

19 POLAR EXPEDITIONS

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The polar regions are becoming ever more accessible and for good reason: they offer fabulous opportunities for travel and expeditions. Remote locations, breath-taking scenery, unusual wildlife – not at all as depicted on television and in the movies. Certainly, there can be bad weather and blizzards but there will also be tranquil moments during the endless twilight or, if you travel far enough north or south, midnight sun and 24-hour daylight.

The polar regions contain a bit of most environments: much of the Arctic is surrounded by deep and fascinating forests; tundra is often braided by rivers that vary enormously in flow during freeze-up or thaw; ponds and lakes are common; mountains and glaciers abound. There are a burgeoning number of polar outfitters, and cruise or travel companies to guide your research.

The polar environment

Much of the North is ocean and there is no single geographical definition to the southern boundary of the Arctic: it is variously described as contained within the Arctic Circle, the extent of continuous permafrost, the tree-line. The land and ice mass of Antarctica are better defined, surrounded by the cold Southern Ocean. At either end of the world, seasonal expansion and break-up of sea ice swells and deflates the extent of the polar regions like some monstrous breathing organism.

This chapter is concerned with environments that have “polar”-like conditions. Mostly, these are at high latitudes but there are ice caps at more temperate zones and even glaciers at high altitudes near the equator. Polar conditions are found in the land and oceans adjacent to the Poles but include Greenland, Iceland, Svalbard and the Patagonian ice cap. In the British Isles, Welsh or Scottish highlands are excellent training grounds for polar travellers and the Cairngorms in the depths of winter have a tundra-like quality.



Figure 19.1 *Polar regions offer fabulous opportunities for wilderness travel and field research* (© Dave Rootes)

Polar people and governments

The Arctic is peopled by many native groups, well adapted to the conditions. It is their home, spiritually as well as physically, and deserves our respect. In addition, many southerners have moved north to work and some have stayed. Antarctica has no permanent residents.

Style of government varies: Greenland, despite home rule, has strong ties with Denmark and expeditions are administered by the Danish Polar Centre; Norway administers Svalbard under an international treaty. Expeditions to Antarctica require a permit or authority to travel from your “home” government.

Many agencies now require some level of environmental impact assessment before authorising access. It makes good sense to prepare a risk assessment of your plans to satisfy yourself and your backers that you have suitable contingency planning.

Make sure that you have the right permission, you know the rules and, for the sake of local inhabitants or those that follow, leave as little evidence of your visit as possible.

Key information sources

Your starting point should be the huge volume of polar information on the web. Contact one of the polar libraries for more depth or detail. The Scott Polar Research

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Figure 19.2 *The weather in polar environments is characterised by strong winds*
(© David Rootes)

Institute, part of Cambridge University, has one of the best polar libraries in the world. Call to discuss your research needs. For a small fee they will search their accessions database and send you an annotated bibliography, saving hours of work at the library.

Weather

Polar weather is characterised by its unpredictability. An idyllic moment can rapidly transform into one of utmost severity as a katabatic wind tumbles off a nearby glacier; 0 to 60 mph in under half an hour is not uncommon. At very high latitudes, and as winter deepens, the likelihood of rain may be small but during summer in much of the Arctic, coastal Antarctica and Greenland, for example, temperatures hover around 0°C. In these conditions, it could rain, snow and be sunny during the compass of a single day.

Extreme daily temperature ranges are uncommon. The difference between summer and winter conditions may be wide and, of course, greater daily temperature ranges can be expected where continental weather prevails, away from the levelling influence of the oceans.

Fortunately, there are good websites listing current and historical weather conditions, although information is limited to reporting stations, e.g. towns, airfields, military or other significant installations. Some country weather bureaux are exceptionally helpful.

HAZARDS OF POLAR TRAVEL

Blowing snow and white-out

Travelling on snowfields and sea ice can be frustrated by blowing snow. It may be only ankle or waist high but surface detail is lost and crevasses, sastrugi or leads become impossible to detect.

White-out conditions form as light reflects back and forth between overcast cloud cover and the snow surface, creating a diffuse and shadow-less effect. This is very hazardous and travel should be avoided unless in an emergency. In a white-out, the horizon is lost and there is no contrast or shadow to define the surface. In certain types of white-out it is impossible to judge whether you are on a flat or sloping surface or how fast you are moving on ski or sleds. It is very easy to become disoriented and lost.

Tents and equipment at camps should be linked by flags or lines to save losing people in blizzard or white-out conditions. If you must travel, the chances of finding camp again can be vastly improved by laying out flag lines around it.

Wind chill

The combination of wind and low temperatures increases the loss of body heat alarmingly. The effect is known as wind chill (Figure 19.3). Put simply, the stronger

Wind speed mph kph		Ambient temperature (°C)							
		-40	-30	-20	-10	-5	0	+5	+10
		Equivalent temperatures (°C) and danger of hypothermia for a fully clothed person							
		GREAT <i>(exposed flesh may freeze)</i>			INCREASING			SMALL	
46	74	-87	-71	-54	-38	-29	-21	-13	-4
35	56	-84	-68	-52	-36	-28	-20	-12	-3
23	38	-77	-62	-49	-31	-24	-16	-9	-1
12	20	-62	-49	-36	-23	-16	-10	-3	+2
6	10	-48	-37	-26	-15	-9	-3	+1	+7
0	0	-40	-30	-20	-10	-5	0	+5	+10

Figure 19.3 *Wind chill index*

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the wind, the colder the “apparent” temperature on exposed flesh: a 10 mph wind at -10°C “actual” temperature has the effect on your skin of about -22°C “apparent” temperature.

A drop in ambient temperature, a rise in wind speed with no change in actual temperature or any freezing temperature in a wind above 15 mph can greatly increase the danger of cold injury (frostbite) and hypothermia.

Wildlife

Many polar species are protected and some are top carnivores. Only the foolhardy travel without firearms in polar bear country. If unsure of what you are doing or inexperienced with firearms, seek a local guide.

Generally, Arctic fauna are wary of humans as a result of being hunted. In Antarctica, animals show much less fear but any animal will attack if startled. Seal bites are particularly nasty because of their bacterial load. Check that you have suitable medication if you are likely to come across them.

Arctic insects (blissfully absent in Antarctica) can, and do, drive humans and other wildlife to distraction. Fortunately, there are few transferable diseases but bites will become infected if not well managed.

MEDICAL

Conventional medical support may be some considerable distance away and good medical back-up must be included in your planning. Fortunately, there are few diseases about and your main concerns will be broken limbs, infected cuts, scratches or bites (insect or mammalian), and cold injury.

Potentially serious are dehydration, exhaustion, cold injury and hypothermia. Note the order – it all starts to go wrong when you get thirsty – and don’t forget the importance of adequate nutrition. Good preparation and equipment will reduce the chances of dehydration and exhaustion and lessen the likelihood of cold injury or hypothermia. Nevertheless, suitable provision must be made in case of accident. The key points to note are:

- Dehydration, inadequate nutrition, exhaustion and hypothermia (and altitude) are all interlinked.
- Minor deficiencies and problems quickly escalate, and have a knock-on and vicious-circle effect.

Ozone and sunburn

Damage to the protective ozone layer is particularly marked over the polar regions where the level of ozone is greatly reduced during the transition from winter to summer. Exceptionally clear air, high levels of solar radiation and the reflective effect

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of snow and cloud combine to “burn” unprotected skin in short order. The likelihood of skin damage leading to cancer is very high. Never go out without first applying high-factor sun cream, even on cloudy days. Especially vulnerable are earlobes and the bottom of the nose, which burn by UV reflection off snow- or ice-covered surfaces.

Snow blindness

The cloud-penetrating ultraviolet (UV) radiation that causes sunburn can also damage your eyes. Snow blindness can be excruciatingly painful and may disable a victim for several days. Even a light touch will have you running for a darkened tent feeling like sand has been thrown into your eyes.

Wear sunglasses certified to guard against UV light and with side pieces – simple Polaroids do not give sufficient protection. Suitably rated goggles are just as good and may be the only option for people who normally wear glasses. Check that you have relevant medications to deal with snow blindness, take spare sunglasses and learn how to improvise some.

Frostbite

Nobody on a well-run expedition should suffer frostbite (deep freezing of tissue). Mild frostbite or superficial freezing, sometimes called frostnip, is more common, especially on the face, hands and feet. Damage to hands and feet can be the most insidious simply because they are usually covered and deep freezing may occur without being noticed.

A blanching or waxy appearance to the skin is a sign of superficial freezing and, if caught quickly, can be reversed with little likelihood of permanent damage. As the face, hands or feet become colder they may start to tingle or sting, followed by numbness. Any loss of sensation is a danger signal not to be ignored.

Check yourself and each other frequently and stop to warm affected areas immediately. Cheeks, earlobes or nose can be thawed by covering with a warm hand. Superficially frozen hands and feet can be warmed under warm clothes. Anything more serious will require shelter or, possibly, evacuation.

Water, fuels and wind greatly magnify the dangers of frostbite because evaporating liquids strip heat from your skin. Bare skin will freeze to very cold metal. Don't learn the hard way by using your mouth as an extra hand and freezing a karabiner to your lips – it's very painful.

Hypothermia

Fumbling with gear and shivering are surprisingly common symptoms that are often ignored. If you become apathetic or uncooperative and your judgement and decision-making abilities deteriorate, you are likely to be hypothermic.

Hypothermia occurs when you lose heat faster than you can generate it.

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Hypothermia is defined as a core temperature less than 35°C (normal is 37°C). There are two types: acute, which is sudden, e.g. immersion in icy water, and chronic caused by gradual cooling, e.g. stranded on an icecap. Medical professionals divide either type into several levels based on core temperature.

Measuring core temperature during an expedition is difficult, so a useful field classification is mild – fully conscious and shivering (core temperature 35–32°C) – or severe – not shivering or with decreased consciousness (core temperature < 32°C). Management depends on which level you have reached.

All polar travellers (and mountaineers for that matter) should recognise the symptoms of hypothermia and know how to manage it. The principles are:

- prevent further heat loss
- restore body temperature to normal.

In brief, the following gives the management of hypothermia:

- For *mild hypothermia*: remove from cold environment; protect from wind, wet, cold; add dry clothes, and especially keep head warm; insulate from ground; give hot drinks with sugar; apply external heat by getting into bag with victim.
- For *severe hypothermia*: victim may have no obvious pulse or breathing. Administer oxygen; do not remove wet clothes; add thermal clothing; get into shelter, preferably a casualty bag; gently evacuate for slow re-warming in hospital. Do not give cardiopulmonary resuscitation (CPR) unless an ECG is available and it can be continued until hospitalisation.

Severe hypothermia is extremely dangerous but treatable. Prevention is best: STOP when you feel thirsty or hungry and sort out the problem before it escalates.

“Space blanket”-type products have improved immeasurably beyond the wrap-around sheet. Take at least one Blizzard Pack (www.blizzard.co.uk). These have been shown to be much better than traditional space blankets for warming cold patients. At a push they can be used for a bivvy, matching a two- or three-season bag for warmth.

Carbon monoxide poisoning

It's cold and blowing a gale. You close the tent tightly to keep out the wind and snow and make a brew. Your eyes sting and you get a headache. You are probably suffering from carbon monoxide poisoning. Carbon monoxide is an odourless and colourless gas produced by incomplete combustion of fuels – by stoves, lamps or vehicles.

The treatment and solution are the same and simple: always make sure that you have adequate ventilation, however nasty the weather. Snow holes, in particular, can

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easily become airtight as the inside glazes over. An axe or ski-stick left poking through to the outside, and frequently rattled, will keep the airflow going.

Personal hygiene

Hygiene soon slips in field camps and cold is a great disincentive to washing. Dirty clothes, particularly socks, lose their insulating properties. Make some attempt each day to keep yourself clean and try to rinse clothing once a week or when you can.

Make sure that snow/ice/water gathering points are well away from washing/toilet areas, and make sure *everybody* knows the camp rules and layout.

Food and drink

Regular and frequent hot meals and plenty to drink are the first steps in keeping warm, not to say having a comfortable time.

It's obvious to say but it is surprisingly easy to be put off eating or drinking when travelling, especially when it is cold or at altitude. All those layers worn to keep warm are a right nuisance when it comes to having a pee or bowel movement. Provision must be made so that people don't avoid drinking just to save the hassle of urinating. The chances of suffering hypothermia are increased by dehydration and lack of food.

Dehydration

If you feel thirsty you are partially dehydrated. Our bodies' response to lack of fluid is a behavioural one and we can consciously refuse fluids all day, so becoming very dehydrated.

Various things contribute directly or indirectly to dehydration but there are problems that are peculiar to polar regions. Cold affects your blood circulation. Chilly hands or feet will drive blood into the core, resulting in the desire to urinate. Cold decreases the ability of the kidneys to concentrate the urine and so conserve water. Cold air is dry and water loss during respiration increases dramatically, as it does at altitude.

Dehydration has a number of insidious effects that should not be underestimated. A decrease in exercise tolerance will occur even before you feel thirsty and may have a dramatic effect on performance. Headaches, dizziness, fatigue, nausea and loss of concentration are all effects of dehydration. Dehydration also reduces the desire to eat.

How much should you drink to keep hydrated? There is no such thing as a "normal" fluid intake because it depends on the rate of water loss:

- An *absolute minimum* for a 70-kg man doing nothing would be about 3 litres/day.
- Plan for 5 litres/day when hanging around camp.
- ADD a litre for every hour of exercise.
- Hard exercise will bump up your requirement to 10–15 litres/day.

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EQUIPMENT

The polar environment encompasses cold–wet to cold–dry, bare ice to deep soft snow, and it is often windy. It is best to use tried and tested equipment and beware of spending the whole expedition budget on the latest style of clothing, tent or sleeping gear. Study expedition reports for lists of equipment that others have taken and seek advice from reputable cold weather equipment suppliers.

Clothing

Keep clothing versatile so that varying weather conditions can be met by adding or omitting layers. Ideally, wear just sufficient clothing to keep warm but prevent overheating. Sweat, generated while exercising, will rapidly chill you when you stop. Try to pace yourself or remove layers to avoid perspiring excessively.

First-time polar travellers tend to wear all the clothing that they have and fail to adjust to the prevailing conditions. Experienced travellers will wear the minimum, keeping items in reserve for when temperatures drop or wind strength increases. Thick, bulky garments should be avoided unless you expect a lot of standing around or travelling on open vehicles. The following are a few key pointers:

- Don't wear tight boots or gloves – this restricts circulation and your feet/hands chill more quickly.
- Don't sweat too much – adjust layers and carry enough to keep you warm when you stop.
- About 10 per cent of heat loss is through the head – carry spare head gear.
- Anchor gloves so that they do not blow away.
- Dry your gear at night – including headgear, gloves, socks, boot insoles.
- Always wear goggles or glasses when travelling over snow, especially if overcast.

Navigation and communication

The ability to navigate is crucial in the polar regions where conditions can deteriorate so quickly. Not all countries are as well mapped as the UK. Aerial photographs, satellite images, map and chart sources can all be found on the web. Seek local knowledge to help fill the gap.

Proximity to the magnetic poles makes compasses unreliable at high latitudes. Global positioning systems (GPSs) are a good alternative but they use an internal grid. Check that you are using the best grid for your locality and check its accuracy in the field.

For emergency communication, take an EPIRB (Emergency Position-Indicating Radio Beacon) and, for more general communications, a satellite phone. Many sat-phone systems do not work at high latitudes because the satellite (lying over the Equator) is “invisible” as a result of the Earth's curvature. Only polar-orbiting

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satellite communication systems will work, e.g. Iridium, at latitudes greater than about 70°.

But with all this techno-kit, don't forget the basics: a signal mirror is still the best way to show your position, especially to aircraft; standard and mini-flares are invaluable for searches (and for keeping inquisitive bears at bay).

Transport

Dog teams, all terrain vehicles (ATVs, usually six-wheelers; unstable four-wheelers – quads – should be left for sports drivers), snowmobiles and boats are all readily available in the Arctic and, with the addition of light aircraft, are invaluable to reach your start point, if not for the expedition itself. All require a degree of skill to drive and experience to deal with associated hazards.

Check local limitations on use of motor transport at your destination, usually imposed to protect vegetation. In some Arctic countries helmets must be worn on ATVs or snowmobiles. You may think you look daft but more people are injured in the Arctic falling off snow vehicles than in any other way. ALWAYS wear a helmet whether you are legally required to or not.

Skis and sleds

Skis, snowshoes and crampons assist travel over otherwise impossible surfaces and each has its techniques for use. Like all techniques, some people are good, some not so, and all need practice. Research the type of surface that you will travel over and seek advice from suppliers for the best footwear and accessories.

Sledging is an exceptionally valuable technique, allowing heavier and more bulky loads to be taken than can be carried. Sledges range from small high-impact plastic trays (kids' sleds), to 2-m Pulks, to wooden Nansen sledges. Your research will indicate the one best suited to your expedition.

Boating

Many polar expeditions take to boats as an excellent way of covering long distances up-river or along coasts. Ice and water temperatures around freezing make boating more hazardous than in temperate climates. A normally clothed body lasts only a few minutes before becoming paralysed. In many regions coast guard cover is patchy or absent.

Plan for worse conditions than the North Sea in winter, avoid ice fields unless your vessel is designed to work in them and use survival suits (see "Supplier details").

Energy and power sources

Availability of fuels varies considerably throughout the Arctic; there are no suppliers in Antarctica. White gas (or naphtha, "bencina blanca" in Latin America, a form of gasoline) is widely used in the North American Arctic; kerosene can be harder to

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Figure 19.4 *Inflatable boats are an excellent way to travel along the coast, but try to get some training in boat handling techniques before you go* (© David Rootes)

find; wood is still the fuel of choice on the edge of the Russian forests.

Fuel consumption increases markedly over use of melting snow (uses more fuel) or ice (uses less fuel) for water. As a guide, you can get by with an MSR-type stove and about 0.33 litre of white gas per person per day. Allow more for base camps and lanterns.

Solar panels work well in polar areas and can be taken for charging batteries for all the electronic kit such as radios, phones or CD player. Make sure that it has a good protection circuit to prevent overcharging.

FURTHER INFORMATION

Suggested reading/research

Alexander, B. and Alexander, C. (1996) *Evocation of Arctic Native Peoples*. London: Cassell.

BBC Enterprises. *Kingdom of the Ice Bear*. Arctic wildlife video.

BBC Enterprises. *Life in the Freezer*. Antarctic wildlife video.

Beletsky, L. and Paulson, D. (2001): *Alaska, The Ecotravellers' Wildlife Guide*. London: Academic Press.

Field guide to the most commonly encountered Alaskan wildlife. Includes short overview of conservation and parks.

Cherry-Garrard, A. (1997) *The Worst Journey in the World*. Reprint. New York: Carroll & Graf Publishers.

Scott's doomed last expedition; possibly the best adventure tale ever written.

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- Churchill. *Birds of the Canadian Arctic*. RSPB. Ornithological video.
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- Duncan, R. (ed.) (2003) *Polar Expeditions*. London: RGS–IBG Expedition Advisory Centre.
www.rgs.org/eacpubs
- Johnson, C. (2002) Polar expeditions. In: Warrell, D. and Anderson, S. (eds), *Expedition Medicine*, 2nd edn. London: Profile Books. Available from www.rgs.org/eacpubs
- Leffman, D. *Rough Guide to Iceland*. London: Penguin. Rough Guides.
- Lindenmeyer, C. (2003) *Trekking in the Patagonian Andes*. London: Lonely Planet.
Descriptions of walks throughout Patagonia.
- Lonely Planet guide. *Iceland and Greenland*. London: Lonely Planet Guides. Travel video.
- Lopez, B. (1986) *Arctic Dreams, Imagination and Desire in a Northern Landscape*. London: Macmillan.
Celebrated meditation on Arctic travels throughout the North.
- Poles Apart. *Polar Updates: Antarctica 2004*. Cambridge: Poles Apart.
Details legislation and environmental requirements to visit Antarctica.
- Rubin, J. (1996) *Lonely Planet Guide to Antarctica*. London: Lonely Planet Guides.
Comprehensive guide to Antarctic wildlife and history.
- Sage, B. (1986) *The Arctic and its Wildlife*. Oxford: Facts on File.
Excellent review of Arctic wildlife.
- Soper, T. and Powell, D. (2001) *The Arctic, A Guide to Coastal Wildlife*. Chalfont St Peter, Bucks: Bradt Travel Guides.
Illustrated guide to coastal marine mammals and seabirds of the circumpolar north.
- Soper, T. & Scott, D. (2000) *Antarctica, A Guide to the Wildlife*. Chalfont St Peter, Bucks: Bradt Travel Guides.
Field guide to Antarctic wildlife.
- Soublière, M. (ed.) (2003) *Nunavut Handbook*. Iqaluit: Nortext Multimedia Ltd.
Comprehensive guide to Nunavut (Inuit part of North West Territories), Canada.
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Detail about wind chill.
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- Swaney, D. (1999) *Lonely Planet Guide to the Arctic*. London: Lonely Planet Guides.
Comprehensive guide to the circumpolar north.
- Umbreit, A. (1997) *Guide to Spitsbergen*. Chalfont St Peter, Bucks: Bradt Travel Guides.
History, wildlife and natural history of Spitsbergen.

Supplier details

- Acton International Inc., 881 Laundry Street, Acton Vale, Quebec, Canada, J0H 1A0. Tel: +1 450 546 3735.
Cold weather boots.
- Baffin. Website: www.baffin.com
Cold weather boots.
- Blizzard. Website: www.blizzardpack.com
Blizzard pack website.
- Cotswold. Website: www.cotswoldoutdoor.com
Contract outdoor clothing supplier.
- Expedition Kit Ltd. Website: www.expeditionkit.co.uk
Expedition equipment and clothing.
- Montane, Unit 7 Jubilee Industrial Estate, Ashington, Northumberland NE63 8UA
Clothing supplier.

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Multifabs Survival Ltd: Multifabs Survival Ltd, Kirkhill Place, Kirkhill Industrial Estate, Dyce, Aberdeen AB21 0GU
Survival suits for hire or purchase.

Open Air, 11 Green Street, Cambridge CB2 3JU
Knowledgeable polar equipment suppliers.

Snowsled Ltd. Website: www.snowsled.com
Designs and manufactures sleds, pulks and tents.

Useful websites

British Antarctic Survey. Website: www.bas.ac.uk
UK Antarctic research centre.

Central Office of Intelligence, USA. Website: www.cia.gov/cia/publications/factbook/
World fact book – good starting point for research.

Cold Regions Research and Engineering Laboratory. Website: www.crrel.usace.army.mil/library/crrel_library.html
Vast collection of scientific and technical literature on cold regions.

Conservation of Arctic Flora and Fauna. Website: www.caff.is
Arctic conservation site.

Danish Polar Centre. Website: www.dpc.dk
Administers expeditions to Greenland.

European Centre for Medium-Range Weather Forecasts. Website: www.ecmwf.int
Links to national weather centres.

GRID-AMAP. Website: www.grida.no/amap
Arctic monitoring and assessment.

NASA. Website: <http://science.nasa.gov/>
Provides ozone details.

National Ice Centre, USA. Website: www.natice.noaa.gov
Sea ice and iceberg charts and data. Current and historical data.

Norsk Polar Institute. Website: <http://npolar.no>
Administers expeditions to Svalbard.

Polar Photographers. Website: www.arcticphoto.co.uk/
Great site for polar images.

Polar Web. Website: www.urova.fi/home/arktinen/polarweb/polarweb.htm
Guide to Arctic and Antarctic internet resources.

Scott Polar Research Institute (SPRI). Website: www.spri.cam.ac.uk
World's most comprehensive polar library and archives.

UK Meteorological Office. Website: www.metoffice.gov.uk
Useful surface weather charts and links to other bureaux.

UNEP World Conservation Monitoring Centre. Website: www.unep-wcmc.org
Conservation of species and protected areas.

World weather from reporting stations. Website: www.wunderground.com
Gives current and historical weather; latter rather tedious to download.

World Weather Links: [www.landings.com/evird.acgi\\$pass*55526469!_h-www.landings.com/_landings/pages/weather.html](http://www.landings.com/evird.acgi$pass*55526469!_h-www.landings.com/_landings/pages/weather.html)
Links to detailed weather sites.