

Environmental Risk Assessment and Environmental Code of Conduct for Antarctic Protected Areas

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Abstract

Antarctica is well known for its valuable reserves and various ongoing important scientific activities. At one side where the Antarctic environment governs the southern hemisphere's weather pattern, other side it is considered as datum for environmental pollution comparison. In Antarctica various places are very important due to its scientific activities and other values and they need special protection. Article 3 of Annex V of the Protocol on environmental protection to the Antarctica Treaty is designated for Antarctic Specially Protected Areas (ASPAs) and article 4 of Annex V is designated for Antarctic Specially Managed Areas (ASMA). Recently during the XXVI ATCM India has submitted two proposals for HSM and one for ASPA. Protected areas provide higher level of protection for specific values. A study is conducted by Wildlife Institute of India during the XVI Indian Antarctic Scientific Expedition to Antarctica (IASE) about the birds and mammals at Princes Astrid coast near Dakshin Gangotri station. Density of seals and penguins along the Princes Astrid coast between 10° to 13° E longitudes were recorded. This area may be proposed to be designated as ASPA. The environmental risk assessment of protected area is an integral part of the study which includes human activities and impacts, natural process and natural variability and viability, urgency and scientific uncertainty. Environmental code of conduct is essential part of environmental risk assessment study which includes the study of material, energy, oil spill and waste, fuel and chemicals etc. Various tools are applied to the proposal to designate the area as ASPA or HSM and the final stage in designation process involves formal consideration (review) by the ATCM, SCAR and CEP.

Keywords

Antarctic Environment

Introduction

Activities in Antarctica are governed by the Antarctic Treaty of 1961, which applies to the area south of 60 degree South latitude, including all ice shelves. The concept of setting aside areas for special protection was introduced in 1964 when the Antarctic Treaty Consultative Parties (ATCP's) adopted the agreed measures for the conservation of Antarctic Flora and Fauna. Under these and subsequent measures five categories of protected areas were established (CPMNAP and ATCM (2000), Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas):

- Specially Protected Areas (SPAs)
- Sites of Special Scientific Interest (SSSIs)
- Historic Sites and Monuments (HSMs)
- Specially Reserved Areas (SRAs)
- Multiple use Planning Areas (MPAs)

In 1991, the ATCPs adopted the "Protocol on Environmental Protection to the Antarctic Treaty" to ensure comprehensive environmental protection in Antarctica. The Protocol designates the whole of Antarctica as a natural reserve devoted to peace and science. ATCM-XVI introduces two new site designations: Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). On entry into force of Annex V, all SPAs and SSSIs will become ASPAs (CPMNAP and ATCM (2000), Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas).

Annex V of Protocol on Environmental Protection to the Antarctic Treaty

Area Protection and Management

Article 3: Antarctic Specially Protected Areas (Protocol on Environmental Protection to the Antarctic Treaty (1991) Final Report of the Eleventh Antarctic Treaty Special Consultative Meeting)

1. Any area, including any marine area, may be designated as an Antarctic Specially Protected Area to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research.
2. Parties shall seek to identify, within a systematic environmental-geographical framework, and to include in the series of Antarctic Specially

Protected Areas:

- (a) areas kept inviolate from human interferences that future comparisons may be possible with localities that have been affected by human activities;
- (b) representative examples of major terrestrial, including glacial and aquatic, ecosystems and marine ecosystems;
- (c) areas with important or unusual assemblages of species, including major colonies of breeding native birds or mammals;
- (d) the type locality or only known habitat of any species;
- (e) areas of particular interest to on-going or planned scientific research;
- (f) examples of outstanding geological, glaciological or geomorphologic features;
- (g) areas of outstanding aesthetic and wilderness value;
- (h) sites or monuments or recognized historic value; and
- (l) such other areas as may be appropriate to protect the values set out in paragraph 1 above.

3. Specially Protected Areas and Sites of Special Scientific Interest designated as such by past Antarctic Treaty consultative Meetings are hereby designated as Antarctic Specially Protected Areas and shall be renamed and renumbered accordingly.
4. Entry into an Antarctic Specially Protected Area shall be prohibited except in accordance with a permit issued under Article 7.

Article 4: Antarctic Specially Managed Areas (Protocol on Environmental Protection to the Antarctic Treaty (1991), Final Report of the Eleventh Antarctic Treaty Special Consultative Meeting)

1. Any area, including any marine area, where activities are being conducted or may in the future be conducted, may be designated as an Antarctic Specially Managed Area to assist in the planning and co-ordination of activities, avoid possible conflicts, improve co-operation between Parties or minimize environmental impacts.
2. Antarctic Specially Managed Areas may include:
 - (a) areas where activities pose risks of mutual interference or cumulative environmental impacts; and

(b) sites or monuments of recognized historic value.

3. Entry into an Antarctic Specially Managed Area shall not require a permit.
4. Notwithstanding paragraph. 3 above, an Antarctic Specially Managed Area may contain one or more Antarctic Specially Protected Areas, entry into which shall be prohibited except in accordance with a permit issued under Article 7.

Article 5: Management Plans (Protocol on Environmental Protection to the Antarctic Treaty (1991), Final Report of the Eleventh Antarctic Treaty Special Consultative Meeting)

1. Any Party, the Committee, the Scientific Committee for Antarctic Research or the Commission for the Conservation of Antarctic Marine Living Resources may propose an area for designation as an Antarctic Specially Protected Area or an Antarctic Specially Managed Area by submitting a proposed Management Plan to the Antarctic Treaty Consultative Meeting.
2. The area proposed for designation shall be of sufficient size to protect the values for which the special protection or management is required.
3. Proposed Management Plans shall include, as appropriate.

Environmental Risk Assessment

Antarctica is often thought of as a pristine land untouched by human disturbance. Unfortunately this is no longer the case. For little more than a hundred years people have been traveling to Antarctica and in that short time most parts have been visited and we have left more than just footprints. More recently attitudes have changed as we begin to realize that there are few unvisited places left on earth and that they of enormous value to humanity. The clean air, water and ice of Antarctica are now of global importance to science for understanding how the Earth's environment is changing both naturally and as a result of human activity. Tourist operators are beginning to tap the huge demand to visit the last great wilderness on Earth. Paradoxically both science and tourism have the potential to damage the very qualities that draw them to Antarctica.

To designate any area as ASPA or HSM a clear understanding is needed of the value to be protected (CPMNAP and ATCM (2000), Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas). Site should be checked for its: environmental values, scientific values, historic

values, aesthetic values and wilderness values. In checking of the environmental values it is to be verified whether area contain physical, chemical or biological features e.g. glaciers, fresh water lakes, melt pools, rock outcrops, plant life or animal life that are particularly unique or representative components of the Antarctic environment.

An environmental risk assessment is required to assess whether the designated area bear the merits of its special characteristics and is there any threats and risks to the area containing the outstanding values.

Environmental risk assessment can be assessed by considering the following study (CPMNAP and ATCM (2000), Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas):

Human Activities and Impacts

It should be assess whether the area is affected by human activities either regularly, infrequently or it was never carried out in the area. Biological or aboitic components or processes of the area should be checked whether it is vulnerable to any existing or likely future human activities in the area. The impact is directly, indirectly or cumulative impact over the temporal and special scale should be assessed. And if there is any disturbance occurs how much time dies it take to return to pre-disturbance or equilibrium levels.

Natural processes

It is important to study whether the natural process like atmosphere, climate, marine, biological and glacial likely to modify the area or its original

Natural variability and viability

It is required to study the short and long term variations or seasonal changes in the population of biota present in the area. Any human impact if there exists so it should also be seen whether the resultant is smaller or larger than the impact due to natural process. There are also the chances that the area may be protected by its own natural capabilities from the outside disturbance and if it is so up to what extent it can be protected.

Non Antarctic Threats

It is very important to study whether the designated area is going to be affected by the threats, which are not in Antarctica and far away like global changes, ozone depletion or long-range transport of contaminants such as long lived chemical pollutants and alien species.

Urgency

Human activity may pose imminent environmental risks sometimes, which needs special attention and should be protected urgently

Scientific uncertainty

There may be uncertainty to know about the impacts on the area by the human or natural phenomenon, if it is not known the possible impacts by the various means than it should be assess also that whether these uncertainties mask significant threats to the area and its value.

India's Involvement in ASPA and HSM

At present India have proposed one site to be designated for AS PA and two sites for HSM in Antarctica. Proposal was presented during the XXVI ATCM held at Madrid, Spain. One HSM has already been awarded its H S M no by the CEP and rest is awaited.

- a. *Historic Site and Monument -HSM- 44 (A Plaque Erected At "Dakshin Gangotri (ATCMXVI (2003), Review Of The Historic Site And Monument -HSM- 44 (A Plaque Erected At "Dakshin Gangotri" Station) - This site is regarding the India's first permanent scientific research station "Dakshin Gangotri", which was built during the third IASE in 1983. Later it got buried under the snow due to snow accumulation and structural heat emission. As this was the First signature of the India on the Antarctica land so it has its own historic value and it is felt necessary to protect the site for its historic values.*
- b. *Site Recommended for Inclusion in the List of Historical Sites and Monuments in Antarctica (ATCMXVI (2003), Site Recommended For Inclusion In The List Of Historical Sites And Monuments In Antarctica) - During the IX- IASE (summer) three scientists from the Geological Survey of India and an officer from the Indian Navy sacrificed there lives in pursuance of the science in Antarctica at India Point, Humboldt Mountains, Wohlthat Massif in Central Droning Maud land. This site is requested to be designated as HSM.*
- c. *Antarctic Protected Areas System "Dakshin Gangotri Glacier, Droning Maud Land"(ATCMXVI (2003), Antarctic ProtectedAreas System Proposed Management Plan For Dakshin Gangotri Glacier, Droning Maud Land, Antarctic Specially Protected Area) - With the availability of this vast amount of data for the past two decades, it has become a valuable site for*

observing the changes in the movement of the Antarctic ice sheet under the impact of global warming. The area has primary scientific importance for glaciologists and environmental scientists. Due to the scientific values of the proposed Area and the nature of the research, the area is protected as an Antarctic Specially Protected Area consistent with Articles 2, 3, 5 and 6 of Annex V of the Protocol on Environmental Protection to the Antarctic Treaty; to prevent interference with ongoing planned scientific investigations.

Future Proposal for SPA

A study is conducted by Wildlife Institute of India (Scientific Report, Sixteenth Expedition to Antarctica-Technical (2000) Publication No 14, Department of Ocean Development, New Delhi) during the XVI- IASE about the birds and mammals at Princes Astrid coast near Dakshin Gangotri station. Density of seals and penguins along the Princes Astrid coast between 10° to 13° E longitudes were recorded. This area is proposed to be designated as ASPA to protect against its biological value.

Environmental Code of Conduct

Environmental Code of Conduct is intended to provide general guidelines to help minimize environmental impacts when traveling, camping and working in the field. The measures in Code of Conduct should not apply in case of emergency. All activities undertaken in Antarctica are required to undergo an environmental impact assessment and must comply with management plans for protected areas where such plans are in place (SCAR AND COMNAP (1996), Monitoring of environmental impacts from science and operation in Antarctica). India has an obligation under Protocol on Environmental Protection to the Antarctica Treaty to protect the Antarctic environment. Major activities take place in the immediate vicinity of the major research stations and are governed by station management plans, it is necessary to ensure that field activities are also undertaken in an appropriate manner. The actions of individuals can contribute significantly to protecting the Antarctic environment. *Environmental Code of Conduct* provide actions to be consider to minimize environmental impacts when traveling, camping and working in the field of proposed ASPA and HSM.

General and Waste Management

- The Antarctic environment is highly susceptible to the impacts of human activities, and has much less natural ability to recover from disturbance when undertaking activities in the field.

- The collection and coordination of relevant information facilitates effective environmental management, science and support operations, to assist in this process, accurately record the custodian, location (preferably by GPS) and usage details of all field activities (such as sample sites, field camps, depots, oil spills, markers, equipment etc.) for management database.
- All supplies and equipment taken into the field must be removed, except where a permit provides otherwise. All wastes produced in the field, other than human wastes and grey water, must be returned to the station or ship providing support. Human wastes and grey water should also be returned to the station or ship providing support, to the greatest extent possible, and must not be disposed of in ice-free areas or ice/snow-covered areas with flow lines terminating in ice-free areas.
- Avoid the use or dispersal of foreign materials that are difficult to collect and remove. Strip down excess packaging before going off-station, to minimize waste taken into the field.
- The collection or disturbance of any biological or geological specimen or man-made articles may only be undertaken with prior approval and, if required, in accordance with a permit

Fueling, Vehicle Movement and Travel in the Area

- Some biological communities and geological formations are especially fragile, even when concealed by snow; one should be alert and avoid such features when traveling to and between field locations.
- Vehicle and helicopter usage should be restricted to essential tasks to minimize: atmospheric emissions; track formation, physical disturbance of the land surface or biological communities; wildlife disturbance; and the potential for fuel spills. When vehicle use is essential, access should be restricted to areas with permanent ice/snow and designated ice-free routes.
- Fuel spills are difficult to clean up, and take many years to dissipate. Vehicles and other equipment should be fully fuelled on station before departure, to reduce the need for refueling in the field. Refueling or changing oil in windy conditions or in areas that might direct accidental spillage into lakes, vegetation or other sensitive areas, should be avoided.
- One should always use fuel cans with nozzles/funnels and an absorbent spill pad/drip tray.
- When traveling on foot, one should use established tracks and designated

crossing points wherever possible. Where such tracks do not exist, take the most direct route that avoids vegetated areas and delicate geological formations such as, sediments, streambeds and lake margins; these features have taken many thousands of years to form and may also be of major scientific importance.

- One should be extremely cautious not to *feed* the wildlife. When around wildlife be quiet, move slowly, stay low to the ground and adhere to the minimum approach distances, unless authorized by a permit

Field Camps

- Existing field huts and campsites should be used where possible. Otherwise, campsites should be located as far away as practicable from lakeshores, streambeds, vegetated sites and wildlife, to avoid contamination and/or disturbance.
- Maximize the use of fixed helicopter pads so that a minimal area is disturbed, and to allow the landing site to be cleaned up when the camp is removed.
- Ensure that equipment and stores are properly secured at all times to prevent foraging by wildlife and dispersion by high winds or helicopter rotor wash.
- Use water wisely to minimize the volume of liquid to be returned to station.
- Solar or wind powered generators should be utilized wherever possible to minimize fuel usage

Fieldwork

- It is essential that *all* clothing and equipment is meticulously cleaned *before* being brought to Antarctica and *before* moving between sampling locations, to prevent contamination, cross-contamination and the introduction and spread of foreign organisms.
- Do not build cairns, and minimize the use and extent of stake networks or other objects to mark sites; such markers should be removed on completion of the related task.
- When permitted to sample, adhere to the sample size specified in your permit and take samples from the least conspicuous location possible.
- One should always use a drop sheet when sampling soils. Backfill soil pits to prevent wind erosion and dispersal of deeper sediments.

- Everybody should take great care when handling chemicals and fuels, and ensure you have appropriate materials with you to catch and absorb spills.
- Minimize the use of liquid water and chemicals that could contaminate the isotopic and chemical record within lake or glacier ice.
- The chemical and biological constituents of lakes can vary greatly with depth. To prevent contamination, or toxic effects on the biota at the surface, avoid reintroducing large volumes of water obtained from lower in the water column; excess water or sediment should be returned to station for appropriate disposal or treatment. Also ensure that sampling equipment is securely tethered, and leave nothing frozen into the ice that may cause later contamination.
- Do not wash, swim or dive in lakes unless authorized to do so; these activities contaminate the water body and physically disturb the water column, delicate microbial communities, and sediments

Conclusions

India has proposed two sites for HSM, one site for ASPA and one site in future may also be proposed to be designated as ASPA with additional study. To protect the environmental values of the sites, environmental risk assessment is very much essential and integral part of the study. This study provides essential features to reflect in the management plan and an edge on the human disturbance and encroachment on the area. Environmental risk assessment study leads to prepare the Environmental code of Conduct for the area. Based on the proposal and paper presented related to the ASPA and HSM, Environmental code of conduct mentioned above shall be very much useful in general for both ASPA and HSM site to protect the pristine environment. The sites have already been under the strict surveillance of Protocol on Environmental Protection to the Antarctica Treaty and once the sites are designated, as ASPA and HSM the Environmental Code of Conduct should be strictly implemented.

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