

24 TROPICAL FOREST EXPEDITIONS

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“Jungle” to many people evokes an image of an unbearably hot suburb of hell where unfortunate travellers suffer endless torment from clouds of disease-carrying bugs, while the trees, dripping with poisonous snakes, serve only as cover for vicious animals waiting to pounce.

The truth, of course, is that tropical rainforests are home to many indigenous peoples and are hospitable once one knows how to live in them. Certainly, they can afford equal or greater comfort than many other expedition destinations though, as with all environments, such comfort is greatly facilitated by good planning and appropriate equipment. Many of the health problems encountered in the tropical environment such as infectious diseases or animal bites and stings are covered in Chapter 20. The purpose of this chapter, therefore, is to give an overview of expeditions in a tropical rainforest and draw attention to a selection of specific points.

The environment

Tropical rainforests cover a dwindling 6% of the Earth's land mass and are defined by their location (between the Tropic of Cancer 23° 27' N and Tropic of Capricorn 23° 27' S) and by their high rainfall, which can be several metres a year. They are thus hot and humid, often with little breeze or respite, though upland forests may chill enough through the night to require a blanket or lightweight sleeping bag. Some forest floors may be under water for much of the year.

Preparation

Much of the success of any expedition relies heavily on the pre-departure preparation. The team should be selected not only for the appropriate combination of skills to complete whatever task the expedition is undertaking, but also for the ability to live with one another for prolonged periods in sometimes trying circumstances. Previous successful expedition participation is a good predictor. Expeditions are often physically challenging but fitness can be improved by training and sometimes a bright sense of humour can be a more desirable asset!



Figure 24.1 *Wading through a jungle river – Irian Jaya (P. Richards)*

The command structure is best decided at the outset with roles and areas of responsibility such as food, medical kits, science data and so on defined and, importantly, agreed by all members to avoid potential conflict in the field. Team bonding and a sense of ownership are helped enormously by shared preparation and realistic “trial runs” before the expedition departs.

Ensure that the team receives appropriate immunisations and advice on hygiene and bite avoidance. All members should know first aid and navigation. Organise jungle training for those new to the environment and training in any special techniques that projects may require. Other chapters in this book are useful sources of advice on pre-expedition preparation.

Water and food

Obtaining water is not usually a problem in tropical forests, although the quality can be variable. In savannah or scrubland water may be scarce. Consider from where you will obtain water and how you will purify, store and carry it. If operating from a base camp then boiling is the most effective sterilisation even for water containing particulate matter, but on the trail removal of sediment by coarse filter (e.g. Millbank bag) and sterilisation with iodine enable regular filling of water bottles. Each member should carry at least 2 litres of personal water. Commercial water purifiers rapidly become clogged unless sediment is first removed by prior filtration. In some parts of

the world water may be contaminated by heavy metals, for example mercury from the gold-mining process in the Amazon basin.

Friendly villages may be able to supply smaller groups with (sometimes unfamiliar) food but large expeditions should be provisioned in case requirements exceed supply. In uninhabited areas sometimes several days' worth of food may need to be carried. Living off the land by trapping, shooting and foraging is ambitious and unlikely to be viable except for the most experienced of jungle travellers. Fresh food deteriorates rapidly and must be stored out of reach of ants and other wildlife. Tins have long shelf life and are relatively immune to predation. Packet or dehydrated food requiring little preparation is useful and is lighter to carry. Food must be cooked hygienically (see Chapter 10) and raw food is best avoided to minimise gastrointestinal illness.

Acclimatisation

Humans may once have been “tropical animals” but for many this is definitely past tense. Those transported abruptly by aircraft from temperate climes are likely to suffer from fatigue, lethargy, poor sleep and reduced exercise tolerance. They should maintain hydration and exercise little in the first few days and this limit on activity should be considered when formulating the expedition itinerary. Acclimatisation is assisted by slower transit overland or on a boat but otherwise takes about 8–10 days (slightly longer in children). Not surprisingly, air conditioning delays acclimatisation and is best avoided. In preparation, careful exercise in a hot humid environment, as simulated by exercising in warm clothing indoors for an hour a day for at least a week preceding jungle exposure, will aid acclimatisation, although the benefit is lost within a week if not maintained. Care must be taken to maintain hydration and the exercise halted if any signs of heat stress develop.

Clothing and equipment

Nudity aids evaporation of perspiration, which in humans is the main method of cooling, but provides no protection from bites or scratches. This and the possibility of offending cultural taboos necessitate clothing for expeditioners. Women in particular need to be mindful of local dress codes in exposing bare legs or even arms. In some forests shorts may be suitable but in others insects and sharp or irritant plants make long trousers and long-sleeved shirts a must. Covering up is especially important in preventing insect bites, particularly from dusk to dawn when malaria-carrying mosquitoes are active. Clothing should be cotton, light, loose and airy. Tight clothing impairs air circulation and evaporation, and predisposes individuals to prickly heat. Pale colours attract fewer mosquitoes and are theoretically cooler.

Both clothing and skin tend to rot when continuously wet. Try to dry the skin at night if possible and reserve a dry set of clothes for camp. A wet set for day travel can be rinsed in camp to remove salt and drying attempted over the fire but can be worn

damp next morning if necessary. A plastic bag large enough to line your rucksack and twisted, folded and taped at the neck will protect dry kit in tropical storms or if the rucksack falls in a stream.

A hat is useful to protect the head from rattan-barbed leaves hanging across trails, for comfort in rains, and for sun protection in open areas. An umbrella is carried by some for open trails or forest downpours but can snag if used when walking. It is, however, useful in camp; tied at the top of a 2-metre tree branch which has been stuck in the ground and denuded of leaves it will make an effective sheltered clothes stand.

Footwear is subject to opinion. Bare feet or sandals provide no protection from thorns, snakes and infections such as hookworm and larva migrans, which burrow through skin in contact with infected soil. Heavy rigid boots can be difficult on slippery logs but a good tread is important in mud. On firm open trails some prefer trainers though these provide no ankle support. In very wet or muddy conditions, rubber boots are simple and provide good protection. The author's preference is for light, quick-drying, cordura-type boots. A flap covering the laces to prevent snagging on foliage is a bonus. Needless to say, all footwear should be well broken-in; "Vietnam Jungle Boots" in particular seem to predispose to blisters. For camp, comfortable lightweight shoes such as trainers are useful but remember you may need to trek in your "spare" footwear.

A machete is essential for jungle survival and generally for making trails or camp. The tool should be respected and care taken to learn safe use. Some locally produced machetes can be of suspect quality, as illustrated when the author narrowly missed impalement by a fast-flying blade that buried itself 4 centimetres into a nearby tree after departing its handle. Its flat edge was being used by a novice to play baseball!!! There is the potential for major injury if one slips when carrying a live blade so it should be sheathed when not in active use. Gloves are useful as hands can sustain many small cuts from sharp grass when cutting foliage.

Shelter

Sleeping on the ground is not recommended due to exposure to scorpions, snakes, ants and other wildlife. Options include constructing a raised platform, a tent (although these can be stiflingly hot and are heavy when wet) or a hammock. A tent with a sewn-in bucket-type groundsheet offers a barrier to ground wildlife and a groove cut into the ground around the tent will drain rainwater runoff. Hammocks are favoured by many, as they can be slung just about anywhere, are quick to erect, light and take advantage of every slight breeze. Hammocks should be slung fairly tight, as sleeping is difficult when sagged to a banana shape. A tarpaulin or poncho rain shelter can then be strung over the hammock and a permethrin-impregnated mosquito net suspended beneath it so that it covers the occupant without leaving gaps or touching the skin. The ground beneath the hammock, and for a few feet surrounding, should be cleared so that the occupant can step clearly on to earth. Leaf



Figure 24.2 *Sleeping off the ground (C. Caldicott)*

litter can hide all sorts of fauna and, although snakes will depart if they detect your approach, to surprise a resting snake by stepping on it from your hammock may provoke a defensive bite. Whatever form of shelter is chosen, a sleeping mat enhances comfort and a silk sleeping bag liner used alone may give sufficient warmth. Group areas such as communal dining can be protected by large tarpaulins.

MEDICAL PROBLEMS SPECIFIC TO TROPICAL EXPEDITIONS

Skin

Stop as soon as practical when you feel any “hot spots” and treat them before they become blisters. Damp and encased in shoes, feet become waterlogged, smelly and infected with fungi, so take every opportunity to air them and avoid sleeping in wet socks. Bacteria can gain entry through soggy broken skin giving secondary infections. Fungal infections are also common in the groin. Wash and dry the skin daily where possible and apply prophylactic antifungal powder to the feet and skin folds. Using a combination antifungal/weak steroid cream (hydrocortisone) economises on weight, speeds relief of inflammation and can double up as anti-irritant on non-infected bites.

Wound infections

In this humid environment, even small scratches can quickly become infected. Minor infection may progress to spreading skin infection (cellulitis) requiring antibiotics, or abscesses, or, at worst, become a life-threatening generalised sepsis (septicaemia). It is prudent, therefore, to examine the skin, particularly legs and arms, each evening. Using carefully cleaned hands, wounds should be washed with soap and water as soon as possible, dried with clean gauze or similar, antiseptic applied and covered if open. Iodine tincture 2% for water sterilisation is an effective antiseptic but traditional cream stings less. Spray-on iodine (Savlon Dry) avoids the need to touch the cleaned wound. Healing is more likely if the wound is kept dry.

Prickly heat (*miliaria rubra*)

This is an intensely irritating prickly rash, which arises in skin waterlogged from continual perspiration. The sweat pores become blocked and inflamed giving a rash of tiny blisters on a background of red skin. Common sites are the waist, armpits, neck, upper back and chest, scalp and flexures. Treatment is to bathe in cool water, gently pat dry and apply talcum powder or calamine lotion.

Insects

Insects are often tiresome nuisances but their importance lies in the large range of diseases they can transmit (see Chapter 19). Malaria is probably the most significant disease in terms of numbers affected. Fortunately, the same methods of bite avoidance work for all. Some people hardly seem to respond to bites whilst others suffer intensely irritating reactions.

Topical or oral antihistamines or Eurax all help with itching, although there is a small risk of skin sensitisation with topical antihistamines. The breach of skin in-

TABLE 24.1 INSECT AVOIDANCE

Cover up	Long sleeves, trousers, hat. Especially dusk to dawn
Insect repellent	DEET, eucalyptus, citronella. Cover all exposed skin. Spray or liquid better than solid stick which may leave gaps
Mosquito net	Especially for sleeping. Avoid gaps; tape tears More effective if permethrin impregnated If touches skin, insects may reach skin through the net pores
In buildings	Net-screened windows/doors. Air conditioning 'Knock down' spray Mosquito coils/permethrin-impregnated heated pads

tegrity or subsequent scratching can produce secondary bacterial infection, which should be treated with antibiotics as above.

Dehydration and heat illness

These are covered in Chapter 23.

Symptoms and signs of dehydration

- Fatigue
- Confusion
- Thirst
- Rapid pulse
- Poor urine output
- Dry mouth and membranes
- Loss of skin turgor (feels “porridgey”).

Maintaining hydration

Thirst is a poor indicator of hydration

Urine should be of good volume and mostly clear

Drink beyond the point when you stop feeling thirsty

(Concentrated urine = dark or tea colour = dehydration)

Gastroenteritis and hygiene

Personal and camp hygiene are particularly important in the tropical environment (see Chapter 10). Acceptable contact lens hygiene may not be practicable in an expedition setting due to the risk of eye infection. Antibiotic eye drops and back-up spectacles must be carried. Diarrhoea and vomiting can spread quickly through the expedition team and hands should be washed with antiseptic soap after use of the latrine and before handling or eating food. I take personal responsibility for cleaning and storing of my own spoon and mess kit and avoid sharing of personal water bottles. As daily fluid requirement is already high due to perspiration, added loss from gastroenteritis can quickly lead to dehydration, particularly where vomiting makes extra intake difficult.

Treatment to replace lost fluid and body salts should begin at the onset of the illness before dehydration becomes apparent. Losses should be minimised by ceasing exercise and remaining in the shade as much as possible. Glucose is rapidly absorbed across the bowel wall, taking water and sodium with it, and is more effective mixed with water in rehydrating than water alone. It is the basis for oral rehydration solution (ORS), which also contains important salts such as sodium and potassium. A

TABLE 24.2 ADDITIONAL SUPPLIES FOR TROPICAL RAINFOREST EXPEDITIONS (SEE CHAPTER 3 FOR DETAILED MEDICAL KIT)

<i>Useful Items in a Jungle Formulary</i>	<i>Examples/notes</i>
Dry iodine spray	Savlon Dry
Soap!	
Insect repellent	DEET
Suntan cream	Factor 15+, water resistant
Antihistamine	Loratdine or cetirizine
Antifungal dusting powder	
Antifungal cream	Clotrimazole with hydrocortisone
Antifungal vaginal cream/pessary	
Eurax cream	(Itchy bites)
Antibiotic for skin	Erythromycin
Antibiotic for gut	Ciprofloxacin, metronidazole
Standby malaria treatment	Seek contemporary advice
Loperamide	
Oral rehydration solution (ORS)	Diorylate
Antiemetic	Prochlorperazine (+ Buccastem)
Gauze	
Non-adherent dressings	Melolin
Blister kit	Compeed/Spenco/Comfeel

TABLE 24.3 OTHER USEFUL KIT

- | | |
|--|----------------------------|
| • Swiss Army penknife or Leatherman multi-tool | • Whistle |
| • Paracord | • Camera polarising filter |
| • Bungees | • Cigarette lighter |
| • Plastic bags (+ ziplock) | • Jay cloth (face flannel) |
| • Duct tape (repairs!) | • Machete sharpening stone |
| • Torch | • Learn basic knots |
| • Candles | |

rough guide is 200–300ml with each bout of loose stool in addition to normal daily fluid requirement. If no commercial preparation is available, it can be made by:

*Eight level teaspoons of sugar + two level teaspoons of salt in
1 litre of sterilised water*

A surprising amount of fluid can be taken by frequent sipping; although some may vomit back, some will stay down. Severe dehydration may require rectal (controversial) or intravenous fluids and evacuation (see Chapter 18 for more details).

In contrast to in Britain, where gastroenteritis is usually viral, in this environment it is often bacterial. This is associated with acute onset, fever and general toxicity, and responds rapidly to antibiotics such as ciprofloxacin. Other useful drugs are loperamide, which slows the diarrhoea, and antiemetic drugs such as prochlorperazine to reduce vomiting. This is available as suppositories or special tablets which can be dissolved under the upper lip (Buccastem).

Psychological problems

Unfamiliar sounds, smells, fear of animals, disease, the intense darkness of night or the isolation of sleeping exposed in a hammock in a strange place may contribute to anxiety. The best tip is to be interested in the jungle around you, learn about the environment and listen to local guides. In other words, become informed. Fear arises from uncertainty and unfamiliarity and knowledge makes the forest accommodating rather than intimidating. Prolonged exposure to wet discomfort saps morale so regular return to a comfortable environment, which might be a well-constructed base camp, is important. "Social time" particularly for sharing of the evening meal and general relaxed chat, is important for team integrity and morale.

HAZARDS AND NUISANCES

Be aware of hazards when choosing a site for the night. Look up! Loose or rotting branches can, and frequently do, crash down. Seemingly attractive abandoned native shelters can harbour spiders, ants or rodents and the snakes that feed off them. Even when it is dry locally, rivers can rise quickly from rain upstream and drown the camp. Routine jungle travel may involve wading through water but care must be taken with fast-flowing or deep rivers. Learn and practise river-crossing techniques in advance but avoid the hazard itself where possible. Do not enter gorges without thought to escape routes.

Trauma may be associated with falls, sprains, use of knives, lacerations on foliage, road traffic accidents or expedition activities such as kayaking. A stout walking pole made from a small tree or branch is useful on steep or slippery ground. Log bridges are often several feet off the floor and fixing the eye on the far end rather than the feet aids balance.

Getting lost in rainforests is very easy. A few steps off a trail and the forest looks the same in every direction. Use local guides who know the area and ensure they



Fig. 24.3 *Log bridge (C. Caldicott)*

don't inadvertently leave behind their inevitably slower charges. On trails keep the persons ahead and behind in sight at all times. Navigation with map and compass can be difficult over any distance but global positioning systems (GPS), although accurate, may be unreliable. The forest canopy interferes with reception and capturing enough satellites for a fix may be slow or impossible. Wide clearings offer the best hope. Batteries do flatten and the humidity is unkind to electronics.

Leeches cause psychological distress out of all proportion to any physical harm. Aquatic leeches attack swimmers and will enter orifices like the nose, mouth, etc. Land leeches tend to attach on the lower limb but can climb rapidly. Socks, trousers



Fig. 24.4 *Leech on hand (P. Richards)*

and boots provide little protection but DEET offers some deterrence. A tickling sensation or sharpness as they bite may give them away but often the first indication is blood-stained clothing. As they inject an anticoagulant, bleeding persists but a single bite is more messy than serious. Before attachment, they can be flicked off but pulling them off after they have taken hold may leave mouth parts behind and predispose to infection. Of themselves, they are not thought to transmit infections. Application of iodine tincture, salt kept dry in a film canister, other chemical irritants or a lighted cigarette all persuade leeches to let go. Burning them off with a lighter is hazardous to both parties! Apply pressure if necessary to stop the bleeding and treat leech bites as wounds.

Snakes can be so well camouflaged and tend to detect the approach of heavy footfall so quickly that it is possible for non-natives rarely to see them. Humans are not prey but snakes may attack defensively if disturbed. Scorpions are easier to detect as they fluoresce under a portable ultraviolet light. Centipedes can give nasty bites. The following precautions will minimise the risk of snake and scorpion bites:

- Sleep off the forest floor.
- Open up and shake out sleeping bag before use.
- Shake out clothing before wearing.

- Check ground before sitting at the base of trees.
- Store boots inverted on sticks – prevents wildlife crawling in.
- Always routinely tap boots to jolt out any unwanted inhabitants.
- Don't put hands into holes.
- Don't poke holes with sticks.
- Don't straddle logs. Step on to them then away.
- Don't put hands blind into the depths of rucksacks.
- Avoid swimming in water containing matted foliage.
- Don't put hands on branches or ledges that can't be seen.
- Remember banks of rivers and streams are common snake haunts.
- Always use a torch and wear boots to visit latrines – snakes hunt at night.

TABLE 24.4 EXAMPLES OF OTHER BIOHAZARDS FOUND IN TROPICAL RAINFORESTS (SEE CHAPTERS 19 AND 20)

<p>Arthropods</p> <ul style="list-style-type: none"> Ants Jiggers Chiggers Myiasis Bees, wasps Irritant moths, caterpillars, butterflies 	<p>Larger animals</p> <ul style="list-style-type: none"> Bats, dogs (rabies), crocodiles, <p>Aquatic</p> <ul style="list-style-type: none"> Stingray Electric eels Piranha
<p>Plants</p> <ul style="list-style-type: none"> Spines or sharp plants Irritant foliage Hallucinogenic plants used by locals Poisonous plants 	<p>Scorpions</p> <p>Snakes</p> <p>Spiders</p> <p>Poison-dart frogs</p> <p>Centipedes</p>

SUMMARY

Tropical rainforests are wet and hot and everything thrives including disease. They can nevertheless be comfortable if attention is paid to personal and camp hygiene, construction of shelters and care of equipment. Hazards can be anticipated and mitigated. Venomous, stinging or biting animals can be avoided and minimising insect bites is essential. Be prepared for serious illnesses but realise that they are rare, the majority being minor. Most of all, enjoy the forest. Few environments reveal such abundance and richness of life, and to lie in a hammock, listening to the many sounds of the forest as dawn breaks through the morning-mist-shrouded trees, will long enchant the memory.