Expeditions

16

Chapter Summary
This chapter first defines what constitutes an expedition and then gives examples of expeditions with different purposes and modes of travel and concludes that many use camping (discussed in Chap. 8) as their primary accommodation. It then examines the history of overseas expeditions (e.g. the South Pole and Everest expeditions) before examining participation numbers. The final part of the chapter focuses on specific environmental impacts of expeditions in four areas: movement and access, campsites on local communities, and the impacts of expedition fieldwork. The final section considers the management of these impacts and gives examples of ways in which expedition organisers can minimise the impact of their expeditions.

16.1 Definitions

What constitutes an expedition? A journey undertaken by a group of people with a particular purpose, especially that of exploration, research, or war. There are no readily available criteria by which an expedition can be defined or classified. The number of people involved might be one criterion. This can range from a single expeditioner to groups in excess of 100. Stott et al. (2015) in a review of youth expeditions defined an expedition, for the purposes of their literature search, as having a "duration exceeding 14 days, self-propelled, and was based overseas or out-of-state" (p. 197).

The environment in which the expedition takes place could be another way to classify or define an expedition. For example, the British Exploring Society, based in the UK, which has organised overseas youth expeditions since 1932, uses four environments to categorise their expeditions: polar, mountain, desert, or jungle.

Expeditions may have different objectives or purposes:

To cross a continent:

1. Various Antarctic expeditions were led by Shackleton, Scott, Amundsen, and Mawson to reach the South Pole in the early 1900s.
2. The Lewis and Clark Expedition from May 1804 to September 1806 was the first American expedition to cross what is now the western portion of the USA.
3. Robert Peary led various expeditions to the Arctic in the late nineteenth and early twentieth centuries, claiming to have reached the geographic North Pole with his expedition on 6 April 1909; Wally Herbert became the first man fully recognised for walking to the North Pole in 1969, on the 60th anniversary of

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Robert Peary's famous, but disputed, expedition.

4. The Burke and Wills expedition of 1860–1861 had the objective of crossing Australia from Melbourne in the south to the Gulf of Carpentaria in the north.

To climb a mountain:

5. Various expeditions were undertaken to climb Everest—in 1920 by Mallory and, the first which was proved to have reached the summit, in 1953 by Hilary and Tenzing.

To cross a desert:

6. Bertram Thomas was the first European to cross the Rub' al Khali (the Empty Quarter) in Oman in 1930–1931 which was crossed again by Wilfred Thesiger in 1946 and 1948 and by Mark Evans in 2017.

To navigate a river/jungle:

7. John Blashford-Snell led the expeditions which made the first descent of the Blue Nile (in 1968) and a complete navigation of the Congo River (1974–1975).

To circumnavigate the world:

8. Mark Beaumont has cycled around the world (Beaumont 2011) and holds the record for cycling his 18,000-mile (29,000 km) route, completed on 18 September 2017, having taken less than 79 days; Robin Knox-Johnston was the first person to sail single-handed, unassisted, and non-stop around the world in 1969.

Another way in which expeditions can be categorised is by means of their mode of travel. Not all, as defined by Stott et al. (2015), are necessarily self-propelled. Just taking the short list of expeditions above, Table 16.1 categorises them based on the modes of travel.

Table 16.1 Types of expeditions

Mode of expedition travel	Chapter in this book in which this is reviewed	Examples (number of expedition in the list in Sect. 16.1)
On foot	Chap. 2	1, 2, 4, 5, 6
On ski	Chap. 11	1, 3
By self-propelled boat, yacht, raft, canoe, or kayak	Chap. 13	7, 8
With animals (horseback, camels, ponies, mules, dogs)	Chap. 9	1, 2, 3, 4, 5, 6
Off-road vehicles (snowmobile, quadbike, motorbike, 4WD Land Rover)	Chap. 5	1
Motorised boat	Chap. 13	7
Bicycle	Chap. 7	8

While perhaps a more recent style of expedition, a number of people have used bicycles to undertake expeditions. For example, Mark Beaumont has cycled around the world (Beaumont 2011) and holds the record for cycling his 18,000-mile (29,000 km) route, completed on 18 September 2017, having taken less than 79 days.

Most expeditions use camping as their primary accommodation. The impacts of camping are discussed in detail in Chap. 8.

16.2 History of Overseas Expeditions

Expeditions are almost certainly as old as humankind. Archaeological evidence clearly shows that our ancestors travelled widely on foot and overseas on rafts and various types of boats as far back as 60,000 or 70,000 years ago. More recently, expeditions in the UK have a history that can be traced back to exploration for geographical purposes. These expeditions can be linked to characters such as Scott, Shackleton, Watkins, and Herbert in the polar regions and Younghusband and Hilary in the Himalaya. A brief consideration on Scott's famous Antarctic expeditions might be useful to communicate the huge scale and commitment of an expedition of that type.

Robert Falcon Scott (1868–1912) was a British Royal Naval officer and explorer who led two expeditions to the Antarctic regions: the Discovery Expedition, 1901–1904, and the ill-fated Terra Nova Expedition, 1910–1913. Scott took along a large team of scientists, and his ship became the most completely equipped vessel for scientific purposes in polar regions. The scientific crew included meteorologists, hydrologists, zoologists, glaciologists, biologists, and geologists, all under control of Dr. E. A. Wilson, the Chief Scientist. During this second venture, Scott led a party of five who reached the South Pole on 17 January 1912, to find that they had been preceded by Roald Amundsen's Norwegian party in an unsought "race for the Pole." On their return journey, Scott and his four comrades all perished because of a combination of exhaustion, hunger, and extreme cold. The bodies of Scott, Wilson, and Bowers were discovered the following spring in their tent some 12 miles from One Ton Depot. Surgeon E. L. Atkinson RN of the recovery party concluded: "We recovered all their gear and dug out the sledge with their belongings on it. Amongst these were 35 lb. of very important geological specimens which had been collected on the moraines of the Beardmore Glacier; at Doctor Wilson's request they had stuck to these up to the very end, even when disaster stared them in the face and they knew that the specimens were so much weight added to what they had to pull." A total of 1919 rock specimens from the expedition are housed at the Natural History Museum today.

Among Scott's party was a Surgeon Commander George Murray Levick who, as well as being one of the expedition's medical doctors, also became a member of the Eastern party which after a brief meeting with Amundsen was to become the Northern party and occupied Evans Cove for summer fieldwork. As a result of impenetrable ice, they were not picked up by boat and forced to overwinter. After tents were ravaged by blizzards, their only hope was to dig a cave in the largest snow patch they could find. Through the winter they cooked primarily with a seal blubber stove and ate seal meat. After surviving the winter, they were able to take a photo of themselves (Fig. 16.1) impregnated with seal blubber oil.

After returning from the expedition, Levick served in the Navy in the First World War and then became a doctor in London where he must have reflected on his expedition experiences. There were expeditions leaving the UK on a regular basis, most notably from some older universities such as those led by Gino Watkins from Cambridge to Greenland (later to lead the British Arctic Air

Fig. 16.1 These six men, the northern party of Captain Scott's last expedition, stand outside the entrance to the snow hole in which they have just spent the 1911–1912 Antarctic Winter in darkness. The low spring sun allows the zoologist and photographer of the party, Surgeon George Murray Levick RN (second from right), to take this picture. Their clothing and hair were impregnated with seal blubber because all their cooking, mostly of seal meat, was carried out over a seal blubber stove. Source: British Schools Exploring Society archive, Royal Geographical Society

Route Expedition in 1930–1931 and the following year died in East Greenland on a hunting expedition), but there were no opportunities for young people at school to obtain adventure experiences abroad. Levick saw a need for tough, demanding challenges and in 1932 took eight boys to Finland with basic equipment for a cost of £30 per boy. In 1933 he founded the Public Schools Exploring Society (PSES) and continued to lead expeditions (growing in size each year) which has today evolved to become the British Exploring Society (http://www.britishexploring.org/).

Interestingly it was not until 1978 when the next youth expedition organisation was formed with similar aims: Operation Drake and then in 1984 Operation Raleigh, since 1991 known as Raleigh International (https://raleighinternational.org/). The 1980s and 1990s saw the beginning of many similar organisations with a variety of aims, operating both in the commercial and charitable sectors with an obvious wide range of aims and objectives. Most expedition providers offer some combination of adventurous activities, science work, and community projects for time periods varying from 3 weeks to 12 months. Some providers work directly with individuals while others operate through schools, education authorities, and youth organisations. Expeditions are staffed by a wide range of qualified personnel including professional outdoor leaders, scientists and researchers, educators, and outdoor enthusiasts, and personnel may be paid staff or volunteers or a combination of both. In addition, expeditions are increasingly connected to offer components of other certifying organisations such as the Duke of Edinburgh Award scheme and the John Muir Award.

16.3 Participation Numbers

Travel and overseas experiences, particularly those involving some form of outdoor education, are regarded by many young people, parents, university admissions, and employers as somehow beneficial to a young person's development. Expeditions have been used in the UK as an educational tool since 1932 when the Public Schools Exploring Society ran their first expedition to Finland.

While gap years and expeditions are slightly different (as the former often incorporates the latter, but not vice versa), no specific statistics are available on the numbers of people engaged in expeditions from the UK each year. Jones (2004), however, estimated that 250,000–350,000 Britons between 16 and 25 years old were taking a gap year annually. In 2008 Rowe reported that "the gap year market is valued at £2.2 billion in the UK and globally at £5 billion. It's one of the fastest growing travel sectors of the 21st century, and the prediction is for the global gap year market to grow to £11billion by 2010" (p. 47).

It is also worth noting the development of British Standard 8848 (specification for the provision of visits, fieldwork, expeditions, and adventurous activities outside the UK) in concert with the Learning Outside the Classroom (LOtC) quality badge scheme (underpinned by the Expedition Providers Association)—further indications of the growth in numbers of people travelling overseas on expeditions and gap years.

Figure 16.2 shows the number of planned and executed expeditions on the Royal Geographical Society (RGS) Expeditions Database, 1964–2018 (https://www.rgs.org/in-the-field/rgs-fieldwork-database/, accessed 05/04/18).

According to the RGS Expeditions Database, between 1964 and 2018 an average of 229 expeditions per year was planned and an average of 177 returned. These expeditions span all continents and all types of expeditions. By accessing the database, it is possible to select for categories of expedition and 114 categories are represented. We are not certain whether these numbers are an accurate reflection of the total number of expeditions which were happening. It's not clear what proportion of all expeditions actually bother to put their plans/reports on the RGS database. It is possible that most of them are there because they had been awarded grants from the RGS (and so were required to upload their plans and reports), so the trend may just reflect RGS grant funding rather than a real decline in number of expeditions since the 1990s.

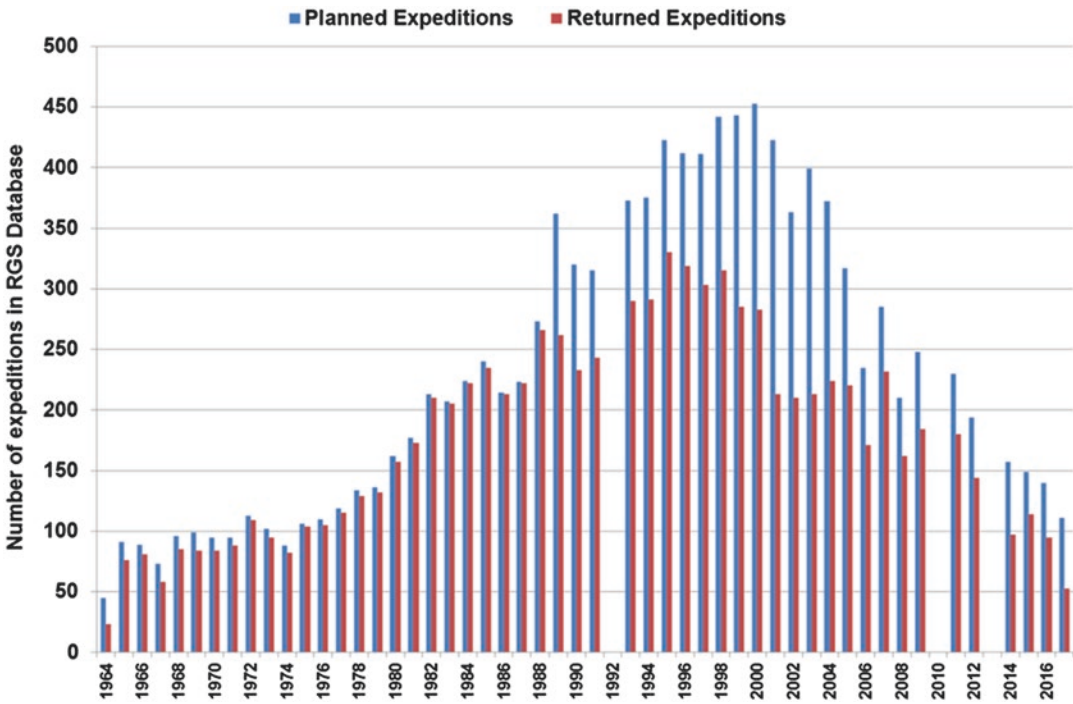

Fig. 16.2 The number of planned and executed expeditions on the Royal Geographical Society Expeditions Database, 1964–2018 (https://www.rgs.org/in-the-field/rgs-fieldwork-database/, accessed 05/04/18)

16.4 Environmental Impact

> *"A wheel mark in the desert lasts for decades. A footprint in the Arctic takes years to fade. Yet the expeditions which make these marks may further our knowledge of the world in which we live, helping us to conserve it."*
>
> (Footprints Forever, *Geographical Magazine*, 1991)

In 2008 the British Ecological Society (BES) and the Young Explorers' Trust (YET) (British Ecological Society/Young Explorers' Trust 2008) published *Environmental Responsibility for Expeditions: A Guide to Good Practice*. In their guide they identified four main areas in which expeditions can impact the environment. These were (1) reducing the impact of movement and access, (2) reducing the impact of campsites, (3) promoting good community relations, and (4) responsible fieldwork. These are considered next.

16.4.1 The Impact of Movement and Access

Travelling to and from an expedition area and moving around during the expedition have potential to have significant environmental impacts. Most overseas expeditions use air travel, and this arguably results in the biggest environmental impact of all. However, if the carbon costs of expeditions are compared with those of business travel or academics flying to conferences, Allison et al. (2011) would argue that they are far more justifiable. If long haul flights are used, then clearly larger and longer expeditions are perhaps better when the carbon emissions per person per day are calculated. However, BES/YET (2008) argue that the carbon costs of an expedition must be offset against the value of the expedition in terms of what it achieves. So it is important that the expedition is well planned and executed so that the benefits gained justify the environmental cost of long-distance travel.

The frequency and type of movement to/from project sites or centres of activity during an expedition can impact the local environment. While Chaps. 2 and 3 discussed the impacts of walking/running on soil and vegetation, Gellatly et al. (1986) conducted an interesting set of trampling experiments while on a British Exploring Society expedition on the Lyngen Peninsula in Arctic Norway. The effects of regular trampling by members of a large expedition in an area of arctic heath were assessed over a six-week period and again the following summer. Characteristic visual changes included the reduction in vegetation cover and an increase in the width, depth, and extent of lateral erosion. Trampling increased soil compaction and bulk density which in turn influenced levels of soil moisture and porosity. Levels of compaction increased with recreational intensity and partial stripping of the surface organic horizon led to a reduction in organic soil material. Their study highlighted the importance of interactive forces such as surface roughness, drainage, and natural obstacles. An assessment of the recovery of damaged sites nearly a year later led to recommendations for more awareness of the potential degradation and fragility of this environment under continued heavy recreational pressure by visitors.

Many expeditions use pack animals to move equipment and supplies to, from, and around the expedition area. Barros and Pickering (2015) conducted a manipulative experiment to assess damage to alpine meadows by pack animals and hikers in the Aconcagua Provincial Park, Andes, Argentina. They recorded vegetation height, overall cover, cover of dominant species and species richness immediately after and two weeks after different numbers of passes (0, 25, 100, and 300) by hikers or pack animals in an experiment, using a randomised block design. They found that pack animals had two to three times the impact of hiking on the meadows, with greater reductions in plant height, the cover of one of the dominant sedges and declines in overall vegetation cover after 300 passes. Impacts of pack animals were also apparent at lower levels of use than for hikers. These differences occurred despite the meadow community having relatively high resistance to trampling due to the traits of one of the dominant sedges (*Carex gayana*). They concluded that pack animals caused more damage than hikers to the alpine meadow, but the scale of the difference in short-term impacts depended upon the characteristics of the plant community, the amount of use, and the vegetation parameters measured. Use of the meadows by hikers and pack animals should be minimised as these meadows are scarce and have high conservation values.

In another study, Cousquer and Allison (2012) examined mountain guide's and expedition leader's ethical responsibilities towards pack animals on expedition. They noted that in the absence of motorised transport, the mule's ability to carry heavy loads over difficult mountainous terrain was exploited. However, they found that the nature of the contract between the leader and the mule was far from clear and the leader's responsibilities towards pack animals could be easily overlooked. They discussed the industry's failure to recognise its responsibilities to pack animals. Chapter 9 discusses horseback riding and its ecological impacts.

During a British Exploring Society expedition in Gipsdalen, Svalbard, in 1995, Kate Eldon and Alan Swan (Eldon and Swan 1993) carried out an experiment which aimed to establish the amount of damage inflicted by walkers on the tundra vegetation and to determine whether the type of footwear had any effect on the damage caused. Two adjacent 10 m "paths" were delimited on the tundra (Fig. 16.3A, left), and the % cover, number, and height of flower stalks (*Dryas octopetala*) were recorded in randomly located fixed quadrats. Each path was walked first 50, then 100 times, then a further 100, Path A with wellington boots and path B with stiff-soled mountain boots. Figure 16.3A shows that % vegetation and mean stalk height of *Dryas octopetala* both declined with the number of passes, though the decline on the track trampled by mountain boots was slightly faster than on the one trampled by wellington boots.

These results may have implications for the best type of footwear to use to reduce damage. Many trekkers now wear light approach shoes or trainers to trek into mountains, keeping their

	Wellington boots	Mountain boots
% vegetation cover at start	36	54
% vegetation cover after 100 walks	23	35
DIFFERENCE	**-13**	**-19**
% vegetation cover after 200 walks	13	22
DIFFERENCE compared with start	**-23**	**-32**
Mean height of stalks at start (mm)	43	39
Mean height of stalks after 100 walks	27	29
DIFFERENCE	**-16**	**-10**
Mean height of stalks after 200 walks	16	14
DIFFERENCE compared with start	**-27**	**-25**

Fig. 16.3 (A) Expedition footwear trampling experiment on tundra in Svalbard (Eldon and Swan 1993). Photo by Tim Stott. (B) Crampons used by mountaineering expeditions can leave scratches on rock, which on popular routes can leave a permanent scar. Photo by Tim Stott

heavy mountain boots for snow, ice, glaciers, and moraines where there is little or no vegetation to damage. However, the wearing of crampons (Fig. 16.3B) on mixed ground (i.e. rock, moraine, and ice/snow) can lead to permanent scratches on rock which, on some popular routes, can easily be seen as a scar and can detract from the wilderness feeling that some walkers and climbers seek.

Some expeditions use vehicles and the impacts of off-road vehicles in wilderness areas are discussed in detail in Chap. 6. These impacts include damage to vegetation and soils, exhaust emissions, potential oil and fuel leakage, and noise and disturbance to wildlife. Vehicles driven on snow (snowmobiles) can compact the snow, and we know that compacted snow takes longer to melt (see Chap. 11: Snow sports) and can damage underlying vegetation.

Many expeditions will use boats as a means to access remote coastlines or islands. Boats can be a very efficient and effective way to ship large amounts of heavy equipment and supplies (Fig. 16.4A–D).

However, as discussed in Chap. 13, there are also negative impacts associated with propeller action (cutting plants or disturbing bottom sediments in shallow water), wave action, oil and fuel spillage, and noise/disturbance to wildlife. However, when used carefully and correctly, in

Fig. 16.4 (A) Bringing in supplies by boat for the 2009 British Exploring Society expedition to Tasermiut Fjord, SW Greenland. Photo by Tim Stott. (B) Supplies for the 2009 British Exploring Society expedition to Tasermiut Fjord, SW Greenland, were brought on this raft. Photo by Tim Stott. (C) Loading supplies onto the Langoysund in Longyearbyen for the 2001 British Exploring Society expedition in Svalbard. Photo by Tim Stott. (D) Small inflatable zodiacs with an outboard engine are popular for use on expeditions to moving equipment and people. Photo by Tim Stott. (E) Cruise ships started to visit Longyearbyen, Svalbard, in the 1990s. Photo by Tim Stott

certain situations small boats can be one of the most environmentally sound forms of transport. However, whether one would consider travel on large vessels such as the cruise ship shown in Fig. 16.4E, as an "expedition" is debatable. While some of the passengers may see it as an adventure, they are hardly self-propelled. However, in the past there has been a serious proposal to run a large (50+ people) British Exploring Society expedition to Bylot Island in the Canadian Arctic and to have the whole expedition based on the ship (moored offshore) and to ferry the expedition

Fig. 16.5 (A) Small expedition camp site in Zara Valley, Ladakh. Photo by Tim Stott. (B) Large British Exploring Society Expedition base camp site in Gipsdalen, Svalbard. The whole expedition only camped here for two nights at the beginning of the six-week expedition. They then moved away in six smaller groups. Photo by Tim Stott. (C) British Exploring Society Expedition base camp site on a storm beach at Brucebyen on Isfjord, Svalbard, in 2001. This site would score 1 using Sørbel et al. (1990) terrain vulnerability classification system. There would be minimal impact from camping as there is no soil or vegetation cover. Photo by Tim Stott. (D) British Exploring Society Expedition campsite on dry river bed in Ladakh in 2013. This site would score 1 using Sørbel et al. (1990) terrain vulnerability classification system. Camping here will have minimal impact as there is no soil or vegetation cover to be damaged. Photo by Tim Stott

members each day onto the island for their science and adventurous activities. To date this idea has not been tested, but it may be a good way of avoiding the environmental impact of camping in large numbers as described in the next section.

Brida and Zapata (2009) discussed the economic, socio-cultural, and environmental impacts of cruise tourism, which in the Caribbean region increased from three million in 1980 to more than 25 million in 2007, and Butt (2007) reported on the impact of cruise ship-generated waste in Southampton. Winser (2004) section 6 offers some useful advice on transport for expeditions and fieldwork.

16.4.2 Expedition Campsites

Chapter 8: "Camping, Wild Camping, Snow Holing, and Bothies" discussed the general impacts of camping on soils and vegetation, wildlife, and water resources. Clearly these same impacts will apply to all expeditions which use camping as the main form of accommodation. Campsites on small expeditions (Fig. 16.5A), however, will differ in their impact from those where there are perhaps 50 or more people in the same place at the same time (e.g. in an expedition base camp, Fig. 16.5B), whilst permanent base camps or bothies (as also discussed in Chap. 8) will present a different range of problems to transient overnight camps.

Drystan Jones conducted an environmental impact study of expedition base camp sites on the East Coast of Oscar II Land, Svalbard (Jones 1997). In summer of 1996, as a member of a large British Exploring Society (BES) expedition, he visited base camps used by BES expeditions in 1987, 1990, and 1993. He was therefore able to compare sites which had been used as expedition base camps nine, six, and three years before his visits, as well as the 1996 base campsite. Each base camp site was paired with a nearby undisturbed "control site." He recorded the number of plant species, % cover, and vegetation height as well as compaction of soil. All four expeditions had changed the base camp areas they occupied. Valuable studies in this field have been carried out by Leif Sørbel and co-workers at the Department of Physical Geography, University of Oslo (Sørbel et al. 1990). They developed a terrain vulnerability classification system which Jones used in his study. Sørbel et al. defined the following classes:

1. *Invulnerable areas*. Examples are active alluvial plains, fans, and tidal shores.
2. *Moderately vulnerable areas*. Dry, well-drained areas with a discontinuous vegetation cover.
3. *Vulnerable areas*. Characterised by continuous vegetation cover, often fine-grained material and relatively high ground moisture.
4. *Very vulnerable areas*. Wear easily causes further erosion. Areas are characterised by fine material, moisture saturation, and continuous, thick vegetation cover, often combined with inclination and proximity to drainage ways.
5. *Areas of conservational value*. Localities which contain biotopes, landforms, or other features which are found to be particularly valuable and therefore should be protected from disturbances.

Jones then used Sørbel's terrain vulnerability scale to describe each of the base campsites. The 1987 site scored 2–3 on the terrain vulnerability classification; it had lost its original cover of *Cassiope tetragona* which he described as a loss to the aesthetic quality of the area. The 1990 site scored 3 on the terrain vulnerability classification and in 1996 supported a different community type to that of the control. The terrain was generally flattened throughout camp area, and the ground was damper (which he ascribed to the thaw of permafrost). The 1993 site scored 2 on the terrain vulnerability classification and showed less obvious change due to the more discontinuous nature of original cover; he observed some scarring of coarse material (which he did not measure). The 1996 site scored 1 on the terrain vulnerability classification. Examples of expedition camps on this type of terrain are shown in Fig. 16.5C, D. Using this site the expedition caused little or no impact on the vegetation or underlying terrain of the base camp—though there were "paths" leading from the area where vegetation had been damaged. He concluded that after nine years the 1987 site was still visibly different to the surrounding area and was occupied by pioneering vegetation species.

In addition to damage to vegetation and soils, which as we have seen, can be minimised by careful selection of campsites, another problem faced by large expeditions is waste disposal, particularly that of human waste. Ideally all human waste would be carried out (as described in the Cairngorm Poo project in Chap. 8), but this is not always practical on a large expedition with 50+ people who are away in wilderness areas for up to six weeks. An appropriate method of dealing with human waste must be adopted, and there are a number of options ranging from group pits to individual burying depending on the number of people, the duration of the camp, and the nature of the location. The generally accepted best practice is, where possible, to dig pits for the latrines and to bury the waste. Clearly this introduces large quantities of nutrients into the normally nutrient poor soils of these wilderness areas. For expeditions based on coastlines, disposal of human waste into saltwater may be an option, but this needs careful consideration and assessment for each situation. Tidal currents, wind, turbulence, nearby habitation, and wildlife all need to be considered in this event. It may come down to a question of concentration vs. dispersal. All toilet paper and sanitary products should be brought out or burnt, depending on any local codes of practice. Latrines should be located at least 75 m away from water courses to avoid contamination of the water supply with coliform bacteria. When washing clothes or bodies, there is the potential to contaminate water, and the BET/YET (2008) guidelines give advice on how expeditions can minimise these impacts.

Kuniyal (2002) noted that biotic pressure due to expeditions, trekking, tourism, and transhumance practices by the shepherds is continuously increasing in mountain areas. Practices like indiscriminate throwing of wastes, leaving behind self-generated wastes and emission of poisonous gases from unattended wastes, cutting of trees like *Rhododendron spp*. (for fuelwood), introduction of hybrid sheep to replace indigenous ones, extraction of invaluable and endangered medicinal plants, and reduction in wildlife because of illegal hunting and poaching (for meat, skin, and medicine) have adversely affected the expedition areas. Kuniyal's study which was conducted on one of the expeditions to the Pindari Valley of Indian Himalayas showed that 61% non-biodegradable waste problem could be resolved by reuse (39%) and recycling (21%), but all the waste needed to be brought back by the visitors from expedition/trekking areas to the road heads for easy transportation to places where it can be reused, recycled, or new products discovered with innovative recovery initiatives.

Mount Everest, the highest mountain on our planet, was first climbed in 1953 and has since become a magnet for mountaineers. Since Sir Edmund Hillary and Tenzing Norgay reached the summit on 29 May 1953, as part of the British expedition led by Lord John Hunt, the British Mountaineering Council (2018) stated that there had been 6871 ascents of Everest by 4042 different climbers (up until February 2014), meaning that some climbers, most of them Sherpas, have reached the top multiple times. Two Sherpas, Apa and Phurba Tashi, held the record for the most ascents—21. Kenton Cool holds the British record for multiple ascents, having reached the summit 11 times, 2 of them within a week in 2007.

Sadly Everest shows the signs of over seven decades of these climbers' quests to stand on the roof of the world. Bishop and Naumann (1996) reported on how climbers would find trash on the mountain in the form of old tents, fixed ropes, used oxygen bottles, human waste, tins, glass, paper, and other garbage left behind by expeditions. Overall, 265 people have died on Everest, between 1922 and 2014. Because it is virtually impossible to rescue ill or injured climbers in what is called the "death zone" (above 8000 m), a substantial number of dead bodies are also left high on the mountain. Since the 1990s, there has been a raising of awareness of this problem, and a number of attempts are being made to clean up on Everest (Ken 2000; Nuwer 2015). *The Guardian* newspaper (2017) reported that the government of Nepal and Everest expedition organisers had launched a clean-up operation at 21,000 ft. to remove rubbish. Sherpas and other climbers were given canvas bags each capable of holding 80 kg (176 lbs) of waste to place at different elevations on Mount Everest. Once full, the bags were winched by helicopters and flown down the mountain. Removing the sacks by air means Sherpa guides do not have to risk carrying heavy loads of waste through the treacherous Khumbu Icefall to the base camp. The operation used helicopters that would ordinarily return empty after dumping climbing ropes on the site. Recreational climbers were being urged to pick up any rubbish along their route, while Sherpas who carried equipment up the mountain for their clients are paid extra—US$2 per kg—to return with bags of trash.

16.4.3 Impact on Local Communities

Most expeditions interact in some way with local inhabitants, and all expeditions, regardless of their objectives, will need to establish some kind of relationship with their host country. To a certain extent, expeditions will change the communities they aim to experience; cultural exchange is not possible without some erosion of cultural differences.

Allison and Beames (2010) discussed the issue of cultural sensitivity and environmental responsibility on expeditions. They noted that critics have identified some problematic aspects of certain practices on youth expeditions, including cultural sensitivity, the use of drugs, and the environmental costs associated with young people travelling outside of their home country (Allison and Higgins 2002). Expedition groups that did not show appropriate cultural sensitivity when travelling in developing nations such as those who do not cover themselves suitably and wear short and sleeveless tops in Muslim countries are criticised. Is flying a group of 50+ young people across the world justifiable (Allison and Higgins 2002) in a time when air travel is now becoming widely accepted as a contributor to global climate change? It seems that many operators and participants are convinced that they must visit lands far away, despite sometimes knowing little of their homeland. This point is contentious and has been responded to by the YET which has convincingly argued that the benefits outweigh the costs. This debate will no doubt gain more momentum if climate change (warming, increased storminess) continues in the future.

Expeditions should be sensitive to their impact on local communities, acknowledge that they are privileged visitors to a host country, and recognise that cultural sensitivities may impose constraints on their activities.

16.4.4 Impact of Expedition Fieldwork

Many expeditions carry out some form of fieldwork either for research or as a means of educating the members of the expedition (Stott 2010). The intention is often to find out more about a particular area so that the findings can, in some way, benefit the scientific community and humankind in general or may even be of direct benefit to the host country or local community. In some cases, the findings might result in the local area being managed more effectively.

Earthwatch (2018) provides citizens with the opportunity to work alongside leading scientists to combat some of the planet's most pressing environmental issues. Expeditions run projects concerned with research on wildlife and ecosystems, climate change, archaeology and culture, and ocean health. Likewise the British Exploring Society offer expeditions for young people which encompass science and adventure. Figure 16.6 shows a field site in Greenland where BES expedition carried out a river study for over a month (Stott et al. 2014) in August 2009. The photograph shows the site next to the river where a group of 12 young expeditioners assisted a professor in sampling the river for four weeks. The trampling impact around the tent, used for shelter when sampling through the night, can clearly be seen. However, it would have been very difficult to have completed the study without some damage to the riparian vegetation, but the outcome was a publication in an international academic journal which may contribute in some way to worldwide understanding of how rivers work.

If expeditions to such places are planned and executed carefully, the likely benefit of the expedition and its research should justify any adverse impact on the environment. As with community projects and other cultural interaction on expeditions, if it is possible to involve the host country or local scientists in the expedition fieldwork, this could lead to the research having greater impact and/or longer-term benefits. However, if the expedition is primarily educational (e.g. a youth expedition) rather than a research expedition, it may be more difficult to justify the use of a particularly sensitive habitat for the fieldwork. Winser (2004) section 5 offers some useful advice for organisers of field research projects on expeditions.

16.5 Management and Education

Publications such as the RGS' Expedition Handbook (Winser 2004) offer a great deal of sound advice for planning, organising, and managing expeditions. The RGS offers a great deal of advice and training for expeditions and fieldwork (Royal Geographical Society 2018) which cover all aspects of expeditions from initial planning stage to the reporting after it's over. Stott et al. (2013) argued that of the many benefits

Fig. 16.6 River in SW Greenland where a group of 12 young expeditioners assisted a professor in sampling the river for four weeks. The trampling impact around the tent, used for shelter when sampling through the night, can clearly be seen. Photo by Tim Stott

young people gain from taking part in an expedition, one is the real life experiences and powerful lasting memories (see Allison et al in review) which will foster positive attitudes towards wilderness environments for the rest of their lives.

In 2008 the BES and the YET (British Ecological Society/Young Explorers' Trust 2008) published *Environmental Responsibility for Expeditions: A Guide to Good Practice*. The publication is not a comprehensive handbook on reducing environmental impacts. Much has been written on the techniques of minimal impact camping, using vehicles on expeditions, working with local communities, and on specific fieldwork techniques. The BES/YET guide is designed to prompt thinking during the initial planning of an expedition. Expedition leaders are expected to consider each of the points made in this guide and bear them in mind when deciding where to locate campsites, identifying access routes, choosing fieldwork projects, and so on. The checklists at the end (Table 16.2) are for photocopying for the benefit of leaders during planning and for use as an audit during screening by the two organisations.

Before an expedition will be considered for grants or approval by either organisation, it must be able to show that the group have an adequate plan to limit their environmental impact and that they will be able to implement that plan in the field. They must be able to demonstrate the steps they intend to take in order to keep the impact of their activities on the local environment to a minimum. It is important that a group ethos is developed so that all members of a group take responsibility for the consequences of their actions, not just the leaders.

In a study focused on university students, Harper et al. (2017) reported that expedition participants believed that the expeditions provided real benefits to the communities visited. Organisations like World Challenge Expeditions

Table 16.2 Checklists provided by British Ecological Society/Young Explorers' Trust (2008, pp. 11–13)

1 Access and movement
1.1 Are you keeping to established routes/tracks? If not, how are you establishing your own routes?
1.2 Have you chosen the least damaging routes to and from campsites or sites of activity? Will these routes be varied to reduce impact?
1.3 Are all the expedition members aware of techniques for minimising movement impact? What training will be provided?
1.4 Are you making the minimum number of journeys during the expedition?
1.5 Do you have the resources and expertise to minimise damage to sensitive areas, for example, walkway construction?
1.6 Will you be using vehicles or powerboats? How will you limit noise and damage?
1.7 What arrangements will you have for refuelling, and how will you avoid leakage and spillage?
1.8 Will you be using pack animals? What will their impact be on the surroundings?
1.9 Will you have a designated movements/transport officer?
2 Campsites
2.1 Do you have adequate information about the environmental sensitivity of campsite locations?
2.2 What will the conditions be like during the season you are visiting, and will they require any special care?
2.3 Who owns the land and how will you obtain permission to camp, if required?
2.4 How much interaction can you expect with any local inhabitants around the campsite?
2.5 Can you justify the location of your campsites in terms of minimum impact?
2.6 On reaching potential campsites, what is your procedure for checking for sensitive areas, nesting sites, animal drinking access, and so on?
2.7 Who will manage the campsite and monitor environmental impact?
2.8 How will you minimise trampling and/or tent damage around the campsite?
2.9 How will you cook? If you are intending using open fires, do you know how much fuelwood is available, and can you justify using it?
2.10 How will you minimise the damage caused by using open fires?
2.11 What is your waste management plan?
2.12 What steps will you take to reduce the expedition's waste?
2.13 How do you intend to deal with human waste, and is this the most appropriate method for the situation?

(continued)

Table 16.2 (continued)

3 Local communities
3.1 Is the local community aware of the expedition and its aims, and what evidence do you have that it is supportive? 3.2 Do you have all appropriate permissions for working in the area? 3.3 Who will liaise with the local community, and who is your contact in the community? 3.4 If you intend carrying out a community project, how have you ensured that it is supported by the community and that it is appropriate and sustainable? 3.5 How will expedition members be briefed about maintaining good community relations? 3.6 Have you considered all local options for supply of goods and services? If you are not using local sources, can you justify this? 3.7 Are you certain that you are not using crucial local resources? 3.8 What is your policy regarding requests for medical treatment? 3.9 How will you avoid compromising the safety of any local participants? 3.10 Will the expedition be self-sufficient in terms of evacuation and/or rescue? 3.11 Do you plan to leave any equipment or materials with the local community? How will you ensure that this will be distributed fairly and utilised appropriately? 3.12 Will there be any follow-up with the local community after the expedition?
4 Fieldwork
4.1 What permissions or permits do you require to carry out your fieldwork? 4.2 What liaison have you had with host country scientists or institutions, and who is your point of contact? 4.3 Do you have adequate information about the environmental sensitivity of fieldwork sites? 4.4 What will the conditions be like during the season you are visiting, and will they require any special care? 4.5 How sensitive is the site to trampling, use of vehicles, collecting samples, and so on? 4.6 Are there any cultural sensitivities you need to be aware of in relation to your fieldwork? 4.7 Has any work of a similar nature already been carried out in the area, and if so, can you justify any further similar work? 4.8 What are your sampling techniques, and will they result in any adverse environmental impact? 4.9 If necessary, how will you minimise the impact of repeated visits to the same site during the expedition? 4.10 Will you be collecting any material, and if so, why is this necessary? 4.11 What fieldwork expertise exists in your team, and/or what training will expedition members have in the necessary fieldwork techniques? 4.12 Who will monitor your impact on the environment during the expedition? 4.13 How will your results be disseminated, and what arrangements do you have for ensuring that the results are communicated to the host country?

(World Challenge Expeditions 2018), which sends around 350 expeditions overseas each year, build in a community project to all its expeditions. This is intended to “give something back” to the host country. It may be helping to dig a well, build part of a school, or paint a community hall. Some expedition providers try to revisit the same regions each year or develop a three-year rolling programme, so that established links can be renewed and developed to maximise the benefits to the host community. Many expedition providers (like World Challenge) are increasingly employing guides and leaders from the host countries. In this way, expeditions are far less likely to inadvertently negatively impact the country they are visiting. Local guides will know the best places to visit and will understand cultural sensitivities. Expeditions should be sensitive to their impact on local communities, acknowledge that they are privileged visitors to a host country, and recognise that cultural sensitivities may impose constraints on their activities.

Many expeditions carry out some form of fieldwork. The BES/YET Guide (2008) offers plenty of sound advice on how to plan, execute, and minimise any environmental impact. Expeditions which encounter rare and threatened habitats which are especially vulnerable to damage must be planned and executed particularly carefully. The likely benefit of the expedition and its research must fully justify any adverse impact on the environment. The possible impact of any subsequent expeditions must also be taken into account.

Geneletti and Dawa (2009) explained how mountain tourism in developing countries was becoming a growing environmental concern due to extreme seasonality, lack of suitable infrastructures and planning, and interference with fragile ecosystems and protected areas. Their study aimed to assess the adverse environmental impacts of tourism, and in particular of trekking-related activities, in Ladakh, Indian Himalaya. Their approach was based on the use of Geographical Information System (GIS) modelling and remote sensing imageries to cope with the lack of data that affect the region. First, stressors associated with trekking and environmental receptors potentially affected were identified. Subsequently, a baseline study on stressors (trail use, waste dumping, camping, pack animal grazing, and off-road driving) and receptors (soil, water, wildlife, vegetation) was conducted through fieldwork, data collection, and data processing supported by GIS. Finally, impacts were modelled by considering the intensity of the stressors and the vulnerability and the value of the receptors. The results were spatially aggregated into watershed units and combined to generate composite impact maps. The study concluded that the most affected watersheds were located in the central and south eastern part of Ladakh, along some of the most visited trails and within the Hemis and the Tsokar and Tsomoriri national parks. This example of a modern approach to understand patterns of tourism-induced environmental degradation is exciting and could be used to support mitigation interventions, as well as in the development of sustainable tourism policies.

Conclusions

1. An expedition is defined as a journey undertaken by a group of people with a particular purpose—especially that of exploration, research, or war. There are no readily available criteria by which an expedition can be defined or classified. The number of people involved might be one criterion. This can range from a single expeditioner to groups in excess of 100. The environment in which the expedition takes place could be another way to classify or define an expedition, for example, polar, mountain, desert, or jungle.
2. Expeditions use various modes of travel which include: on foot, on ski, with animals (dogs, horses, ponies, mules, camels), self-propelled boat (canoe, kayak, raft, yatch), off-road vehicles (snowmobile, quadbike, motorbike, 4WD Land Rover), motorised boat, and bicycle.

3. Expeditions are as old as humankind. Archaeological evidence clearly shows that our ancestors travelled widely on foot and overseas on rafts and various types of boats as far back as 60,000 or 70,000 years ago.
4. There has been a growth in organised expeditions since the first youth expedition provider, the Public Schools Exploring Society (now British Exploring Society), was established in 1932. The number of expeditions on the RGS Expeditions Database, 1964–2018, shows an increase from 1964 to the mid-1990s, followed by a decline.
5. The environmental impact of expeditions can be considered in four categories:
   - Impact of movement and access
   - Expedition campsites
   - Impact on local communities
   - Impact of expedition fieldwork
6. The BES and the YET (2008) published *Environmental Responsibility for Expeditions: A Guide to Good Practice* which is an excellent guide with checklists which expedition leaders can use to minimise their impact.
7. By organising youth expeditions and taking young people into wilderness areas for extended periods, some would argue that the benefits outweigh the costs to the environment and local host community. Taking part in an expedition might be one of the most powerful learning experiences available, leaving memories which can last a lifetime.

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