



C.4 DESERT ENVIRONMENTS

Alasdair Kennedy (Reviewed 2007)

A description of what can be expected in a desert environment shows them to be unfamiliar, and potentially hazardous, places in which to travel. A process for understanding what lies behind a safe expedition for your group is followed by details of how to manage the particular hazards of the desert.

WHAT IS A DESERT?

Deserts form in areas of low rainfall, generally defined as less than 10" (250mm), and high temperatures. The amount of rainfall will affect the vegetation which can grow. There may be no rainfall for many years, resulting in no vegetation. At the other extreme, there are deserts which are covered with scrubby vegetation, which reflects intermittent or seasonal rainfall.

Limited cloud cover results in a high intensity of sunlight falling on the desert surface, and on anything living on it. It also results in rapid heat loss at night. This is extreme in winter, but may be less noticeable in the summer. These extremes of temperature make deserts windy places.

There are many varieties of desert, depending on rainfall, wind, geology, and the shape of the land. The classic landscape is the sea of sand dunes, but there are much greater areas of gravel plains, flat sand sheets, bare mountains, and stony plateaux. In the Sahara, these are described as erg, reg, and hamada, so names on the map can be a clue as to what to expect.

The lack of water makes deserts hostile to life, so few people live in them. They are largely "deserted", with settlement confined to places where human ingenuity can get water to the surface, or where there are economic or strategic advantages. Being "deserted" makes deserts attractive to people from cities who are looking for a great expedition location, but it also means that the very things that make them hostile to settlement will make them potentially hazardous to the expedition members.

Before travelling to a desert, thought must be given, at the very least, to the means of survival, and, at best, to making the time in the desert comfortable, stimulating, and satisfying for all the participants.

HOW MIGHT WE THINK ABOUT SAFETY?

Expeditions are about making dreams become reality. As we are to look at safety in the desert, it is appropriate to start with a thought from T.E. Lawrence, more popularly known as Lawrence of Arabia, writing in "The Seven Pillars of Wisdom".

"All men dream, but not equally. Those who dream by night in the dusty recesses of their minds wake in the day to find that it was vanity. But the dreamers of the day are dangerous men, for they may act out their dream with open eyes, to make it possible"

So your dream of an expedition to a remote desert makes you a "dangerous man"! Or maybe, a "dangerous woman"!

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If the dream involves taking other people on an expedition, how are we to make these other "dangerous men" responsible for their own safety, and the safety of others? Lawrence had an answer:

"The chief agent is the general's head, and his understanding must be faultless, leaving no room for chance."

Although Lawrence had military leadership in mind, the same principle may be applied to an expedition. The leader has to anticipate the dangers which may be faced because of the dreams of these "dangerous men", and make sure that something is done about them. The leader has to know how to throw light on the subject.

Enlightenment is the result of people thinking for themselves. So, too, is safety. Safety is not just a list of rules to be remembered, but more of an attitude which has to be discovered. Safety is inextricably linked to enlightenment, or understanding. It is equally linked to morality, and to morale. Individuals, especially on an expedition, have an obligation to be responsible for themselves, and to each other.

Responsibility is based on the simple utilitarian principle of "pain and pleasure". This old idea simply means that if a thing is good, it has to be right. If it brings pain, it must be wrong. Knowing how to make even this simple judgment depends on knowledge and reason. Your group has to be given the information on which judgments can be made. Rather than depending on a list of rules, this will provide a disposition which will allow the individual to adapt safely to any situation. Industrial posters put this idea more crudely when they shout "Think Safety!"

All this is really a process of education, and everyone knows that education takes a long time. During the time that your expedition members are learning to "think safety", they may be damaged in a hundred different ways. If, while waiting to develop sound moral judgment, an individual were to be splattered by a car on the first day of an expedition, then an early list of basic safety rules would have been a much better option. On the principle of "pain and pleasure" rules on how to avoid being splattered must be good!

While all members of an expedition have to learn to look after themselves, and each other, the ultimate responsibility for the twins of safety and morale must lie with the leader. As Lawrence said, "the chief agent is the general's head." It is an essential leadership role to think about every possible threat to safety. In modern jargon, that is drawing up a risk assessment. Initially, he, or she, has to think for every individual in the group. Such a concern for safety and well-being is the mark of the humane leader. The response is an upward spiral of improved morale, and a corresponding improvement in safety and well-being.

Despite the extreme danger, Shackleton's concern to be a humane leader meant that he never lost a man on his Antarctic expeditions, and that was at a time when losses on expeditions were generally expected and accepted. Regardless of the image presented in the movie, Lawrence of Arabia had an abhorrence of exposing his men to needless risk, and he preserved lives and morale in the most demanding circumstances. Captain Johnny Walker; the commander of the Second Escort Group in the Western Approaches, was another meticulous and humane leader, and he is remembered in Liverpool folk-lore as much for his care of his men, as for the defeat of

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the U-boats in the Battle of the Atlantic. But he died of a stroke from overwork.

What all three leaders had in common was the belief that, in ensuring the safety of the group, the buck stops with the boss. The leader must have in place the means of avoiding danger in the early days of the expedition, and a means of developing in his people the ability to make reasoned judgments as the expedition progresses, because each individual is valuable.

Imposed rules, on safety, as with anything else, assume that the expedition members cannot, or should not, think for themselves. Such rules have their place in the early "feet-finding" days of the expedition, but can lead to resentment, and the exhaustion of the leader who has to think of them first, and police them afterwards. If the trouble is taken to explain the reason for the rules, then the principle of "pain and pleasure" should ensure that the "rules" become absorbed as a logical and permanent part of each individual's make-up.

To give one example: "Rule No.328 for desert expeditions: keep fingers on the side of stones when you pick them up!" It smacks of squaddies whitewashing kerbstones, and like the 327 rules before, it is likely to be soon forgotten! However, explain that it is a bad idea to put your fingers under the stone when you try to lift it, because a lurking scorpion would probably take a bad-tempered stab at the intruding pinkies, and the rule becomes a good idea, and is not forgotten.

Education, enlightenment, judgment; call it what you may, the aim is to get every member of the expedition automatically asking, "What could be the consequence of what I will do next?" At this stage, we are back to "pain and pleasure" again! Get to this stage, and we can forget about the rules.

KEEPING SAFE IN THE DESERT

There are aspects of safety which are common to any expedition, such as considerations of personal safety in strange towns, and awareness of traffic dangers on the road. Others are specific to a particular environment. Our task is to look at safety in a desert environment.

Deserts are places of high temperatures and little water. Our bodies are like machines, which are composed largely of water, but which use water to keep within a safe working temperature. Changes in the normal balance between liquid intake and heat bring stress, inefficiency, and breakdown. Safety in deserts relates, above all, to maintaining that balance, with a few peripheral elements, such as sandstorms and creepy-crawlies, thrown in.

CLOTHING is your first line of defence. The aim is to protect the body from extreme conditions, so that the core temperature can remain constant without stress. Once acclimatized, there are two alternatives; stripped down to shorts and tee shirt, which gives high water loss, or completely covered, which reduces water loss. Assuming sufficient water supplies, the ideal is to combine both, wrapping up at times of highest evaporation e.g. in wind, or in the heat of the day. Wear loose cotton clothing. Include clothing that will lightly cover arms, legs, neck, and head for full protection in the early days of acclimatisation. A wide-brimmed hat, or a cotton chech wrapped round the head makes good sense. Wrap the tail of the chech around the face in dust and extreme heat. Don't strip off if water is rationed; a deep tan may look good, but it's not worth using up your water for one.

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Sandals without socks allow the feet to harden, but beware of burning the tops of the feet until they are tanned. They give healthy feet, but at the cost of less protection against thorns, sharp stones, and stings. Suede desert boots are preferred by some, but sweaty feet may cause fungal infections. Beware of sun beating through the windows of vehicles onto bare arms and legs. If driving in shorts, sit on a towel. It will soak up sweat, and prevent a vacated seat from heating up to skin-burning temperatures. Good quality sunglasses reduce glare. You need warm clothing for mountain and winter nights; Pertex and pile is ideal.

WATER BALANCE is helped by sensible clothing. 60% of the body is fluid, which comes from water, and the proportions must be maintained to keep the body operating effectively. The body is cooled by sweating, which gives WATER and SALT loss. Symptoms of salt loss are dizziness, cramps, nausea, ringing in the ears, weakness, and headache. DRINKING should be little and often. The amount of water the body needs rises rapidly with the temperature, and then reduces as it acclimatises. There is a temptation to over-drink in the early stages, particularly if using lots of sticky soft drinks, and leads to over-sweating and salt loss.

High rates of evaporation mean that sweat may not be visible on the skin until you get into the shade, lean against another person's bare skin, or sit on a seat. The body works very hard to pump blood round your body, and pump out sweat, so don't abuse it with alcohol, which dehydrates, or with excessive physical demands in the heat of the day. Drink sufficient to keep URINE output normal. If it is dark or reduced in volume, drink more. Drink plenty of liquid before setting out from camp on foot, and take a water bottle. Water consumption fluctuates wildly with temperature, fitness, and state of acclimatisation.

A salt and bicarbonate drink, with a touch of sugar; is a cheap alternative to commercial electrolytes for maintaining salt balance after high water loss. Mix half a teaspoon of salt, a quarter teaspoon bicarbonate of soda, and a teaspoon of sugar in half a litre of water, and drink whenever there has been increased sweating through heavy work, hot wind, or high temperature. Salt sensitivity in taste decreases with heat, so you can add extra salt to food, as it will pass unnoticed. Salt tablets are best avoided, as they often cause vomiting.

Make the most of your water by reducing loss of fluids through diarrhoea and vomiting. You can do this by taking care with water supplies. Most piped supplies in settlements, artesian bores, and deep wells are safe, but purify if in doubt. Water from shallow wells and open water sources should be purified. Choice of purification methods depend on circumstances, and volume required, and include boiling, filtration, chlorine tablets, and iodine.

Bacteria can spread in storage tanks, so clean them regularly. Find out in advance which places have heavily mineralised water, and plan re-supply accordingly. Salt- or gypsum-tainted water will keep you alive if there is nothing else, but is unpleasant to drink unless disguised.

HEAT EXHAUSTION ("sun stroke") results when the balance between temperature control and fluid throughput is upset. It is most likely in the early stages, before full acclimatisation. If the body is unable to maintain the core temperature at the normal 37° it will begin to fail. Symptoms are as for salt loss, plus increased sweating, rapid weak pulse, and feeling of distress and restlessness. Treat with rest in the shade, electrolytes or salt and bicarb drink, body cooling by evaporation from wet towels wrapped round the body, fanning, and maintaining a regime of

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frequent drinks, preferably varied in order to assist absorption by the gut. Collapse is serious. As with collapse from cold exposure, it is the sign that the body is shutting down, and urgent medical attention is essential.

The leader's task is to ensure that everyone keeps an eye on each other during hard physical work, and knowing when to call a halt for a brew of tea or a pan of soup. A quickly made liquid meal is a great morale booster on a hard, hot, day.

SUNBURN is an early risk, and unlikely once tanned, unless at high altitude. Skin burned by the sun is damaged in the same way as it would be when burned by any other source of heat. Damaged skin disrupts the sweating process, and is liable to infection. Exposure to sunlight stimulates the growth of melanin in the skin pigment, which gives a protective tan. It is a slow process, so expose little and often in the early stages. Over-exposure to the sun is usually not noticed by individuals, so look out for each other. Red skin is burned skin! Use sun creams until the tan has built up. If skin burns, the new skin is delicate, and easily damaged. Lubricate and protect it. European residents with dark skin also need to be aware of the need for precautions during acclimatization.

Take special care over skin which normally sees little sun, such as the tops of the feet; the back of the neck and ears if hair has been recently cut; and the underside of nose, chin and ears which are exposed to light reflection. Nose and lips are vulnerable to burning, drying, and cracking, so keep oiled or creamed, even after tanning. The creases at the back of the knees need care, as sweat quickly washes away sun protection.

Sunburn should NOT be accepted as an inevitable part of the acclimatisation. If anyone does burn, then calamine lotion, and anti-histamines such as Phenergan will lessen the pain. If blisters burst, dressings will protect, and prevent infection. Salt and bicarbonate drink will replace fluid loss into the tissues. Each of these may be needed in varying combinations, depending on the extent of damage.

Poor **HYGIENE** is a threat to safety. Intestinal infections spread rapidly, and dysentery can terminate an expedition. Be scrupulous about hand washing before handling food and after toilet. Have a disinfectant bucket for hands at each meal. Your kitchen can be a source of repeated infection. Scrub surfaces, disinfect and wash utensils. The smallest scrap of waste food left crusted on a pan will harbour infection, which can initiate a downward spiral of poor health, lethargy, low morale, discontent, and increased risk of accident.

Unwashed fruit, and uncooked or cold local food, especially salads, should be avoided, unless you wish to waste days of your expedition in a squatting position. Hot, cooked food is generally safe, and it should be part of your adventure to try local dishes. Keep your brain in gear when offered cold drinks in the market on a hot day! Quarantine anyone with the runs as far as food handling, cooking duties, use of cutlery and the like is concerned. Avoid sharing water bottles.

Personal hygiene is vital in close-knit groups. A personal squeezy bottle of disinfectant alcohol gel is now a cheap and convenient way of cleaning your hands while on the move. Wash at night, rather than in the morning, in order to allow a protective film of grease to build up on the skin overnight. It is possible to wash from head to toe with a sponge and a pint of water. Start with the teeth, and end with the feet. Bury waste, even if caught short with the runs; the next fly

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on your food may not have wiped its feet.

DIARRHOEA can be debilitating, means rapid fluid loss, and spreads infection. Tell the rest of the group if you get it, and treat immediately. In most cases, a liquid diet for a couple of days, without drugs, provides a cure. Return gradually to normal solid diet. Only go onto drugs if the runs persist. Take additional fluids while on liquid diet, in the form of sweet tea, fruit juices, powdered milk, soups, and supplements such as Complan or Sustagen. Add salt to make up for what is missed in the solid meals. Be scrupulous with hygiene, even if you feel like death. Keep a disinfectant bucket in camp toilets.

CUTS, BLISTERS, and THORNS should be cleaned and dressed to prevent infection. Medicated dusting powder helps to keep wounds dry. Look out for thorns on the ground beneath acacia trees; they can pierce feet and footwear.

MOSQUITO bites can cause malaria. Be meticulous about taking recommended anti-malarial tablets, and keep a record. If camping near water at night, cover up with suitable clothing, use insect repellent, and sleep under a net.

NOSE BLEEDS can be sudden, and look alarming. Mucus in the nose dries out with heat and dust. Nose picking becomes habitual to remove the "coke". Dilation of the blood vessels in very hot dry conditions, particularly if it is windy, can cause epidemics of nosebleeds. Bung up with cotton wool!

BURNS are a hazard around the kitchen, as flame from cookers and "steam" from pots are invisible in the intense sunlight, and pans may not look hot. Freshly poured black tea can scald, so be patient, or get into the habit of topping up with a splash of cold water.

SNAKES AND SCORPIONS are not a real hazard, provided you do not poke around in holes, under rocks, or amongst vegetation. They will avoid you if given the chance. Snakes are cold blooded. They are sluggish in the cool of the morning, and you might surprise them if you go out for an early morning pee. Try to avoid sleeping overnight in areas of tussocky grass. They are good hunting areas for desert snakes, and the snakes will probably be coiled up by the tussocks in the morning. Look where you put your hands and feet, check before you sit, and don't leave clothing lying around on the ground. Scorpions are active at night, so a camp bed is invaluable. Shake boots before putting them on. Camel spiders look alarming, and are attracted by camp lights, but they rarely bite. Good psychological preparation helps remove the fear of creepy crawlies, but learn what to do just in case of accident.

SANDSTORMS are uncomfortable, can restrict visibility to zero, and can be dangerous if you try to press on through them. Stop, and take shelter. Dust can hang in the air for days after a sandstorm, and the air feels oppressive. Heads ache, eyes get red, throats sore, and tempers get short. Wrap up in a chech, don't rub your eyes, and suck a sweet. Keep fluid levels up, as the wind desiccates. Blowing dust can cause a build-up of static, causing electrical shock from vehicle bodies. Beware if pouring petrol from metal cans in such conditions.

DESERT DRIVING Learn to use a map, note landmarks, and keep an accurate navigational log. The smallest object can serve as a landmark. Frequently used routes develop ripples at right angles to the line of travel, growing into huge corrugations where traffic is heavy. Their

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shadows in the headlights are a useful guide at night. You will not get lost if you are anywhere near them! Wheel tracks can last for many years in gravel and coarse sand. They can be a help or a hazard. Know where you want to go if you follow them, and still do your own navigation. Sand dunes have logical patterns, and are accurately mapped on some surveys. Wind ripples on sand sheets and the backs of dunes are caused by prevailing winds, and may be used to check direction. The steep slip face of a dune is invariably soft, while the back slope is firm. Don't be tempted to charge a vehicle up the back slope, as you risk being tipped over as you pass the crest. In dunes, don't drive into a situation where you can't see a way out. Sand tracks (or sand ladders) are used if your vehicle bogs down in soft sand, but avoid holding them steady with hands or feet when driving a vehicle over them. The torque from the wheels can send them lashing out.

When recovering a bogged down vehicle, appoint one person as marshaller to co-ordinate activities, for example, to ensure diggers are clear before the driver lets the clutch in! If sand is too soft to make progress, stop and rest until evening. It is pointless exhausting a party digging and pushing. The sand will firm up after sunset, making progress easier the following morning. Aim to rest up in the heat of the day. If there is no natural shade for your siesta, rig up your own.

KEEPING YOUR HEAD RIGHT. A relaxed ATTITUDE helps to increase comfort, and reduce stress. Watch the locals; they take their time, seem to amble along, and do nothing for the three hours or so of the "siesta". Plan your acclimatisation, and allow for it in your schedule. A rush to get "stuck in" is of little use if your members drop like flies on the way. Expect to take three weeks to acclimatise fully on a Sahara summer expedition. You will take activities in your stride in week four which could cause severe physical and psychological distress in week one.

Get used to dawn starts, take cover in the heat of the day. Heavy work and heavy thinking is best done in the cool of the day. Assume that nothing will happen in towns in the middle of the day, and you will not be disappointed. At Ramadan, normal daytime routines virtually cease. Keep jobs simple, everything in its place. Anticipate the day's needs the night before. Anticipate the effects of heat stress; people cannot be pushed far before they boil over in every respect. The locals feel the heat as much as you do, and they will not be rushed to meet your timetable. A handshake and a smile, patience, and flexibility will save damaging rows. There is always tomorrow, and remember, no matter how hot the day, it will always pass, and each day will be easier than the last.

Finally, don't forget about "declimatisation". Remember to pack the warm clothes which you will need when you leave the desert, and wonder why you feel chilly when others you pass are quite comfortable in shirt sleeves. Be patient with each other. The rush for the umpteenth pee of the hour, as tissues flush away stored water, no longer needed as cooling sweat, is a natural reaction to temperatures at long last lower than body heat.

CONCLUSION

We started with the "general's head", and the responsibility of the leader for safety. We will close with the paradox of the successful expedition, which is that safety belongs to everyone, and not just the "generals". Again, Lawrence puts his finger on it, when he said that "*our ideal should be to make our ranks a happy alliance of able commanders-in-chief.*" If the learning experience is successful, then everyone ends up equally responsible for safety, and you end the expedition happy with a job well done. **Have a safe expedition!**

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