairs, attended the session on Tuesday morning, 22 September 1998.

Appendix 3

List of Acronyms and Abbreviations

ADD	Antarctic Digital Database
AEON	Antarctic Environmental Officers Network
APIS	Antarctic Pack-Ice Seals Programme
ASMA	Antarctic Specially Managed Area
ASPA	Antarctic Specially Protected Area
ATCM	Antarctic Treaty Consultative Meeting
ATCP	Antarctic Treaty Consultative Party
ATS	Antarctic Treaty System
BOD	Biological Oxygen Demand
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEE	Comprehensive Environmental Evaluation
CEP	Committee on Environmental Protection
COMNAP	Council of Managers of National Antarctic Programmes
DO	Dissolved Oxygen
EASIZ	Ecology of the Antarctic Sea-Ice Zone
EIA	Environmental Impact Assessment
GAP	Gap Analysis Procedure
GLOCHANT	Group of Specialists on Global Change and the Antarctic
GOSEAC	Group of Specialists on Environmental Affairs and Conservation
IEE	Initial Environmental Evaluation
IP	Information Paper
IUCN	International Union for the Conservation of Nature (World Conservation Union)
N	Nitrate
NADC	National Antarctic Data Centre
NASA	National Aeronautical and Space Administration
NGO	Non-Governmental Organization
NSF	National Science Foundation
P	Phosphate
PAH	Poly-Aromatic Hydrocarbons
pH	Hydrogen potential (acidity)
RAPAL	Reunión de Administradores de Programas Antárticos Latinamericanos
SAER	State of the Antarctic Environment Report
SCAR	Scientific Committee on Antarctic Research
Si	Silicate
SPA	Specially Protected Area
SSSI	Site of Special Scientific Interest
TEWG	Transitional Environmental Working Group
TIC	Total Inorganic Carbon
TOC	Total Organic Carbon
US	United States of America
WP	Working Paper

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.

SCAR Bulletin

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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Polar Record appears in January, April, July, and October each year. The Editor welcomes articles, notes and reviews of contemporary or historic interest covering the natural sciences, social sciences and humanities in polar and sub-polar regions. Recent topics have included archaeology, biogeography, botany, ecology, geography, geology, glaciology, international law, medicine, human physiology, politics, pollution chemistry, psychology, and zoology.

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