Exploring a Changing World

A guide to fieldwork for youth expeditions

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Working safely:
Some fieldwork situations (such as working in pro-glacial streams, on steep slopes or in areas with potentially dangerous animals) can carry significant risks and may require leaders or additional leaders with the competence to ensure safety. YET strongly recommends adherence to BS 8848 for all ventures, including those involving fieldwork. BS 8848:2008+A1 is the "Specification for the provision of visits, fieldwork, expeditions and adventurous activities outside the United Kingdom".

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Contents

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Each year as many as forty or fifty groups of young people leave the country to take part in youth expeditions. In fact, Britain has a unique history of organised youth exploration stretching back over three quarters of a century. Although primarily intended to provide adventure and challenge to young people, early youth expeditions almost all carried out a significant amount of fieldwork. Because they mainly took place in cold countries and followed the traditions of geographical exploration, much of their fieldwork involved the survey and mapping of glaciers, mountains and lakes. But expeditions have moved on. Today's professional scientific expeditions set out to explore the challenges of conservation, the functions of complex ecosystems and the pressures humans exert on diminishing resources. Youth expeditions, on the other hand, have largely abandoned fieldwork in favour of adventurous activities or community projects. Of those few that still include field projects in their programmes, most still reflect the inventory type approach of early explorers, with descriptive survey and mapping of land forms remaining popular activities. Only a minority explore contemporary scientific objectives.

According to records kept by Geography Outdoors, the centre supporting field research, exploration and outdoor learning at the RGS-IBG, the proportion of youth expeditions undertaking field projects has fallen to one in ten. There is no single reason for this decline, but there are possible contributory factors. One is the growth of commercial expedition provision where the group logistics and organisation is provided by specialised companies, many of whom offer a mix of adventurous activities or community projects, but little in the way of fieldwork. If more youth expedition leaders opt for this kind of package approach, the decline in fieldwork will inevitably continue. A second factor may be the parallel reduction in fieldwork provision in many schools and universities. As the impact of this reduction has fed through to the current generation of young adults, the resultant loss of fieldwork experience and expertise has probably had an impact on the pool of volunteer leaders with the confidence to take on the responsibility for expedition field projects. A third factor has been the growth in the popularity of adventurous activities in exotic locations. The appeal of scuba diving or kayaking to potential expedition members is obvious but these kinds of adventurous activity tend to focus on the personal growth and skills of participants rather than on the exploration of their world. That this is happening whilst there is a growing enthusiasm for participation in youth expeditions means that the huge and growing potential for youth expeditions as an informal global classroom is not being fully realised.

The aim of this guide is to encourage more youth expeditions to include fieldwork in their programmes. There are several reasons why this is timely. In the formal education sector there is an increasing emphasis on the value of enrichment activities outside the classroom. This has been reinforced by the government publication of a Manifesto for Learning Outside the Classroom. Youth expeditions incorporating field projects are in a position to make a significant contribution to this broader education outside the classroom, especially as the popularity of expeditions seems to be increasing. Secondly, there has been national concern about the decline in fieldwork opportunities in schools and universities. Research on outdoor learning suggests that it is at least as effective for developing understanding, if not more so, as classroom based teaching, but also that its biggest impact could be to increase interest, motivation and an inclination to find out more. Many young people go on to pursue related degrees or careers in geographical, environmental or conservation sciences after inspirational fieldwork experiences, so youth expeditions can help contribute to the next generation of field explorers. Developing a field skills base is also seen as important, hence the range of recent initiatives to try to reverse the decline in school and university fieldwork. The youth expedition sector can provide practical field experience such as animal and plant identification that expedition members may not now gain from school or university. Finally, and perhaps most importantly, there is the value of fieldwork in raising the environmental awareness. Many expeditions travel long distances to operate in environmentally sensitive locations, both of which inevitably involve significant environmental cost. This can and should be mitigated to some extent by increasing the environmental awareness of their members and changing the way that young people see and value the world. Suitably designed field projects can increase understanding of environmental problems and lead to lifelong changes in attitudes and behaviour on the part of participants, which offsets some of the environmental cost of the expedition.

For the purposes of this guide, fieldwork is taken to mean projects that involve the measurement and collection of field data and information from the expedition locality, in other words the sort of work that is now often described as 'traditional' fieldwork. Youth expeditions often carry out other activities such as artwork, social work, making videos, investigations of members' responses to arduous conditions and creative writing. Whilst these may all be useful and worthy additions to an expedition programme, they fall outside the scope of this guide. Instead, the fieldwork being promoted here is the sort that provides a unique opportunity to learn about biological and geographical processes on the ground, where they are happening; this is the type of fieldwork that has seen such a sharp decline over the last decade. Nor does this short guide set out to be a comprehensive manual for expedition field techniques. Instead, it focuses on promoting a selected range of types of project considered to be appropriate for youth expeditions. To restore the place of fieldwork on youth expeditions, youth expedition leaders need advice and support to enable them to make field projects a primary objective. To be successful, such projects must appeal to young people and be relevant to their broader education. This requires a new approach. The advice that follows suggests to youth expedition leaders how that might be achieved.

Giving projects a context

Fieldwork on youth expeditions should be set in a global context with which expedition members can identify. Enthusiasm, motivation and understanding will all be better if field projects are designed around local situations that have wider global implications which have been explained to the group. The knowledge and understanding that expedition members gain from participating in their project can then be more readily fitted into their wider appreciation of the bigger world picture and of global change. Biodiversity loss, human impacts on the landscape, exploitation of resources and climate change all represent ideal contexts.

Choosing suitable field projects is always the first challenge. Volunteer leaders to run a field programme are usually recruited to a leader team after the concept and shape of the expedition has started to form. This means that in most cases, those planning fieldwork for youth expeditions are faced with choosing projects for a location that has already been decided and for a particular period in an established timetable. These conditions can impose constraints on what is possible. Far less often, where fieldwork may be the only objective, the destination of the expedition and the timetable is determined by the choice of field project. This sort of 'single purpose' expedition is more typical of undergraduate expeditions than of school level expeditions, where a more varied programme of activity is usually the norm. Some of the advantages of this second approach can also be gained by expeditions with a mixed programme if the fieldwork leader is recruited at the start and planning takes account of the field project from the outset. The more the expedition plan can be built around an ideal project location and timeframe, the more successful and rewarding the fieldwork is likely to be.

The two key attributes to look for when trying to decide on suitable projects are *context* and *change*. Can the work can be linked to a wider environmental process or concern or does it offer the opportunity to detect or document change over time? Projects that combine both of these attributes offer the most to youth expeditions because the sort of results that allow change to be demonstrated are the most satisfying and the sort of projects that successfully tap into the environmental concern of young people are undoubtedly the most motivating. Once a suitable context has been established, there are two ways to approach the question of change. First, look for past work or data that can be used as a baseline against which your findings can be compared. One of the best places to search is amongst the reports of previous youth expeditions which contain a vast array of baseline studies that have never been followed up. Trawling through a number of past reports can quickly suggest suitable ideas for follow-up projects around which an expedition field project could be built. If the destination is already fixed, this narrows the scope for finding a previous project, but such a search is still the most worthwhile place to start. The more expeditions that start in this way rather than carrying out a project from scratch, the more they will add value to the vast amounts of 'one-off' data and information already amassed by past youth expeditions and seldom re-visited. The largest collection of past expedition reports is at the RGS-IBG Expeditions Database, which can be searched online. Alternatives include following up on the work of host country academics and institutions, or locating the work of individual expedition organisations, charities or schools in the UK, but this sort of start point is always harder to find. Searching the internet is likely to provide the fastest route to relevant ideas and email has greatly improved the process of making contact with people in host countries.

In the absence of locating baseline data against which your own findings can be compared, the next best thing is to establish a baseline dataset for others to follow-up on in the future. At the very least, your expedition report can then form the basis of a subsequent expedition's plans. This does require your report to be presented in such a way that another group could use it to relocate and repeat the fieldwork some years later. Organisations which run a series of expeditions over time should plan to re-visit destinations with the specific object of trying to detect change over time. Being in a position to highlight the possibility of changing conditions gives youth expeditions a new purpose in a rapidly changing world where field observation is often in short supply, a purpose moreover that is likely to be most useful to the host country or region. Many argue that youth expeditions lack the expertise and reliability to collect data that can be used for rigorous scientific or management purposes. In many cases this will be true, but flagging up or confirming the fact that environmental change may have taken place and indicating the direction and rate of such change can be extremely useful to host country scientists or institutions without the resources to carry out the monitoring. For this reason, ideas for projects built around suggestions from host country scientists or institutions are going to be the most worthwhile, although often academics in UK universities working on longer term overseas projects are able to provide a useful starting point. Such starting points ensure that your project is relevant and contemporary, both crucial when looking for an appropriate context, and ensure that those who might possibly benefit from the findings are identified early in the planning.

Finally, the likely nature of the work that needs to be carried out in the field may also determine the choice of project. Expedition groups usually contain members with a wide range of interests, aptitudes and abilities. Even if they are all at school and studying A levels, it is likely there will only be a few with a detailed grasp of, for example, geomorphology or plant physiology or ecological energetics. In general, projects that require a detailed conceptual understanding of biological or geological principles are much less likely to be successful because they will not be readily accessible to many of the participants. There will also be only a few with confident and precise identification and field data collection skills, so projects requiring skilled or highly technical data collection are also to be avoided. The best projects involve relatively unskilled, low tech methods that everyone can learn to perform reliably and are built around relatively straightforward ideas or processes that everyone can grasp, even if they are not science or geography specialists. Above all, expedition members need to be able to see the link between what they are doing on the ground and the wider global picture.

Box 1

Fieldwork that is more likely to engage young people because it is readily grasped and carried out	**Fieldwork that is less likely to engage young people because it requires detailed conceptual understanding, specialised skills or extreme precision**
mapping boundaries such as vegetation, coastlines, glaciers or snowfields	geological mapping
projects involving the identification of a controlled number of readily recognised species	plant physiology experiments
transects involving observation or sampling	serious surveying of terrain
mapping and determining land use of settlements or agriculture	projects requiring anything other than simple taxonomic identification
measurement of environmental parameters with straightforward probes or meters	projects involving interviewing local people where there is a language barrier
use of questionnaires	most geomorphology
specific behavioural observations of readily observed animals	ecological projects that require theoretical understanding
sampling that involves counting, cover estimation, biomass or simple diversity indices	most projects requiring sophisticated equipment or instruments
creating local maps for local use	pointless collection of data whose value is unconvincing and recording is tedious

From ideas to activities

Developing workable field projects for youth expeditions from initial possibilities can often be the most difficult part of the process. The key issues are *expertise* and *time*. The potential projects you will consider when making a choice will inevitably vary considerably in terms of how difficult they will be to carry out. Even if you have filtered out less suitable options using the lists in Box 1, you may be left with a choice from a list with wildly differing degrees of practicality. The first thing to consider is time. This means establishing the window in the expedition timetable that can be devoted exclusively to the project with the entire team present. Transit time to and from the project location, setting up any necessary base, obtaining supplies and undertaking any on site training and familiarisation required all have to be subtracted from what might be allocated as 'fieldwork time' by the expedition leader. You need to know how many person days will be available for the duration of the fieldwork period. Only then is it possible to work through sequentially what will have to be done to set up and run the project and estimate the likely time required. Setting up time is often underestimated: laying out grids for sampling, setting up transect lines and establishing control points for mapping all take time, especially when conditions are challenging and expedition members may not be fully acclimatised. It is usual for work to speed up as individuals become more accustomed to the conditions and more adept at the techniques. An incomplete project is much less satisfying than a simpler but complete one, so decisions made at this stage about what you are likely to be able to realistically achieve are crucial. It is well worth building in a more streamlined alternative at this stage, which could be rapidly adopted in the field if it becomes apparent that the planned project is too optimistic or if expected local support fails to materialise.

Expertise is the other main constraint. When the majority of the expedition group are relatively unskilled in fieldwork techniques, the success of a project depends on the oversight of at least one person with a clear sense of what needs to be done and how to do it. This does not mean that inexperienced leaders should not attempt fieldwork of the sort suggested in this guide. The whole point of this guide is to encourage leaders to have a go by explaining what to do and how to do it, perhaps starting with fairly straightforward activities. The most useful form of expertise is local knowledge, where familiarity with a location and what it contains that will help a project with a short timeframe to run smoothly. There is no substitute for meeting up with and working with a local contact in the field and if you are able to find someone suitable and willing to do so, more ambitious projects immediately become feasible. It is well worth investing the time looking for such a contact. Failing that, a preliminary visit to the site may be an option, although often not within the budget of youth expeditions. Useful alternatives include finding someone in the UK who has worked in the location and going to talk through your plans with them, corresponding with such a person in the host country, or gleaning useful information from the reports of other expedition groups, especially if you are following up previous work. You may even find a lead to potential local contacts from such reports.

Other constraints include the skills and aptitudes of the expedition members and their likely motivation. The nature of the task needs to be matched to the nature of the group. It is common and often helpful to give out a questionnaire to expedition members shortly after they join up so as to establish their interests, background and practical skills. Although relevant, subjects being studied at school or college are often poor indicators of likely fieldwork aptitude. However, it may be that individuals emerge who can be given specific roles or delegated responsibilities.

Equipment and its availability and cost are further considerations. As a rule, the simpler and more basic the equipment, the less likely it is to fail under expedition conditions. However, sometimes the use of one piece of sophisticated equipment such as a digital balance (to weigh small quantities of biomass), a digital level (to survey a profile) or a refractometer (to measure the sugar concentration in nectar) can make a task much easier or open up a completely new possibility, so should not be discounted entirely. Many of the digital meters and probes now available for measuring environmental parameters such as temperature, flow velocity, wind speed and so on are relatively robust and reliable for field use. Data loggers, GPS, hand held computers and laptops can be bought in a 'ruggedised' form for field use or can be enclosed in protective cases. If you are going to use electronic equipment, battery replacement and/or recharging will always present you with a problem if there is no power supply available. However, solar recharging technology is improving all the time and can be obtained fairly easily. Together these practical and logistical considerations will determine whether a promising idea can be turned into a realisable fieldwork project.

Box 2

some possible ideas and starting points for good projects
• tying into local conservation charities, NGOs, government departments eg wildlife departments, conservation departments, 'citizen science' schemes • working inside reserves and protected areas (permissions required) • working with local field study centres in host countries (see RGS-IBG world register of field centres) • for single school or department expeditions: curriculum enrichment where project develops current work or activity • mapping glacier or snowfield change (linked to photographic records?) • ground truth establishment for satellite images • early morning observations of primate social behaviour • effects of drought on crops grown and yield • bird surveys by point counts • live capture of data in the field e.g. from NOAA weather satellites to predict local weather conditions • studying changing forest cover: canopy cover, forest structure • land use mapping in settlements using GIS: impact of migration, tourism • estimating animal population size: dung counts, belt transect counts (with simple statistical software) • investigation of places subject to impending change eg sea level rise, dam construction • measuring biomass: biomass estimates for forests, litter • responses to changing weather conditions or human impacts: measuring glacier outflow, sediment loads, erosion • digital photograph libraries with supporting data (of certain groups of species or land forms that might be subject to change) • transects that record changing substrate type: coral reef flat sedimentation • mapping vegetation boundaries that may move: at forest boundaries, seagrass or algal extent, at altitude boundaries, in communities where species composition may change • monitoring human or animal impacts: removal of fuel wood, trampling, grazing, trails • distances travelled for fuel wood or water • looking for changes in species diversity: insects, flowering plants • making basic maps for local nature reserves or protected areas using GPS • mapping roads, tracks and villages where the maps are old, wrong or lacking detail • using indicator species to measure ecosystem 'health': urchins on reefs, butterflies (use laminated ID cards/keys on PDAs) • building environmental education into your project: making materials for local schools, making trail guides or leaflets, making interpretative material such as sign boards • capacity building in local schools: showing local schools how they could follow up on your project

Box 3

approaches that do not usually make a good project
• standard fieldwork activities done in the UK to teach techniques or concepts: rocky shore transects (difficult to identify species in exotic locations), measurement of wave height and direction, river profiles (can be done anywhere, so do not utilise the location) • curriculum based projects with traditional structure involving hypothesis, data, conclusions: timeframe usually too short to form hypothesis from observation • trying to do coursework: owing to the current requirements for standardisation and moderation it is unlikely that any fieldwork carried out on an expedition could be used towards all or even part of exam based coursework • short term meteorological recording (other than for interest value) • projects framed in vague terms: 'animal surveys', studying the geology of an area' • hopelessly optimistic projects: making a species inventory for a forest, preparing a management plan for a threatened area, carrying out a 'bird survey' • pointless mapping of land forms or features simply because they are there • projects that look at seasonal variations or require seasonal comparisons (unless data for other seasons is available) • projects entirely dependent on encountering a single species or group (unless certain to be present) • projects requiring long term continuous observation: pollination studies • anything requiring collection of biological, geological or archaeological material (legality, conservation and ethical considerations, probable lack of facility to identify or process it) • compiling lists of 'species seen' (other than for interest value) • watching other people do the work where skilled techniques are required (mammal trapping, mist netting, electro-fishing) • providing the labour for someone else's research project (unless the rationale is clearly explained and there is an agreement that the data collected will be interpreted in the light of the overall findings)

Techniques and tools

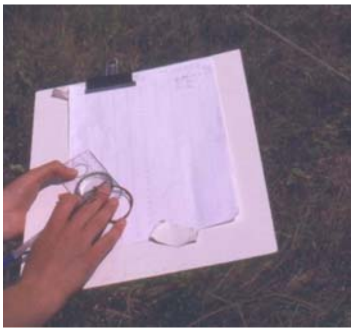
It is impossible for a short guide to provide a complete set of rigorous methods for all types of potential fieldwork project. Instead, this section provides a small selection of techniques, illustrated by examples, which could be adapted to suit a wide range of different situations applicable to youth expeditions. By grouping the suggestions around a few techniques rather than by fieldwork discipline, the hope is that leaders will be encouraged to see other possibilities for using the techniques that would suit their own expedition. Some sources of more detailed information about field methods and techniques are provided at the end of this guide.

1. Mapping

Producing a map is often a good way to record existing conditions against which subsequent fieldwork can be compared. Simple but informative maps are also often the easiest way to record the location of a sampling site so that it can be reliably relocated. Simple maps can be produced with basic equipment and careful survey techniques, but rapid advances in several technologies have made the process easier. Handheld Global Positioning System (GPS) receivers are now small, relatively rugged and fairly cheap and are ideal for locating positions on the ground with the sort of accuracy suitable for most youth expedition fieldwork. Geographical Information Systems (GIS) software can be run on laptops in the field or, probably more easily, back home during the production of the report. The more advanced of these are probably beyond the scope of youth expedition projects, but using basic GIS software can help with the presentation and analysis of spatial data and generate a quality end product at a variety of scales. Combining the use GPS with traditional manual survey methods makes it much easier to create maps tied to known positions on the ground, whilst the use of infra-red or laser rangefinders can speed up the survey process considerably, allowing a mapping project to be completed in a much shorter period of time.

Local mapping of small areas can be carried out using a compass and tape measure or rangefinder. A series of compass bearings and distances between or along features can be drawn to scale on paper, after correcting for any magnetic variation, to show the spatial relationship between a series of features. This method could be used to map the positions of trees in an area of forest or the streets and buildings of a small settlement. Standing by a feature such as a corner of a building or a tree, its position is marked onto a sheet of paper. The paper must be orientated so that north is vertically upwards. Using a sighting compass, a bearing to the next feature to be mapped is taken and the distance to it is measured. Laser rangefinders are excellent when it is difficult to reach a distant feature with a tape measure. A line representing that distance on that bearing is drawn to scale on the paper. The process is repeated for all the other features to be included on the map. GPS can then be used to locate and record the positions of several key points on the map for future re-location. This method is especially useful when visibility over longer distances is restricted amongst trees or buildings.

Mapping a small settlement in an area exposed to increasing tourist development was designed to show how the character of the settlement might change as the proportion of land use targeted towards tourist services alters over time. The intention was to re-visit the location at a future date. This sort of project can be a good way to get expedition members to consider the influence of their own presence in the local community.



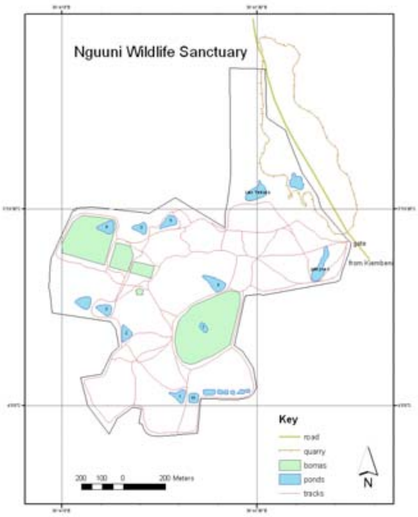
Plane table mapping is a useful method for larger areas where the whole of a snow field, coastal reef flat, glacial snout or vegetation community can be seen. It is limited by the extent of visibility, which can be reduced by weather conditions. It involves sighting of the features with an alidade across a sheet of paper laid on a flat board, supported on a tripod or other temporary support. A straight baseline is established, normally running along part of the boundary of the area to be mapped. The two ends of this baseline can be located by GPS so it can be re-established at a future date. A scale version of the baseline is drawn along one edge of the sheet of paper. The board must be arranged on its support so that one end of the line on the paper is exactly above the same end of the line on the ground and the paper must not be allowed to move during the sighting procedure. One end of the alidade is then lined up with the end of the baseline. The other is swung round until the hairline crosses are lined up with the first feature to be plotted. A sighting line is then drawn along the alidade from each end of the baseline towards the feature. This is repeated for all the other features to be included on the map. Lines should be numbered and a record kept of the feature sighted against each number. Where features are not easily visible from the baseline, for example patches of sand underwater on a reef flat, people or poles can be used as markers, provided the particular point can be accessed easily and safely. When all the features have been sighted from one end of the baseline, the plane table is moved so that the other end of the baseline on the paper is directly above the other end of the line on the ground. Once again, sighting lines are drawn from the end of the baseline along the edge of the alidade towards each feature. During this second stage, it is crucial that each feature is re-sighted to exactly the same point as before, so it is helpful if some sort of mark or peg is left on the ground the first time. The intersection of each pair of lines on the paper marks the position of each feature. Boundaries and other linear features such as stream banks or cliffs can then be drawn in manually on the paper by connecting such points. This is a good method for mapping features such as larger individual plants amongst low growing vegetation, physical features such as river banks, wadis and terraces on hillsides, or the extent of trampling effects, grazing and erosion, sounding small lakes or mapping archaeological sites.

A permanent quadrat measuring 50m x 66m in boggy area was mapped by plane tabling to show the positions of key plants. The quadrat was beside a footpath in a national park, used by increasing numbers of walkers. Re-mapping at a later date will reveal any changes to the plant distribution due to disturbance or path erosion. To enable the re-mapping of the quadrat, one corner was positioned at a permanent footpath marker post.

GPS receivers can be used for more than simply finding the position of a feature. Linear features such as paths, edges of forests, boundaries of vegetation zones or front edges of glaciers can be mapped by using the waypoint facility of a GPS. A series of waypoints can be marked and saved whilst walking (or canoeing or biking) along the line of the feature. The data can then be downloaded to a computer, used to plot a track, saved as an image and converted to a map by adding detail, key and scale using a suitable drawing package. Free downloadable software such as EasyGPS and GPSUtility can handle and display GPS data from most receivers. Finally, data from a GPS receiver can be imported directly into GIS software and the points connected by lines or polygons. This is a useful method for mapping regularly shaped field systems or settlements, especially where straight lines can be used to connect features. All these possibilities use the GPS data from scratch to produce simple maps. GPS data can also be superimposed onto Google Earth images which can be useful if the imagery for the expedition area is of high enough resolution. There are potential complications if the data needs to be superimposed on existing maps or digital images in a GIS, and especially if real time GPS positions are used with existing maps. The GPS settings may need to be changed so that the data is compatible with the co-ordinate system of the map or image, otherwise the points will not be accurately positioned. Resolving such complications are beyond the scope of this guide but information about this is readily available, often in the GPS user guide.

The accuracy of position data recorded as standard GPS waypoints is usually good enough for mapping vegetation boundaries, roads and tracks, fields and so on, especially if the user only ever records co-ordinates or marks waypoints when the positional accuracy of the GPS reading, which varies, is shown as high on the screen. However, if the idea is to re-map at a later date to try and detect changes on the ground, such as the position of the front edge of a glacier, the error in the GPS readings could be greater than the change you are trying to measure unless the GPS is used carefully. So long as you are aware of the potential shortcomings of handheld GPS data, and take steps to reduce error as much as possible, it is adequate for the purpose of many youth expedition field projects.

A wildlife sanctuary was using a sketch map for its operations. A series of GPS readings at key points on the boundaries and along the tracks were used together with a scanned image of the original sketch map in a GIS. By entering the GPS co-ordinates for each point it was possible to produce a higher quality geo-referenced scale map for future use by staff at the sanctuary. This is an example of how expedition fieldwork can benefit local people.



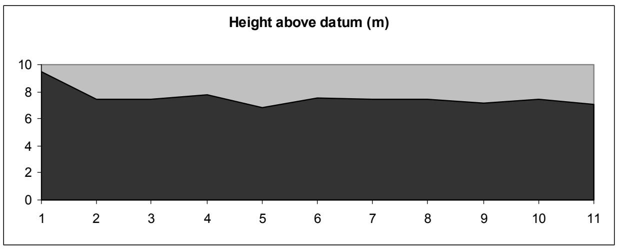
2. Profiling

Profiles are vertical sections showing the height of the ground surface such as a slope or river bed, relative to a fixed height, at intervals along a line. Hill, river or shore

profiles, like maps, are often useful as a backdrop for recording and illustrating the locations of sampling sites. However, they can also be used to monitor change, especially in the gradient, where erosion may be taking place, or in the position of features on the profile, such as shorelines or tree lines or different substrates. Together with measurements of the average velocity of the water, a river profile can be used to estimate the flow rate at a certain point and Manning's formula can be used to estimate flood discharge. Profiles can be surveyed manually using clinometers, or poles, string and a spirit level. However, the use of a telescopic level on a tripod in conjunction with a graduated survey pole makes the process a great deal quicker and easier. The elevation data obtained from a handheld GPS is usually far too inaccurate for local profiling. If the profile is to be resurveyed
in later years, the ends must be accurately located.

A clinometer is a device that allows the user to sight to a fixed point and read off the angle of inclination between themselves and that point. The angles and the distances between each point can be plotted to scale directly onto paper, or trigonometry can be used to calculate the height difference from the angles between points. Alternatively, a metre ruler or a length of string or chain can be used to span two points on the slope. Once leveled using a spirit level, the difference in height between the two ends and the ground can then be measured. Survey poles marked in 50cm sections are often used at each end of the string, especially when the slope is steep of if the profile is under water such as a river bed or reef flat. A telescopic level is mounted on a tripod and set up at a benchmark height. It needs to be carefully leveled before use. Once set up at a particular point, the cross hairs visible through the telescope can be used to measure how far above or below the benchmark a point at the same height is on a graduated pole in the distance.

Working out the zonation of mangrove trees on the shore profile involved sighting with a telescopic level along a straight line amongst the trees, not the easiest of tasks. Once the profile was drawn, the different species present along the fairly shallow gradient could be identified. This was part of a project to identify the species that would grow best as seedlings in zones needing reaforestation following clear felling for fuel and building timber.



Box 4

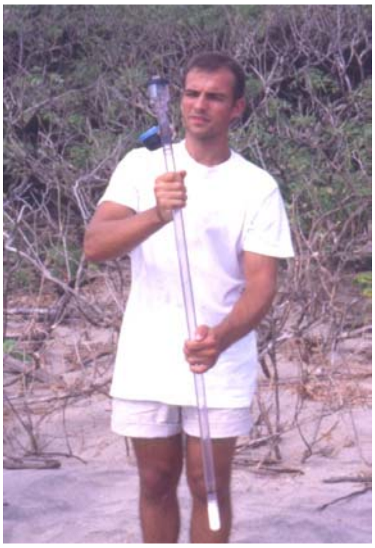
possible fieldwork based on mapping or profiling
• mapping vegetation boundaries such as tree lines, the change from one vegetation type to another on mountain slopes, the position of the edge or zones within areas such as mangrove forest • mapping the changing position or shape of glaciers or snowfields • mapping and calculating the areas of crops in field crop systems • mapping tree positions and the extent of the tree canopy • mapping the extent or zone of influence of settlements • mapping types of land use and field sizes within settlements • recording the vegetation type associated with different points on a shore profile or hillside profile • producing maps to show the position of sampling sites • making maps for local people to use

3. Point sampling

Point sampling involves the collection of data or photography from a fixed point, sometimes for a certain period of time or within a certain distance of the point. Point data is likely to be most useful when it is used to make comparisons between one place and another or after a period of time has elapsed at the same place. If the position of the point is recorded so that it can be relocated, the sampling can be repeated in exactly the same way to obtain comparative data, perhaps after a number of years. Point sampling along streams, shores, roads or tracks can be constrained by access or site suitability. If the sites are to be re-sampled in the future, the critical information includes the method of sampling used and the means of access, as well as the precise location.

Examples of point sampling include the testing of water quality or sediment load at different points along a river or lake shore, road traffic or pedestrian counts, the use of a light trap or pitfall trap for insects, measurement of ablation rates at different points on a glacier and the and a record of bird species seen or heard from a fixed point during a certain period of time. Measurements at different points taken at the same time can be used to make useful comparisons. For example, comparisons can be made between the melt behaviour of areas of glacier with different amounts of rock debris on the surface or between small areas of packed snow and glacial ice, which have different levels of reflectance.

Measuring the velocity of water in a river with an impeller linked to a meter can be combined with a river profile to allow estimates of flow rate to be obtained, which can be compared for different times of day or different seasons or after periods of changed climatic conditions. Here, the data compared flow rate downstream of a melting glacier at different times of day. Osmometers can be used to monitor the moisture level deep down in the sand on a beach at different heights on the profile. In this case, the project was to monitor the impact of rising sea level on the suitability of the beach for nesting turtle eggs.



Obtaining a precise location of the points sampled can be a challenge. The accuracy of standard handheld GPS receivers is not likely to be good enough to relocate points to within a few metres, although this may be good enough for many purposes. Using carefully measured distances and compass bearings to nearby features such as trees or boulders that are unlikely to move can be more precise. Arranging the sample points in a regular grid pattern or at regular distances along a linear feature are a popular approaches that aid relocation of the points. To repeat the measurements some time later, simple but informative maps giving details of the locations are crucial and can form a supporting project.

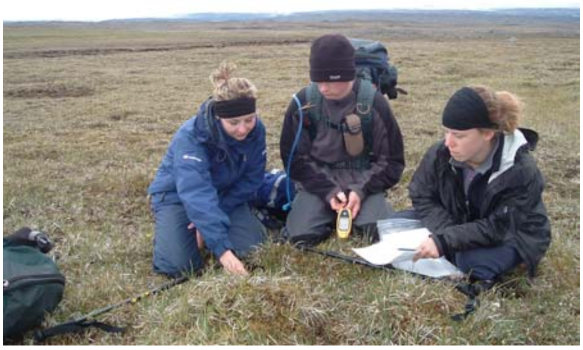
Measuring the amount of ice lost from glacier surface over time involves using ablation stakes inserted into holes drilled in to the ice. These point samples can be arranged in a pattern across an area. A marker on the stake is used as a reference and the height of the marker above the ice is measured at the same time each day. The rate of ablation can be related to other factors such as air temperature, as is beings done in this case. Regular recording of environmental factors such as air temperature can often be achieved by using a data logger which automatically records measurements at a chosen time interval.

Point sampling using pitfall traps and light traps are examples of biological sampling where identification of the catch can often be impossible because of a lack of expertise. However, as long as the catch can be sorted into recognisably different kinds of animals, the number of different species can be estimated. Projects aimed at finding out the number of species of animal or plant present are ideal for youth expeditions for two reasons. First, they do not require that the species be identified, only that they be recognised as different, and secondly the data is reduced to a single species richness 'score' for each site that can easily be compared with others and with scores obtained by subsequent expeditions, provided that the sampling method is standardised and that sufficient detail is provided in the report so it can be repeated exactly.

4. Using quadrats

Quadrats are areas, usually square and marked out in some way, within which the same sampling process takes place. To gain a representative sample and improve reliability, a series of quadrats are often sampled and some sort of average determined. Although small portable wire quadrat frames are often used for fieldwork, quadrats can also be improvised using two metre rulers, or even walking poles, set out at right angles to indicate the boundaries of the quadrat. Larger areas, such as 10m x10m quadrats, can be marked out with string or by simply using corner poles to indicate an area in which measuring or counting can take place. The position of the quadrat can be indicated on a map, by using a GPS to find the position of one of the corners, or sometimes by using some sort of permanent marker or distinctive feature on the ground as a reference point.

Sampling quadrats can be marked by setting out marker posts, or can be marked temporarily using walking poles as long as the area sampled remains the same. On the left an area due to be flooded by a new reservoir was sampled for its plant species whilst a project to monitor the progressive effect of erosion used a grid marked with semi-permanent posts that can be returned to by a later expedition. It is important that sufficient quadrats are selected randomly by some means in order to gain a representative sample of the overall area.

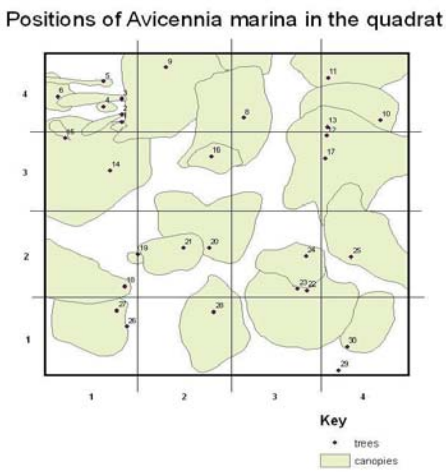


Large quadrats in which measurements can be made can be marked out easily with string, but if they are to be more permanent it may be necessary to use nearby features as a means of relocation, or to put up permanent marker posts or metal pegs. If samples from quadrats need to be representative of a large area and free from any form of sampling bias, a sufficient number must be carried out to be representative and they must be positioned randomly within the sampling area. The best way to do this is to establish a grid, either real with string and pegs if small quadrats are being used, or using a map grid for larger quadrats. Then random co-ordinates can be generated in some way, either by rolling dice or pulling numbers on folded bits of paper from a pocket. The quadrats are then positioned at those co-ordinates.

For sampling forest trees, the use of circular ‘point centered’ quadrats is a useful technique. Here all the trees within a certain radial distance of one focal tree can be measured in terms of height or diameter of trunk at breast height (DBH), which is taken to be 1.2m from the ground. As long as the position of the focal tree is recorded so it can be located, the measurements in the quadrat can then be repeated at a later date to detect signs of change. The selection of the focal trees should be random within the plot. One way to do this is to follow a compass bearing across the plot and choose every other tree that lies on the line.

Quadrats are often used to find the average number of features in a given area such as the density of trees or other plant species or to find the proportion of an area taken up by something, such as sea-grass in a lagoon or substrate type in a stream, usually in the form of % cover. Percentage cover within a quadrat can be estimated by eye, with practice.

A project to measure the percentage cover in a mangrove forest used gridded quadrats set out with string. Within the areas, tree trunk positions were determined by their distance from intersections. These were plotted onto a large sheet of paper. Canopy cover for each grid square was then drawn by looking upwards from the ground to the sky. The positions of the grid corners were recorded by GPS so the quadrat can be relocated. The results can be used to monitor changes in canopy cover resulting from removal of trees for fuel wood.



Box 5

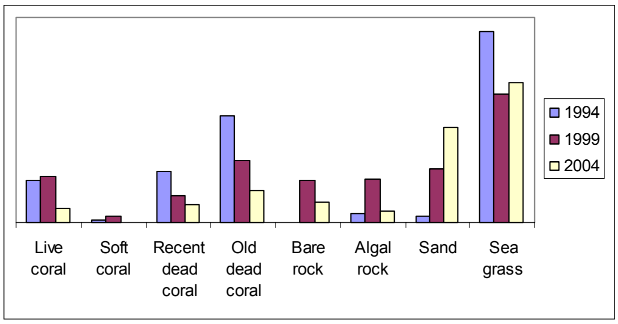
possible fieldwork based on point samples or quadrats
• recording all the bird species seen or heard for a fixed period of time from one point early in the morning • measuring the chemical quality of a river or stream at different points along it • finding the number of insect species attracted to a light trap during a fixed period of several hours • measuring the rate of loss of ice, or ablation rate, from the surface at different points on a glacier • counts of traffic, types of transport or travellers on foot at fixed locations for fixed periods of time • measuring the size or height of all the trees within a fixed distance of one particular tree • measuring the impact of trampling, visitor pressure, grazing or fuel wood collection around focal points such as settlements, wells or tourist sites • finding the sediment load of a river at different points • estimating various types of biomass within a quadrat

5. Using transects

Transects are lines, either real or imagined, laid out across an area where some sort of environmental gradient exists and along which samples or data are collected. They can be made with a tape measure, with rope or string, by creating a track or path, by laying a chain or weighted string underwater, or by following a compass bearing. Data can be collected at every point along the line, at regular intervals, within a certain distance either side of the line, or by moving along it for a certain amount of time. If a string or chain is used for the transect line it needs to be set out as straight as possible. This is often not as easy as it sounds when obstructions and gradients are taken into account, or if it is underwater where currents will tend to displace it. Transects can also be created by simply following a compass bearing or GPS track. This is useful over much longer distances where a tape or string becomes impractical.

Line transects can be scored for the whole length of the line, recording what is present and over what distances. Then simple proportions of different substrate types or vegetations types can be calculated and compared with subsequent data. This can be useful for monitoring processes such as sedimentation in a lagoon or the spread of plants or the loss of trees due to fuel wood harvesting.

Monitoring the accumulation of sediment on a reef flat was carried out using weighted line transects set out beneath the water. A series of 50m transects were scored along their entire length for sediment, coral and bare rock. The length of transect occupied by sediment was calculated as a proportion of the total distance. The sediment most probably comes from river bank erosion due to deforestation further up the coast. This project has tracked the increasing amount of sediment accumulating on the reef flat for over fifteen years.



Quadrats can be placed at regular intervals along the line and scored. Alternatively, counting items within a certain distance either side of a transect can be a useful way of getting an idea of population size or the abundance of something. This technique is not as easy as it sounds and needs some training to be able to judge the distance in question. Counting sea urchins within five metres either side of a transect is easy, but when the distance is greater, say twenty five metres, and the items being scored are amongst trees, it becomes much more difficult to see them and to judge the distance reasonably accurately. Practice beforehand is critical. If the distance of each object at right angles from the line is measured and recorded along a certain transect length, some free downloadable software called Distance can be used to calculate the total number of objects in an area, such as the population size for an animal species.

Point samples or quadrats can be placed at regular intervals along a transect as a means of gaining a representative sample, or to reveal differences across an area such as a desert margin. The quadrats are usually positioned on the same side of the line. However, an alternative is to use quadrants centered on points spaced along the transect. If sampling points are established every ten metres along a randomly placed transect, the transect itself and a line at right angles to it can be used as axes. This defines four quadrants grouped around each point in which sampling can take place. A simple method to determine tree density that can be used to monitor the impact of timber extraction or grazing involves measuring the distance from the centre point to the nearest tree in each quadrant. The four measurements are averaged and squared to give a measurement of the mean area occupied by each central tree. By simple proportion, the number of trees per hectare can be estimated.

Point centred quadrants along a forest transect, together with estimation of height and extent of damage to each tree, were used to assess the degree of elephant damage in contrasting forest areas and can be repeated in the future to monitor the effect of an increasing elephant population.

forest area	**mean distance (m)**
Mwaluganje	4.42 (n = 59)
Kivumini	4.28 (n = 38)
Makadara	4.37 (n = 39)
Longomagandi	3.34 (n = 68)

Box 6

possible fieldwork based on transects
• recording the substrate type along a transect across a reef flat to monitor sedimentation or spread of algae or loss of live coral • recording primate observations by walking along a transect for a fixed time • counting the fish seen within 5 metres either side of a transect whilst snorkeling along • following a transect across a settlement to identify patterns of land use • locating and recording the dung of a particular species by measuring the position of the transect and the lateral distance between each sample and the transect line • setting pitfall traps at regular intervals along transects in two different situations • identifying different vegetation zones so as to detect changes • the change in vegetation away from a well in a semi-arid area

6. Collecting data by questioning and interviews

Asking local people for information can be problematic, especially in terms of obvious sensitivities concerning intrusion or suspicion and because of language barriers. However, with the right approach asking questions and using interviews can generate useful data. In general, questions should be designed to generate specific information rather than views or opinions or general statements.

Asking local people about their traditional uses of plants in this project depended on an interpreter, but produced interesting information that could be used to track changing levels of indigenous knowledge over time. However, it also gave expedition members a fascinating insight into aspects of local lifestyle.

Sokotei	roots are boiled to make a drink to give to women giving birth to release the placenta
Mbono	used to make oil which is used as a fuel and use as a purgative
Mbukuruni	seeds from fruit used to kill amoebas

Box 7

possible fieldwork based on questioning and interviews
• asking people how far they have travelled to a particular place for goods or services to work out zones of influence • asking people where they encounter particular animal species to assess population distribution • asking people about traditional uses for plants where such information is slowly being lost • asking people about their use of local resources to assess human pressures • testing locals' perception of problems, wealth, or distances

7. Tools

A great deal can be achieved without the use of specialised or expensive equipment but specific tasks often require the measurement of environmental conditions for which particular pieces of equipment will be required. The following is a list of hints and tips relating to equipment, including some suggestions for improvisation.

Basic survey and mapping can be achieved with a mixture of improvised and bought equipment. Tape measures and spirit levels can be bought cheaply from discount tool shops. The open reel type tape measures are best since they are more easily dried out. Survey poles are relatively cheap to buy but are often difficult to transport, especially by air. However, they can often be improvised in the field. A perfectly serviceable plane table can be made from a flat piece of plywood with a tripod mount attached to the underside so it can be used in conjunction with a variety of camera tripods that expedition members may take anyway. Ordinary navigation compasses are not suitable for accurate sighting. Sighting compasses, clinometers and alidades are precision items that can be bought from suppliers such as Geopacks and Alana Ecology, as are laser rangefinders, although these can often be bought more cheaply from golf shops. Enclosing the plane table in a large transparent plastic bag big enough to protect the paper is crucial if it is likely to rain.

Mapping and survey projects can be carried out with a mixture of simple, improvised equipment and a few specialist items. All of the techniques can easily be rehearsed before departure so that all of the members of a team understand what they have to do. An internet search will produce plenty of descriptions of how to carry out plane tabling.

Handheld GPS receivers can be bought from outdoor shops or mail order from online suppliers such as Expansys. There is an increasing variety of different makes and models so it is important to consider exactly what sort of features you might need for the particular circumstances of the fieldwork you are planning. In many cases, entry level units do not offer features such as an external antenna socket so paying a little more can be well worthwhile. A good buyers' guide to GPS receivers for expedition fieldwork can be found in Field Techniques: GIS, GPS and Remote Sensing, listed in the sources of information at the end of this guide. There is also plenty of information available on manufacturers' websites.

Running simple GIS software in the field on a laptop or a PDA is becoming increasingly possible. There are still obviously all the inevitable problems with battery supply or recharging and the difficulties of using relatively delicate equipment in arduous field conditions. However, battery life is improving all the time and waterproof protective housings such as the Otterbox (available from Expansys) can be bought for a whole variety of equipment. Useful tips about using technology in remote conditions are available from Technology for Conservation and Development (t4cd). Even if data is collected onto spreadsheets on a laptop or PDA, or entered into a GIS in the field, it is still crucial to keep paper-based backup records in case of equipment failure or loss. Methods for using GPS and Google Earth for simple fieldwork activities can be obtained from the Juicy Geography and Digital Explorer websites.

GPS receivers are a very useful tool for almost any expedition fieldwork. If it is possible to download the data to a laptop in the field, then data can be stored or progressively added to a GIS. In this case, the laptop was powered by a small generator in a static base camp.

Sampling equipment can also be a mixture of improvised and bought equipment. A tape measure, string and pegs is all that is required for most large quadrats. Portable frame quadrats can be bought from suppliers such as Alana Ecology. Small portable grid quadrats can be cheaply improvised from square section plastic covered mesh sold by fencing suppliers or garden centres. This can simply be cut to size. Nets, soil corers and ice augers need to be robust and are best bought. It is worth getting the best you can afford from a supplier such as GB Nets because they will be much more hard wearing than homemade ones. However, sampling equipment such as pitfall traps can be improvised from plastic or polystyrene cups sunk into the ground level with the surface and butterfly traps can be improvised from the type of hanging meat safes sold for camping, baited with fruit. Traps for flying insects can simply consist of yellow washing up bowls of water during the day or brightly illuminated vertical white sheets fashioned from cheap shower curtains at night.

Obtaining a sample of ice from a glacier requires robust, purpose made equipment like this auger, but trapping butterflies can be carried out effectively with improvised equipment. These mesh meat safes had a one way entrance flap added to form a trap that could be baited with fruit.

Measuring biomass in the field can be done with spring balances or with small robust portable digital balances. Clearly larger quantities of bulky material such as branches or leaves cannot be weighed on a small balance. Heavy duty spring balances can be bought from good ironmongers or from an agricultural supplies shop. Used together with string or plastic bags to bunch or hold bulkier material, they are a convenient way to weigh higher volumes. Small items such as invertebrates can be weighed on digital balances.

The measurement of environmental factors usually requires specialised equipment. For example, a range of robust water flow metering equipment is available from GB Nets. On the other hand, ablation stakes can be improvised with white painted bamboo canes. A wide range of instruments and meters can be bought from the suppliers listed at the back of this guide.

Anemometers need to be good quality otherwise they are notoriously unreliable at lower wind speeds. On the other hand, relatively cheap vernier calipers from a discount tool shop can be used to measure the diameter of tree seedlings just as effectively as an expensive forestry diameter tape that coverts from circumference to diameter. Obviously this would not work for larger trees, but was perfectly adequate for this project in a mangrove forest.

If measurements need to be made frequently, or at fixed intervals for a long period, data logging may be more convenient. Data loggers store a series of readings which can then be downloaded to a computer. Professional data logging equipment tends to be prohibitively expensive for youth expeditions, but borrowing such equipment might be an option. Alternatively, school level data logging equipment from manufacturers such as Data Harvest has become much more reliable and robust and may be more than adequate for expedition use.

The use of pre-prepared data collection sheets is often very useful for youth expedition fieldwork. If these are laminated, they can be written on with marker pens and then wiped off for re-use when the data is later transferred to a notebook or master recording sheet. Where identification will be required, it can be very helpful if a limited range of species or minerals or rock types are extracted from field guides and put together on pre-prepared identification sheets or a simple identification key rather than having the expedition members use the field guides themselves. The majority will not have the experience or expertise to use field guides reliably, whereas a simple choice between, for example, six tree species, is much easier to handle. Of course, this does depend on prior knowledge of an area and what might be encountered.

In projects where identification is necessary, pre-prepared ID charts can streamline the activity. Here, in a transect survey to assess human impact on a reef, pictures of eight indicator fish species were put onto a laminated card that could then be used as a recording sheet. Software now exists to create small identification keys that will run on a PDA. It is much better to custom build a key for the locality featuring the species that will be encountered than to have expedition members struggling with unwieldy field guides.

Last but by no means least, it is important that expedition members have a chance to try out the fieldwork techniques that they will carry out on the expeditions, especially where methods or equipment need to be practiced. Some training and familiarisation beforehand is always helpful to the smooth running of the fieldwork, even if this only takes place during the first few days of the expedition. More useful are some training sessions well before departure where the activity can be simulated in some way and the equipment tested, so any unexpected difficulties or pitfalls can be identified and solved in advance.

Useful contacts, sources of information and equipment

Details of previous expedition fieldwork:
RGS-IBG Expeditions Database http://www.rgs.org/expeditionreports
RSGS Expedition Reports http://www.geo.ed.ac.uk/RSGS/expedits/reports/
BEG archive http://www.brathayexploration.org.uk/archiveindex.htm

Field methods and techniques
Practical Methods in Ecology, Henderson (2003) Blackwell ISBN 1 40510 244 6
Fieldwork Techniques and Projects in Geography, Lenon and Cleves (2001) Collins ISBN 978 0007114429
Field Techniques: GIS, GPS and Remote Sensing, RGS-IBG (2005) ISBN 0 907649 88 2
Using GPS for surveys: http://www.alanaecology.com/acatalog/Using_GPS_for_Surveys.html
Using GPS to create a map: Adit Limited http://www.aditsite.co.uk/html/gps_survey.html
Using GPS for fieldwork: http://www.juicygeography.co.uk/gpsschool.htm
Field Techniques in Glaciology and Glacial Geomorphology, Hubbard and Glasser (2005) John Wiley and Sons ISBN 978 0 470 8442 4
African Forest Biodiversity: A Field Survey Manual for Vertebrates, Earthwatch (2002) ISBN 0 9538179 4 6
Survey Manual for Tropical Marine Resources, English, Wilkinson and Baker (1997) AIMS ISBN 0 642259 53 4
Ideas for using a PDA and GIS for fieldwork: http://www.geographyteachingtoday.org.uk/images/text/Fieldw_SD_article.pdf
Using ICT in remote locations: Technology for Conservation and Development http://www.t4cd.org/Technology/Pages/default.aspx
Practical Guide to the Study of Glacial Sediments, Benn and Evans (2004) Hodder Arnold ISBN 978 034075959 2
Information about datalogging: Grant Instruments http://www.grant.co.uk/Data+Aquisition/What+is+data+logging/
RGS Expedition Handbook, Winser (2004) Profile Books ISBN 1 86197 0447
Expedition Field Techniques: Bats, Bird Surveys, [Conservation] Education, Fishes, Insects, Primates, People-Oriented Research, Reptiles and Amphibians, Small Mammals, RGS-IBG http://www.rgs.org/GOpubs

Fieldwork equipment suppliers
Geopacks
Unit 4A, Hatherleigh Industrial Estate, Holsworthy Road, Hatherleigh, Devon EX20 3LP http://www.geopacks.com
Alana Ecology
The Old Primary School, Church Street, Bishop’s Castle, Shropshire SY9 5AE http://www.alanaecology.com/
GB Nets
PO Box 1, Bodmin, Cornwall PL31 1YJ http://www.efe-uk.co
Watkins and Doncaster
PO Box 5, Cranbrook, Kent TN18 5EZ http://www.watdon.com

Expansys
Unit 1, Kiwi Park, Westinghouse Road, Trafford Park Manchester M17 1HW
http://www.exapansys.com
Data Harvest
1 Eden Court, Leighton Buzzard, Bedfordshire LU7 4FY
http://www.data-harvest.co.uk/datalogging/sec_index.html

Fieldwork software suppliers and downloads
EasyGPS: freeware for GPS data transfer http://www.easygps.com
GPS Utilty: freeware for managing and mapping GPS data http://www.gpsu.co.uk
Map Maker Gratis: free GIS software http://mapmaker.com/products.htm
Distance: software for handling transect data http://www.ruwpa.st-and.ac.uk/distance
WildAuthor: software for making identification keys for PDAs
http://www.wildknowledge.co.uk
Google Earth for fieldwork: http://www.digitalexplorer.co.uk

Field guide suppliers
Subuteo Natural History Books
The Rea, Upton Magna, Shrewsbury SY4 4UR http://www.wildlifebooks.com
NHBS Environment Book Store
2-3 Wills Road Totnes Devon TQ9 5XN http://www.nhbs.com

Working safely
Safety in Biological Fieldwork, Institute of Biology (1990) [relevant for all disciplines]
Safe and Responsible Expeditions, Young Explorers' Trust (2002) ISBN 0 905965 04 3
BS8848: British Standard for the provision of adventurous activities, expeditions, visits and fieldwork outside the United Kingdom, BSI (2008)
Off-Site Safety Management courses http://www.rgs.org/OSSM

Working responsibly
Environmental Responsibility for Expeditions, British Ecological Society and Young Explorers' Trust (2002)

General advice on planning and running youth expeditions and fieldwork
Young Explorers' Trust http://theyet.org.uk
Geography Outdoors http://www.rgs.org/GO
Teaching Geography http://www.teachinggeographytoday.org.uk
Fieldwork Knowledge Library http://www.fieldworklib.org

Publications from Geography Outdoors

The following books on Field Techniques can be purchased from Geography Outdoors: the centre supporting field research, exploration and outdoor learning, RGS-IBG, 1 Kensington Gore, London SW7 2AR, UK

Orders by post, phone, fax and email are welcome

Postage: UK: prices include postage and packing. Overseas Air Mail: please add £4 per item in the EU or £9 for the rest of the world. Contact us for bulk orders.

Discounts: Orders of 3-9 of the same publication: -10%.

Payment: Pre-payment is required in UK pounds sterling, by cheque to 'RGS-IBG', or by Switch, Visa or MasterCard, quoting card number, Switch issue number and expiry date. Orders can also be placed on www.rgs.org/GOpubs

Bats
An overview of techniques that can be used by small expeditions to study bats in the field.
Kate Barlow, 1999. ISBN 978-0-907649-82-3. £10.00
Bird Surveys
Joint publication with Birdlife International for the BP Conservation Award.
1998. ISBN 978-0-907649-79-3. £10.00
Education Projects
Advice on how to incorporate conservation education projects into an expedition.
Jen Hurst (ed), 1998. ISBN 978-0-907649-78-6. £10.00
Fishes
Capture, preservation, identification and analysis of fishes, the most diverse group of vertebrates.
Brian Coad, 1995. ISBN 978-0-907649-71-7. £10.00
GPS, GIS and Remote Sensing
How GISci techniques can be used for logictics, research, conservation and mapping.
N. McWilliam et al. 2005. ISBN 978-0-907649-88-5. £15.00
Insects
Advice on field methods and equipment for collecting insects and other terrestrial arthropods.
G. McGavin, 1998. ISBN 978-0-907649-74-8. *£10.00*
Primates
Guidelines on projects, preparation, field methods and equipment for primate studies.
Adrian Barnett, 1995. ISBN 978-0-907649-69-4. £10.00
People-Oriented Research
A discussion of social research techniques, including participatory rural appraisal.
Sachin Kapila & Fergus Lyon, 2006 (eds). ISBN 978-0-907649-67-0. £10.00
Reptiles & Amphibians
Search methods, handling techniques, post-expedition activities and information sources.
Daniel Bennett, 1999. ISBN 978-0-907649-81-6. £10.00
Small Mammals (excl bats)
Detailed guide to trapping, dietary analysis, habitat description and more.
Adrian Barnett & John Dutton,1995. ISBN 978-0-907649-68-7. £10.00

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