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AUSTRALIAN ARMY

MANUAL OF LAND WARFARE

PART THREE

VOLUME 2 PAMPHLET No 7

SURVIVAL

1987

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PART THREE

TRAINING

VOLUME 2

TRAINING FOR WAR

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SURVIVAL

1987

Headquarters Training Command
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Authorised for issue

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Major General
General Officer Commanding

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**Australian Army Manual of Laud Warfare,
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Doctrine Production, Force Development Group, Combined Arms Training and Development Centre is responsible for the management and sponsorship of this pamphlet. The doctrine contained herein was approved on 6 January 1987.

AMENDMENT CERTIFICATE

1. Proposals for amendments or additions to the text of this pamphlet should be made through normal channels to the sponsor. To facilitate this, there are amendment proposal forms at the back of this publication.

2. It is certified that the amendments promulgated in the undermentioned amendment lists have been made in this pamphlet.

Amendment List		*Amended By (Printed Name and Initials)*	*Date of Amending*
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3.			
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PREFACE

Aim

1. The aim of this pamphlet is to provide doctrine for survival training in the Australian Army.

Scope

2. This pamphlet is designed for use by leaders at all levels in the preparation and conduct of instruction on the subject, rather than as a field guide. To assist survival in the field, a number of additional aids are to be produced. These are described in Chapter 7. Combat survival principles and techniques are described in *ML W Two, Int Trg 1.2, Unit Intelligence.*

3. A direct and practical style of writing has been adopted, with particular emphasis being placed on the Australian environment. General principles described are valid for all likely areas of interest.

References

4. The publication should be read in conjunction with the following references:

   a. *MLW Two, Inf Trg 3.2, Fieldcraft and Target Detection;*

   b. *ML W Two, Int Trg 1.2, Unit Intelligence;* and

   c. *MLW Two, Med and Dent Trg 3.1, First Aid.*

5. A guide for further study is provided at Annex A to Chapter 7.

CONTENTS

ILLUSTRATIONS

Figure *Page*

Table

ABBREVIATIONS

The following abbreviations are used in this publication. Their sources are as shown.

JSP (AS) 101

GP	General Purpose
PW	Prisoner of War
SOP	Standing Operating Procedure

Common Military Usage

CAC	Conduct After Capture
DFDA	Defence Force Discipline Act

CHAPTER 1

GENERAL CONSIDERATIONS

SECTION 1–1. INTRODUCTION

Mental Attitude

101. Soldiers need to have a tough mental attitude if they are to apply survival skills successfully in adverse situations. One of the main ingredients for such an attitude comes from the confidence achieved through training which provides the essential knowledge and skills required to survive.

102. Another important part of the mental attitude is the will to survive – the urge to succeed despite the odds. Although survival is a basic human need, the strength of will to survive, like all other human characteristics, varies for each individual. A well trained soldier possessing a high degree of self confidence, coupled with a strong sense of survival, will succeed.

103. Survival is enhanced by a systematic approach to training which identifies the key elements to be considered. The elements which contribute to a soldier's survival are discussed in paragraphs 104 to 108.

104. **Motivation.** The individual's motivation and the group's morale are critical aspects for survival. Personal motivation may be driven by a number of factors: a return to family, belief in a cause, a determination to defeat the enemy or the situation at hand. The morale of a group, that bond creating cohesion and esprit de corps, results in a united will which may boost the flagging efforts of weaker members in the team.

105. **Confidence.** The most effective way of instilling self confidence is through the acquisition of knowledge and the practical application of skills during training. Progressive training broadens a soldier's understanding of his own capabilities and limitations. Coping with arduous and dangerous situations provides motivation for the soldier and serves to develop his confidence.

106. **Adaptability.** A soldier requires both initiative and flexibility in adapting to his environment. Training can only expose a soldier to a limited range of possible situations. Practice in quick decision making coupled with success in achieving small, short-term goals, increase the adaptability of the soldier.

107. **Energy Balance.** There is a need to balance the amount of physical energy expended in obtaining immediate physical needs, such as food and water, and the effort required for long term survival. Inactivity or a lack of

confidence will result in poor decision making, a decrease in stamina and an early demise. Activity which realises short-term goals is well spent and encourages the soldier to continue in this type of productive effort.

108. **Resource Use.** Resource use refers to physical as well as mental resources. The three basic elements necessary for survival are: water, shelter and food. Further detail on these elements is provided in Chapters 3 to 6. Knowledge and skill gained in training will enable soldiers to take advantage of the physical resources available. Assigning priority of activity to more immediate needs is an important part of resource use. Mental resilience provides the ability to relax and gain inner strength and can be developed through practice. Such resilience temporarily alleviates stress and provides encouragement to the soldier to continue in his physical efforts.

SECTION 1–2. STRESS REACTIONS

Understanding Stress

109. Circumstances in which survival skills are required create stress for the soldier. Understanding reactions to stress, and knowing that some personal control is possible, enhance a soldier's chances of survival.

110. Stress is a condition that imposes demands for adjustment on the soldier. Prolonged or excessive stress is apt to overtax the soldier and may eventually lead to a breakdown in organised behaviour.

111. It is important to understand that stress can have positive as well as negative effects. Stress can be used to lift performance so that personal effort and abilities are intensified: progressive training in combat and survival techniques does just that. This experience gives the soldier a better insight into his potential for survival and his ability to cope.

Deprivation

112. Stress imposed by combat survival may be imposed through three possible types of deprivation:

a. *Social Deprivation.* Social deprivation separates the soldier from his family and his normal social environment. The soldier becomes concerned about the welfare of his family and in turn, misses the reassurance that family and friends provide.

b. *Sensory Deprivation.* Sensory deprivation arises when any one of the senses becomes damaged, especially sight, hearing and touch. Personal tolerance is lowered and fear may lead to panic behaviour.

c. *Physical Deprivation.* Physical deprivation arises through sleep loss and poor diet which inevitably result in fatigue, both physical and mental. The basic need for survival is threatened and the individual may again exhibit panic reactions in attempting to reduce the stress.

113. Each type of deprivation affects individuals to a different degree. Because of the different effects of deprivation on individuals, some individuals will not survive a given set of circumstances whilst others will cope successfully. Attitudes and self involvement determine how individuals will react.

Stress Symptoms

114. The isolation and fear generated within individuals confronting a survival situation give rise to a number of physical and behavioural reactions:

a. *Physical Reactions.* Physical reactions to stress include trembling, sweating, nausea, frequent diarrhoea, frequent urination, pounding heart, anxiety and stomach pains.

b. *Behavioural Reactions.* Behavioural reactions to stress include not moving or talking, blank expression, individual outbursts, being argumentative, moodiness, decreased appetite, apathy, inability to sleep and aggression.

115. These symptoms are warning signals. If the soldier is part of a group then he should be treated as a friend and not someone who is ill. On the spot treatment may include:

a. not over-reacting,

b. remaining calm,

c. reassuring the soldier,

d. showing understanding,

e. teaming up with him for a while, and

f. giving him something to drink and keeping him warm if possible.

Ability to Cope

116. Coping techniques that work best for the individual should be identified and practised by applying them to everyday problems until they become automatic. A well tried technique will provide confidence when there is a need to apply it in a stressful situation.

117. The technique selected and its application will vary greatly among individuals. There are four main types:

a. *Direct Action.* The tasks which need to be completed are recognised and a direct approach to solving the problems at hand is undertaken. The physical involvement in doing something is in itself stress reducing. The achievement of immediate goals promotes further similar behaviour.

b. *Relaxation.* A number of relaxation techniques are now available and include, meditation, yoga, systematic deep muscle relaxation, and attention control training. The effectiveness of these techniques varies with the personality of the individual. The selection and conscious development of a relaxation technique will enable the soldier to use such a skill when subject to the stresses of survival.

c. *Rational Thought.* Stress may result in panic which promotes irrational thinking. The selection of problem solving and decision making techniques which work well in normal situations should be practised so that the skill is automatically applied under duress. It is essential that these techniques be practised and developed in circumstances which do not involve stress.

d. *Positive Attitude.* Expectations influence behaviour, and those harbouring thoughts of failure or death will almost certainly not survive. A positive attitude towards survival maintains motivation and encourages the soldier to keep trying despite the odds.

SECTION 1–3. LEADERSHIP AND GROUP BEHAVIOUR

General

118. Normally, a group stands a better chance of survival than the individual in a hostile environment. However, for the group to be effective in combat survival it is essential that individuals have confidence in themselves, their leader and the group.

119. All members must recognise the formal leader and abide by his decisions. The leader must be capable of satisfying the needs of the individuals and develop a high level of group morale. The effectiveness of the group to cope in a survival situation is dependent on its ability to cope with problems and situations beyond the capacity of individuals.

120. The cultural and social bonds that exist within the group in normal circumstances often become severly strained in a survival situation. Accepted standards of behaviour may degenerate to the point where stealing, lying and violence may plague the group. The leader is

required to exercise firm discipline if the group is to maintain an appropriate standard of behaviour.

Group Survival Factors

121. There are several factors affecting group survival which the leader must be aware of and take into account if he is to maintain effective control of the group. These factors are as follows:

a. *Use of Individual Skills.* The leader should capitalise upon those individuals having particular skills pertinent to survival. The recognition of these skills, and their effective utilisation, encourages such individuals to support the formal leader and maintain group cohesion.

b. *Accept Suggestions.* Individuals within the group should be able to contribute ideas and express criticism. However, once the leader has made a decision, he should ensure that it is carried out.

c. *Organisation.* An essential element in group survival is the effective employment of the group. Because physical activity reduces both stress and the likelihood of panic, all members of the group must be kept occupied. The following principles should be applied by the group leader in the planning of group tasks:

(1) Members should work in pairs on similar or related tasks.

(2) Pairs should be tasked daily.

(3) Tasks assigned to pairs should be rotated to avoid the possibility of disputes arising from alleged inequalities in the workload.

(4) Tasks should be scheduled for morning and evening hours, leaving the remainder of the time for rest and group involvement in survival planning.

d. *Leadership.* There will be times when the leader must make decisions without group input. At such times, leadership by example is important. Subordinates will tend to follow someone doing something in times of stress, since action is itself stress reducing.

e. *Discipline.* The self discipline of individuals in the group is an important factor in maintaining group cohesion. However, imposed discipline may be necessary to prevent individuals quitting a task because they do not realise they have sufficient reserves to achieve the goal.

f. *Reaction To Casualties.* The sight of the dead and wounded affects individuals differently. A casualty within the group is stressful since it threatens the notion of protection and invulnerability. The leader must work at keeping his subordinates occupied and redirect their focus to goals which can be quickly achieved to restore their morale.

CHAPTER 2

MEDICAL ASPECTS

SECTION 2–1. INTRODUCTION

Basic Physiology

201. To improve the chances of survival, a basic understanding of how the body works is vital. This chapter will cover the need for food and water, hygiene, common illnesses and injuries. The structure and functions of the body are covered in *MLW Two, Med and Dent Trg 3.1, First Aid*.

SECTION 2–2. FOOD AND WATER

202. The body needs food and water to survive. Food supplies energy, the same as petrol does for a car. It also provides reserves in the form of fat. Water is needed to cool the body. It also allows the body to excrete waste products from the body in urine.

Food

203. After eating, food is ground up by the movements of the stomach, to which digestive juices are then added. Food then passes through the small intestine where bacteria and more digestive juices break it down further and the intestine wall absorbs it into the bloodstream. The residue is passed out through the bowels. The digested food is taken to the liver for reprocessing and is then sent to the rest of the body, or is used in the muscles for energy.

204. **Food Deprivation.** The body must have energy; if no food is eaten the body will start to use its reserve. For a period of approximately 24 hours the body can function on the store of glucose deposited in the liver and muscles. After that it starts breaking down its own tissues to provide energy. Pure fat alone cannot be used for energy. It clogs up the system like dirty fuel in a carburettor. To be used by the body, fat must be burnt together with some carbohydrate. If no food is consumed, the body starts breaking down its own muscles. Over 10 to 14 days, the body will become quite weak if no food is eaten. This will happen regardless of how fat the body is. However, small amounts of carbohydrates, as found in fruits and vegetables, will prevent the breaking down of large amounts of body muscles and body strength will be retained for much longer.

205. Protein in small amounts is essential for good health. However, in larger amounts, protein wastes use up water from the body and are excreted in the urine. Any substance with food value must be eaten in a starvation situation. Many unpalatable substances such as cockroaches, ants and rats contain protein and constitute a valuable source of food.

Water

206. Water is taken into the stomach, and absorbed into the bloodstream. It is used to dissolve waste products and excrete them in the urine. It also helps cool the body by evaporation through perspiration. In hot climates when hard work is being performed, the body may need in excess of 20 litres a day to operate efficiently. In a survival situation, it can make do on much less.

207. Excessive body temperature can result in death. The body recognises this and keeps its temperature very accurately at 37^{o}C. It does this mainly by evaporating perspiration for cooling. This regulation of body temperature through perspiration accounts for the excessive requirement for water in hot climatic conditions.

208. **Water Deprivation.** When the body is deprived of water it conserves moisture by minimising the volume of urine released. This process of fluid conservation can be helped by keeping cool (ie, restricting exercise, staying in the shade, etc). An acclimatised person, working in a hot environment, can lose up to 4 litres of fluid through perspiration per hour. There is a minimum loss of body fluids through perspiration and urine; this loss of fluid approximates 1300 ml per day in an adult male. Therefore, a water intake from food or fluids below 1200 ml per day (equivalent to slightly more than a one litre standard Army water bottle) will result in slow dehydration and eventual death.

209. The kidneys filter soluble waste products from the body and pass them out in urine. They also assist to regulate body water levels. If the body is short of water, the kidneys only excrete the water that is necessary to get rid of body waste. The urine then becomes concentrated (dark yellow). More waste products are produced by the breakdown of protein and fat than by carbohydrates such as fruit, vegetables and sugars. When water is scarce, the kidneys should not be overloaded by eating too much fat and protein. If they are available, sugar, potatoes and other starchy foods such as fruit should be eaten. If water is scarce, it should not be drunk while no thirst is felt and the urine is diluted and clear. Drinking should be delayed until kidneys are conserving water and the urine is dark yellow.

SECTION 2–3. HYGIENE

Personal Health and Hygiene

210. In survival conditions cuts, scratches, blisters, ingrown toenails, etc, can occur very easily. If such problems are not guarded against and treated with the utmost care and attention they can quickly become serious.

211. **Body.** If possible, all parts of the body should be washed daily, especially the armpits, crotch and feet.

212. **Hands.** Most diseases are transmitted by hand. Germs collect under the finger nails, so keep nails clean and short. In the bush a twig may be used as a nail file. If water is available, hands should be washed before touching food and immediately after toilet activity.

213. **Armpits and Crotch.** In hot climates, sweat in the armpits and crotch, makes them constantly wet. The skin gets soft thereby assisting the entry of germs, or producing tinea. These areas must be washed frequently and should be exposed to the sun and air for a short period each day. This allows the skin to dry and the sun to kill any bacteria.

214. **Feet.** Healthy feet are vital for survival. Disease and infection of the feet may cripple. Adequate care will prevent foot troubles. Sweat and dirt collect on feet, which are constantly exposed to the risk of minor injuries such as blisters and ingrown toenails. Healthy feet are maintained in the following manner:

a. *Socks must be cleaned daily.* If only one pair is used they should be removed, washed and dried. If no water is available socks should be taken off, fluffed up as much as possible to restore their cushioning effect (because this changes the areas which take pressure), aired and put back on the opposite feet, or inside out on the same foot. If it is not possible to dry the socks, they should be worn wet. A wet, clean sock is far better than a dry, dirty one.

b. At least ten minutes a day should be allowed to wash, dry and air feet.

c. Toenails must be kept short and clean. Dirt which gets down the sides of the nail contributes to ingrown toenails.

d. Tinea grows in areas where the body is constantly wet from perspiration. It may cause the skin to flake off between the toes. Feet should be dried and aired as much as possible if tinea develops.

e. Blisters must be protected from dirty socks or they will get infected. All blisters and open cuts on the feet must be cleaned daily and, if possible, covered with a band-aid, elastoplast or similar adhesive dressing.

215. **Teeth.** Oral hygiene is important to prevent tooth decay. Teeth may be cleaned using a soft bushy stick. Salt or ashes may be used as toothpaste.

216. **Clothing.** Clean clothing is just as important as a clean body. Socks and underclothes are particularly important. Dirty underwear means that the skin is continually exposed to the risk of infection. Dirt contains germs which are rubbed onto the skin and find their way through minute cracks or through the sweat glands. Socks and underpants should, if possible, be changed or washed and dried daily. Bedding should be shaken, hung in the sun and aired daily.

SECTION 2–4. SICKNESS AND INJURY

Illnesses Caused by Poor Hygiene

217. **Vomiting, Diarrhoea and Dysentry.** Vomiting, diarrhoea or dysentry can be very dangerous, especially when water is scarce and hygiene standards are allowed to drop. It is critical, therefore, to understand what causes these symptoms and how to avoid them. Vomiting is the loss of food and fluid through the mouth. Diarrhoea is characterised by watery bowel motions, while dysentry is normally identified by the passage of blood and mucus from the bowels. All cause a great loss of water and salts from the body, resulting in weakness. These illnesses can kill, particularly in a survival situation where medical support will be limited.

218. **Cause.** Vomiting, diarrhoea and dysentry are caused by germs reaching the stomach through the mouth. The germs can be carried from faeces or garbage to the mouth by the hands. These diseases can also be caused by eating bad food or poisonous fish, plants or fungi; or by drinking poisoned, dirty or salt water.

219. **Prevention.** Vomiting, diarrhoea and dysentry are often the result of poor field hygiene. With stress, it is very easy to neglect the simple rules of hygiene. Many who might otherwise have survived have died purely through poor hygiene practices. Practise these simple rules:

a. eat and drink only food and water known to be safe;

b. always use clean hands to touch food;

c. prevent rats, flies, etc from crawling on food;

d. apply proper sanitation measures such as covering body wastes with soil and properly disposing of garbage by burning or burying it; and

e. if remaining in one place for more than 1 or 2 days, cover bowel motions with 30 cm of soil to prevent rats and other animals from exposing it. (Urine does not spread these diseases).

Illness Caused by Climatic Conditions

220. **Heat Exhaustion.** Heat exhaustion is caused by excessive loss of water and salt from the body. It is common in hot climates when fluid loss is not adequately replaced by fluid intake.

a. *Symptoms.* The signs and symptoms of heat exhaustion are:

(1) headache;

(2) mental confusion;

(3) vertigo (dizziness);

(4) drowsiness;

(5) extreme weakness, and in some cases, fainting;

(6) the skin is pale, cool and wet with perspiration;

(7) temperature may be subnormal or slightly elevated; and

(8) the pulse is rapid and weak.

b. *Treatment.* Heat exhaustion is relieved by returning the patient's circulation to normal and by replacing lost salt and water. This is best achieved by moving the patient to a cool place and placing him in the horizontal position; elevating the feet and rubbing the legs and arms will assist circulation. Give large quantities of water, preferably containing 0.1 per cent salt solution by mouth as freely as the patient will accept. The correct salt content can be obtained by adding one level teaspoon of salt to a canteen of water. The patient's clothing should be loosened or removed to assist in cooling the body.

221. **Heat Stroke.** Heat stroke is a result of over-heating of the body and causes damage to the heat regulating centre of the brain.

a. *Symptoms.* Impending heat stroke may be preceded by headache, dizziness, mental confusion, frequent desire to urinate, and diminished or absence of perspiration. Usually, heat stroke starts with sudden collapse and loss of consciousness leading to coma. The patient's skin is red, hot and dry; there is an absence of perspiration. The body temperature is very high.

b. *Treatment.* The lowering of the patient's body temperature as rapidly as possible is the most important factor in the treatment of heat stroke. Lowering body temperature can be achieved by:

(1) removing the patient's clothing and immersing the patient in cool or tepid water. If there isn't sufficient water, sprinkle or sluice the patient thoroughly, then fan him to quicken the cooling effect of evaporation;

(2) rubbing the patient's arms, legs and trunk to increase circulation to the skin; and

(3) giving fluid freely by the mouth (if the patient is capable of accepting it).

222. **Sunburn.** Sunburn must be avoided at all costs. It causes pain, discomfort and loss of sleep. Sunburnt areas do not perspire, thereby making the individual more prone to heat stroke. When sunburn turns into blisters, valuable fluid, body salts and protein are lost. The raw areas can also become infected. Keep out of the sun wherever possible and cover up as much of the body as is practicable. Individuals who are sunburnt also lose more heat in cold situations as the blood vessels in the skin, because of the damage caused by sunburn, are unable to adapt to climatic conditions.

223. Many people become severely burned because they fail to realise that the effects of sunburn are not felt until it is too late. In hazy or overcast conditions the danger of sunburn is increased because it is less noticeable. The wise soldier will keep out of the sun as much as possible and allow his skin to tan slowly. After acquiring a tan the dangers of sunburn are somewhat reduced.

224. **Prickly Heat.** Prickly heat starts off as numerous little itchy red dots in areas where there has been heavy sweating, eg, armpits, crotch and trunk. Prickly heat is caused by blocked sweat glands. Areas affected by prickly heat cannot perspire, thereby adding to the risk of heat stroke. The treatment is to allow the skin to air, and wash and dry the affected areas so that the glands become unblocked.

225. **Hypothermia.** Most Australians have little experience with cold injury. However, there are vast areas of Australia where cold is a very real problem for a survivor. The inland deserts, although extremely hot during the day, can get bitterly cold at night. The high regions of the Great Dividing Range often have sub zero temperatures and snow falls in many areas.

226. Hypothermia occurs when the heat lost from the body is greater than the heat produced, resulting in a fall in body core temperature. Unless treated, this condition is fatal. It can occur when a casualty is immersed in water with a temperature less than 20^{o}C, or on dry land when the temperature is less than 10^{o}C.

227. Hypothermia is avoided by keeping the body warm. Ways to remain warm in a cold environment include:

a. covering the neck and head as both radiate a lot of heat;

b. getting out of winds and breezes as these cool the body rapidly;

c. avoiding alcohol as when the body is cold alcohol does not give warmth; and

d. providing insulation by trapping a layer of air against the body. This can be done with loose layered clothing, paper and dry grass. If plastic is used, care must be taken as moisture can form on the plastic from dew, or on the inside of the plastic cover through condensation. This moisture may freeze in extremely cold climates.

228. **Symptoms of Hypothermia.** The symptoms associated with hypothermia are:

a. lethargy;

b. feeling cold;

c. irritability;

d. confusion;

e. loss of interest;

f. loss of concentration;

g. pale and cold skin;

h. irregular pulse;

i. hypotension (abnormally low blood pressure);

j. coma and collapse; and

k. cardiac arrest.

229. **Treatment.** Treatment for hypothermia must start immediately. The basic requirement is to warm the casualty until the body temperature is normal and normal colour returns. The most appropriate treatment depends on the degree of hypothermia involved. Hypothermia

may be either mild or severe. The appropriate form of treatment for each are:

a. *Mild Hypothermia.* When mild hypothermia occurs the casualty usually remains conscious. Strip and warm him in a sleeping bag (or blankets) with hot water bottles or hot rocks wrapped in towels. Failing this, another person should occupy *the sleeping bag with the casualty.*

b. *Severe Hypothermia.* With severe hypothermia, the casualty is usually unconscious. Strip and immerse him in water with a temperature of 42^{o}C to 44^{o}C. If this is not available, then carry out the treatment as for mild hypothermia.

230. **Frostbite.** Frostbite commonly occurs to exposed areas such as the nose, ears, fingers and toes. It is the actual freezing of tissue in a localised area, and occurs as a result of exposure to temperatures below -40^{o}C. The danger of frostbite is particularly acute when low temperatures are accompanied by strong winds. Frostbite is rare in temperatures above -10^{o}C to -15^{o}C, unless the skin is wet or exposure is prolonged.

231. **Signs and Symptoms of Frostbite.** Frostbite is accompanied by an uncomfortable coldness in that part of the body followed by a feeling of numbness, which is sometimes accompanied by a stinging, aching pain. The skin is red at first, then a pale, waxy white. While frozen, the injured part has no feeling.

232. **Treatment of Frostbite.** Warm the frozen part rapidly, but at temperatures no more than body temperature. If water is available make sure it is no more than hike warm.

233. If frostbite of the feet occurs and there is a distance to be travelled, thawing should not occur until the final destination has been reached. A casualty can walk on frozen feet, however, once thawed, he will become a stretcher case.

234. **Wind Chill Factor.** Some cold injuries such as frostbite can be avoided by a consideration of the wind chill factor prior to working in extremely cold climates. High wind velocities greatly increase the danger of freezing exposed flesh.

235. **Snow Blindness.** Snow blindness is sunburn of the eyes caused by the ultra violet rays of the sun, both directly and by reflection off the surface of the snow. It may occur on both dull and bright days.

236. **Signs and Symptoms of Snow Blindness.** Symptoms appear four to six hours after exposure. A sensation of grit in the eyes, watering of the eyes and an intolerance to light.

237. **Treatment of Snow Blindness.** Once developed, the only first aid treatment to be offered is cold compresses and bandaging of the eyes. Snow blindness can be prevented by the use of tinted goggles. Improvised goggles can be made from a piece of material with small slits cut in them. This will stop the direct reflection of the ultra-violet rays.

Common Physical Injuries

238. **Minor Cuts and Abrasions.** Minor injuries, of no importance usually, can become very serious during survival. Cuts and scratches will become infected and cause pain, discomfort, fevers and blood poisoning unless very carefully treated. They are more likely to become infected because the injured person:

a. will probably be in a weakened, vitamin-deficient state;

b. will probably not have antiseptic ointments and bandages to treat them with; and

c. may ignore them and only try to do something about them when they have become badly infected.

239. It is essential to treat even the most minor cut and scratch. Every particle of dirt or other foreign matter must be removed from the wound. The injury must be washed thoroughly at least three times a day. If possible, let the air and sun get to it (but not flies) until a scab forms. If there is no infection underneath, a scab is the best cover. If antiseptic ointment is available, a thin film of this should be applied to the wound three times a day, just after washing.

240. **Lacerations (Deep Cuts).** The same principles apply for lacerations as for minor cuts. However, they will take longer to stop bleeding and form a scab, and will be more difficult to keep clean. Bandage them, but not before the cloth has been boiled in water. If no fire is available, the cloth or bandage must be thoroughly washed in water and hung in the sun to dry. Clean bandages must be applied at least every 24 hours. If possible, they should be changed every eight hours immediately after bathing the wound and applying antiseptic ointment, as fluid and blood that leaks out of open wounds create an ideal environment for germ growth. A crust or scab over a wound prevents germ growth.

241. **Bleeding.** The best method to stop bleeding is to place direct pressure onto the wound. Place the hand, fist or a rolled-up shirt directly

over the bleeding point and press firmly until bleeding is controlled. Keep your hand in position for at least 10 minutes. This action is usually sufficient to stop even arterial bleeding. At times, 20 to 30 minutes of direct pressure is required. Pressure must be continuous. Do not worry if the shirt or hands are dirty. The priority is to stop the bleeding first before worrying about infection.

242. Open wounds must not be covered unless it is necessary to hold the tissues together and to stop bleeding. If they must be covered, the covering must be cleaned and changed at least daily. If antiseptic ointment is available, this can be done less frequently (eg, once every 24 to 48 hours). Flies and dirt must be kept out of the wound. Cuts and scratches on feet, shins, knees, elbows, etc, must not be allowed to rub against socks, trouser legs or sleeves, otherwise they will almost certainly get infected. They must be exposed to sun and air, or covered with clean antiseptic bandages. The worst area in the body for cuts to turn into infected wounds and tropical ulcers is the shins. Any effort to keep open wounds on the shins from getting infected will not be wasted.

243. **Fractures.** Most of the pain, shock and further blood loss associated with fractures comes after the initial injury, or when the broken ends of the bone move around, grate against each other or dig into the tissues. Keep the bone fragments from moving by applying a splint to the injured limb. Splinting is usually done by placing a straight firm object, such as a piece of flat wood along the limb, and tying it above and below the break. The splint should be well padded and tied firmly. The limb below the bandages should have circulation, for example, one should be able to feel a pulse in it, or at least see that it stays pink and warm. If it goes blue and cold, the bandages may be too tight. Firm bark casing from a tree which is about the same diameter as the fractured limb is suitable for splinting.

244. **Foreign Bodies in the Eye.** Eye injuries are common in the bush or desert and can be extremely painful. Foreign bodies often get under the upper eyelid. They will be seen if the lid is inverted or turned back. Press down on the closed eyelid with a match or twig and, at the same time, pull out and up on the upper eye lash. The foreign body will often be found on the back of the lid where it can be wiped away with a soft cloth. Sometimes the object is stuck on the eyeball itself; usually on the clear area over the pupil (the cornea). It can also be wiped off with the corner of a handkerchief or other such material. The eye should be kept closed for 24 hours after removal of a foreign body.

245. **Snake Bite.** Approximately 95% of all snake bites occur on the limbs. Snakes are normally timid creatures and only bite when provoked.

In a survival situation however, where the snake is a source of food, the likelihood of being bitten is quite high.

246. **Symptoms of Snake Bite.** The major signs and symptoms of snake bites are many and varied and may take up to 24 hours to become evident, but will usually appear from 15 minutes to two hours after the bite. As a general rule the following sequence applies:

a. Less than one hour after being bitten, the victim suffers headache, vomiting and transient faintness with confusion or unconsciousness.

b. One to three hours after being bitten, paralysis of the cranial nerves may commence, producing drooping eyelids, double vision and difficulty in swallowing. The lymph glands may enlarge and may be accompanied by abdominal pain, dark urine, rapid pulse and haemorrhage.

c. More than three hours after being bitten there may be paralysis of the limbs, progressive respiratory paralysis and circulatory failure.

247. **Treatment for Snake Bite.** To prevent the poison spreading, the following actions should be carried out:

a. Promptly restrict the circulation by binding the area of the bite with a restrictive bandage. It should be as tight as one would bind a sprained ankle. Bind as much of the limb as possible. Crepe bandages are ideal but clothing, old towels or any flexible material may be torn into strips and used.

b. Keep the limb as still as possible.

c. Reassure the casualty and keep him calm and quiet.

d. Observe airway, breathing and circulation, providing prompt basic life support if these fail.

e. If possible, transfer to medical aid without delay.

248. The following actions/procedures **ARE NOT** to be used in the treatment of snake bite:

a. cut or exercise the bitten area,

b. apply a tourniquet,

c. wash the bitten area, or

d. remove bandages or splints.

249. **Insect Bites and Plant Stings.** Except for the Funnel Web Spider, no insect or plant in Australia should cause death in an adult. Centipede and scorpion stings can be extremely painful but are not fatal. They are treated by the application of hot compresses or by immersing the affected part in hot water. The patient is then kept comfortable and reassured. Plant stings are covered with a dry dressing to prevent scratching and possible secondary infection.

250. **Marine Stings**. Sea creatures which may inflict dangerous stings include:

a. the Box Jellyfish – Sea Wasp (Figure 2–1),

b. the Blue Ringed Octopus (Figure 2–2),

c. Cone Shells (Figure 2–3), and

d. the Stone Fish (Figure 2–4). Descriptions of these creatures, including the signs, symptoms and treatment of their stings are contained in Table 2–1.

TABLE 2–1. MARINE STINGS

Ser	*Creature*	*Description*	*Signs and Symptoms*	*Treatment*
(a)	*(b)*	*(c)*	*(d)*	*(e)*
1	Box Jellyfish Sea Wasp	Found in northern water during summer months. Main body is cuboid in shape and may be as large as a man's head. At the base of the cube are four fleshy pedicles which trail up to 60 tentacles of varying lengths (up to 10 metres). Along each tenticle are microscopic stinging capsules which are responsible for the discharge of venom.	• Intense pain which increases within the first l5 minutes in mounting waves, despite the removal of the tenticles • Area of contact are linear and multiple, showing as purple or brown lines like those made by a whip. • Weals occur promptly and massively. • Respiratory (breathing) distress and failure. • Cardiac arrest.	• Flood the adherent tenacles with vinegar. • Apply a compression bandage over the sting area after vinegar has been applied. • Monitor breathing and circulation.

Ser	*Creature*	*Description*	*Signs and Symptoms*	*Treatment*
(a)	*(b)*	*(c)*	*(d)*	*(e)*
2	Blue Ringed Octopus	Found in rock pools around most of the Australian coast. With tentacles expanded it may measure up to200 mm. Colouring is yellow/brown with rings on the tentacles and body which turns iridescent blue when the animal becomes excited. Sting is normally painless.	• Numbness and tingling of the mouth. • Difficulty speaking and blurred vision. • Rapid and complete paralysis.	• Immediate pressure and immobilisation (ie as per snake bite). • Artificial respiration may be required for up to six hours.
3	Cone Shells	Found in shallow waters, reefs and ponds in both tropical and temperate waters. May be up to 100 mm in length. The sting is made through a poison dart which comes out of the pointed end of the shell.	• Severe pain (or none at all depending on species). • Numbness at bite site. • Tingling around mouth and lips. • Respiratory difficulty.	• Pressure and immobilisation. • Artificial respiration may be required.
4	Stone Fish	Found in northern waters. Looks like a stone. May grow up to 300 mm and has up to 13 poisonous dorsal spines. If picked up or stepped on, the venom may be injected deeply into the tissue of the victim.	• Severe pain locally. • Muscle paralysis. • Respiratory failure. • Cardiac arrest (due to direct action of toxin on the heart muscle).	• Immerse the limb in hot water. • Do NOT use pressure. • Immobilisation. • Artificial respiration and resuscitation may be required.

Figure 2–1. Box Jellyfish – Sea Wasp

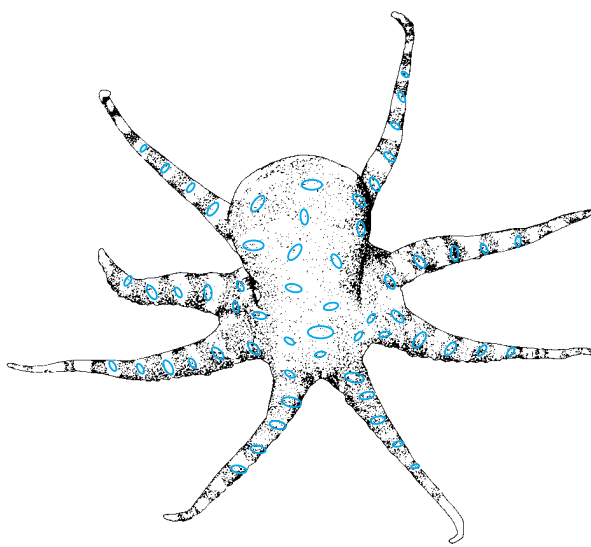


Figure 2–2. Blue Ringed Octopus

Figure 2–3. Cone Shell

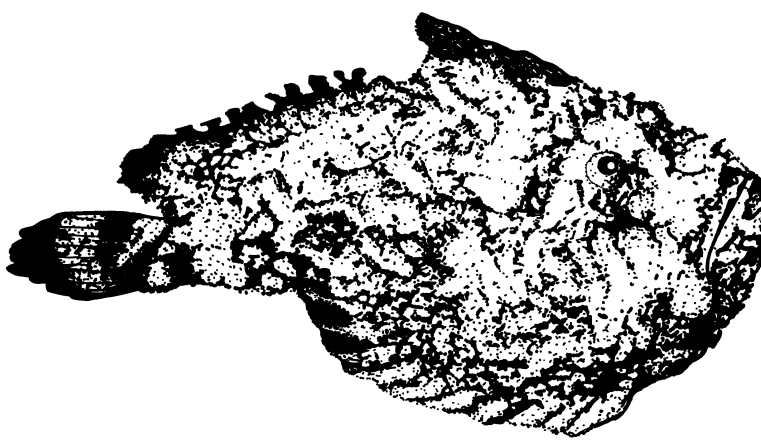


Figure 2–4. Stone Fish

CHAPTER 3

PHYSICAL ELEMENTS

SECTION 3–1. INTRODUCTION

301. The ability to live off the land depends on the ability to recognise the resources available. Some environments will have more to offer than others. Maximum use should be made of any resources in order to achieve the three elements of survival. These elements water, shelter and food, are further discussed in Chapters 4, 5 and 6.

302. Circumstances will dictate which of the three elements has priority at any particular time. It is worth remembering that while the human body can do without food for a considerable period of time, lack of water and shelter can kill very quickly. The following examples demonstrate how natural resources can provide the three survival elements:

a. Paper bark provides shelter.

b. Morning dew provides water.

c. Wild grass seeds provide food.

303. Some natural resources may be able to provide more than one of the survival elements, but there is a need to recognise the value of such resources and exploit them fully. The paper bark tree is an excellent example (Figure 3–1).

Figure 3–1. Example of Survival Resources

SECTION 3–2. THE ENERGY BALANCE

304. During survival, it is particularly important to pay attention to the balance of energy, that is the energy expended compared with the return for effort. For example, if 200 kJ of energy is used trying to obtain food that only provides 100 kJ of energy in return, the activity is not worth

undertaking. Likewise, holding a fishing line by hand all day when it could be tied to a tree, is a waste of energy resources.

305. A survivor must judge which activities are worth carrying out and which are not. Many decisions are based on common sense. The various survival methods discussed in this publication are simple and practical. Most of the instructions contained here have been used by Aboriginal people for thousands of years and are, therefore, known to be viable from an energy balance point of view. Anyone in a survival circumstance, when confronting a physical task, should ask themself the question, 'How can I carry out this task using the least amount of energy?'

SECTION 3–3. PHYSICAL DEPRIVATION

General

306. Cold, pain, thirst, hunger, fatigue and sleep loss are all physical deprivations that most people have experienced at some time. However, few people have experienced these problems to the degree that survival is threatened. The main physical deprivations are discussed in the following paragraphs.

307. **Cold.** The greatest initial danger to the survivor in a cold environment is not the lack of food and water, but that of dying from exposure. Cold is a far greater threat to survival than many soldiers realise. Cold reduces the ability to think clearly. The only motivation for a cold person is to get warm again. Experience has proven that close physical contact will conserve body heat. Many races (eg, Eskimos) have proven that, with ingenuity, cold climates can not only be adapted to, but can also provide a livelihood. However, cold must be controlled, as it affects both the body and the mind, causing lack of judgement and decreasing the will to survive.

308. **Pain.** Pain is nature's way of advising that something is wrong with the body. Pain can be coped with by remaining occupied, both physically and mentally. The existence of pain is not denied; rather, the preoccupation with pain is replaced with more constructive thoughts. If one gives in to pain it can weaken the will to survive and override all actions, thereby leading to despondency.

309. **Thirst.** After cold, the greatest danger to survival is lack of water. Even when thirst is not extreme, it can dull the ability to think clearly resulting in the individual becoming tired and lazy. This is because the body is lacking water even though many do not realise it. Thirst is usually associated with survival in the heat where fluid is lost from the body in perspiration to maintain body temperature. Fluid loss can be limited by minimising exposure to heat, wind and excessive activity.

310. Failure to appreciate water requirements can prove fatal. Serious dehydration occurs in survival situations even when there is plenty of water. Table 3–1 shows the results of fluid loss on the human body.

TABLE 3–1. RESULTS OF FLUID LOSS ON THE HUMAN BODY

Percentage Loss of Body Weight Through Fluid Loss	*Results on the Body*
5%	Tiredness and lethargy accompanied by an inability to think clearly and an increase in body temperature.
10%	Dizziness accompanied by a tightening sensation experienced in arms and legs. Body becomes flushed, speech is indistinct and hallucinations can occur.
15%	Death.

311. **Hunger.** A human being can survive several weeks without food. However, hunger is dangerous because of the effect it can have on the mind, reducing the ability to think clearly. Hunger will also increase susceptibility to the weakening effects of cold, pain and fear. Hungry people do not like to be touched, are easily bored, lose interest and eventually develop a deep despondency. During survival, people may ignore quite wholesome edible things because they are culturally biased or squeamish. Examples of these foods are grubs, snakes, lizards, frogs and cooked blood. All of these foods will sustain life. Eventually, acute hunger may break down these barriers, but often too late to avoid starvation.

312. **Fatigue.** Fatigue makes people careless and indifferent. Even a moderate degree of fatigue can lessen the ability to think clearly. Fatigue does not always come from over-exertion. Fatigue may also be caused by a feeling of hopelessness, the lack of a goal, dissatisfaction, frustration or boredom. More often, fatigue presents an escape from a situation that has become too difficult. This situation must be recognised before it develops too far. All members of the survival group must be motivated to continue. The onset of fatigue can be controlled by establishing and maintaining a sensible work pattern.

313. **Sleep Loss.** Sleep loss is particularly dangerous due to the effect it can have on the ability to think clearly and solve problems. Lack of sleep causes a deterioration in mental abilities even though the individual can still perform physical tasks normally. Most emotional disturbances and physical deprivations cause sleep problems, thereby aggravating the overall condition. Warm and comfortable sleeping conditions are a priority for long term survival.

Cumulative Effect

314. The types of deprivation described above have a cumulative effect. It is unlikely that any of them will be experienced individually. To survive, it is important to identify one's reactions to each factor and deal with it in turn. The environment must be controlled by the survivor, not vice versa.

CHAPTER 4

WATER

SECTION 4–1. INTRODUCTION

General

401. Of the total weight of the human body, about 90 per cent is water. The body requires that volume of water to carry out its various functions. It obtains about 50 per cent of its requirement by drinking and the remainder from the processing of food consumed.

402. Some foods have a higher percentage of water than others. Foods such as apples, water melons and lettuce provide more water than do nuts and grain. The body makes use of moisture from food in the same way as it does from direct intake of fluid.

403. The most obvious way to maintain the required water level in the body is to drink. During the course of a day, the body will lose from one to 10 litres of water, depending upon the amount of perspiration. Water is also lost from the body through urination and breathing. All water lost must be replaced. (Paragraphs 206 and 309 refer).

404. Because the body cannot obtain enough water to meet its requirements from food alone, the maintenance of an adequate supply of water in a survival situation must be afforded a very high priority.

Water and The Environment

405. In some of the driest areas of Australia, even the Aborigines find it impossible to live because of the absence of water. It is often thought that high temperatures alone result in a lack of water, this is not correct. A combination of high temperature and lack of humidity leads to such a result.

406. Of all the environments found on the Australian continent, the desert areas provide the greatest difficulty in locating water. If water is found it is more likely to be a rock pool, a soak or a small catchment in a tree trunk, rather than a running creek or river. There are a number of natural signposts or indicators for such water supplies and these are described in Section 4–2.

SECTION 4–2. NATURAL WATER INDICATORS

407. The five basic natural water indicators which apply in all environments are:

a. vegetation,

b. geographical formation,

c. animal behaviour,

d. bird behaviour, and

e. insect behaviour.

Vegetation

408. Wherever vegetation is found, there must be moisture in the soil to support that plant life. Some species, such as spinifex and salt-bush, do not require very much moisture to support them. Other species, particularly those with broad green leaves (indicating underground water presence) require a considerable amount of water. All plants and trees evaporate moisture in the same manner. The underground root system soaks up water from the soil, sending the water up the roots to the trunk, from which it travels along the branches. It reaches the leaves of the tree and is released via the surface of the leaf into the atmosphere.

409. In arid landscapes, outcrops of green vegetation are an excellent indication of nearby water. In some locations, these outcrops will be found along the edges of what appears to be a dry creek bed (Figure 4–1). A well or soak dug in this location may provide water from the same source which nourishes the vegetation.

410. It is not always necessary to dig in order to locate a supply of water. High rocky outcrops quite often have rich green bushes growing on the steep slopes (Figure 4–2). The trailing roots of these bushes will lead to a small pool of water. These rocky pools will be hidden from the sun's rays in cracks, crevices and beneath overhanging rocks.

411. Some trees manage to store water. This store is contained within the trunk of the tree, the woody pith becoming saturated with water. This pith may be sucked or squeezed dry. The Queensland bottle tree and West Australian baobab are two such species. Other trees develop bumps on the sides of the trunk which hold quantities of water (Figure 4–3), or cavities within the trunks themselves. Apart from trees, other vegetation types such as cactus, pigweed and pigface contain quantities of moisture which may be crushed or squeezed from the plant.

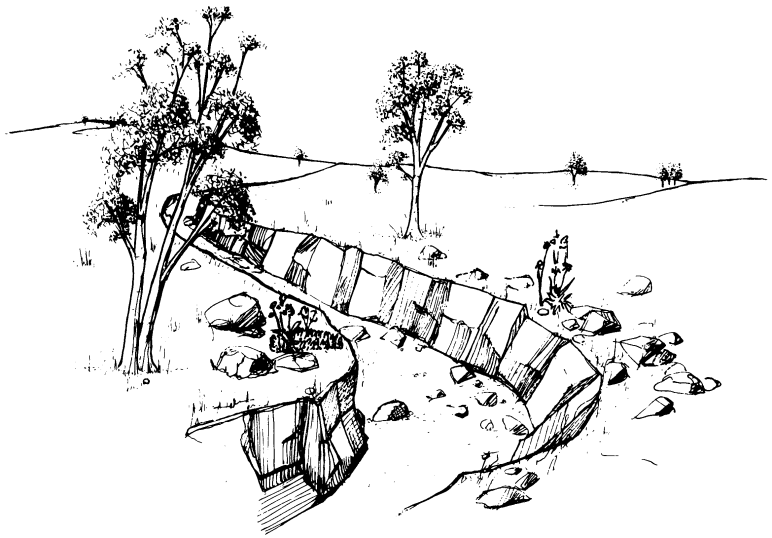


Figure 4–1. Water Indicators – Dry Creek Beds

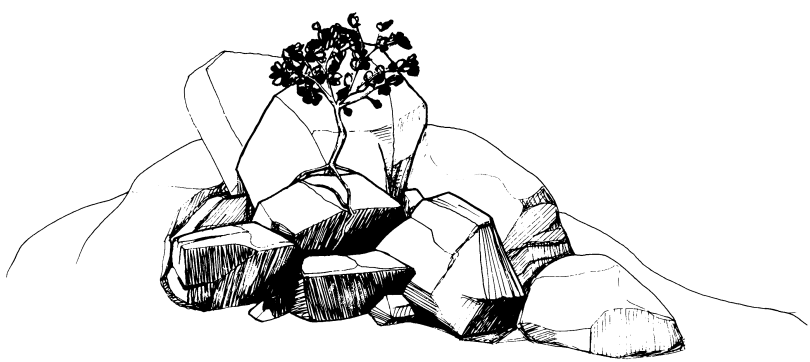


Figure 4–2. Water Indicators – Rocky Slopes

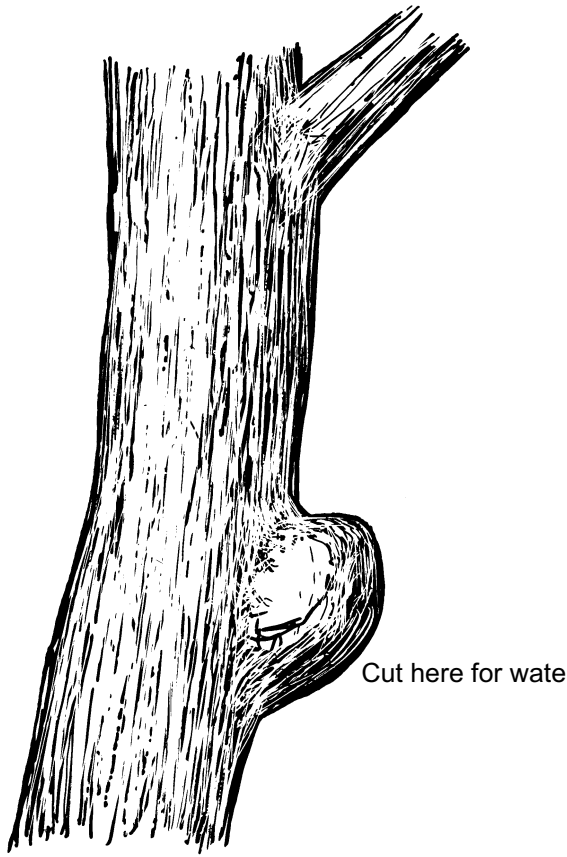


Figure 4–3. Water Indicators – Trees

412. Water may be obtained from a number of types of trees by draining. This method can be used with a wide variety of bloodwood, she-oaks and eucalyptus trees. In desert areas, the long thin roots of trees are dug up and cut into lengths about 0.5 m long. These lengths are placed vertically and the water in the root system is allowed to drain. The structure of the root system will only allow the water to drain in the one direction, ie, from the tip of the root to the trunk of the tree. When placing the roots in the draining position, the trunk ends must be placed in the collection container. It also aids the process if the draining end of the root has been cut at a sharp angle (Figure 4–4).

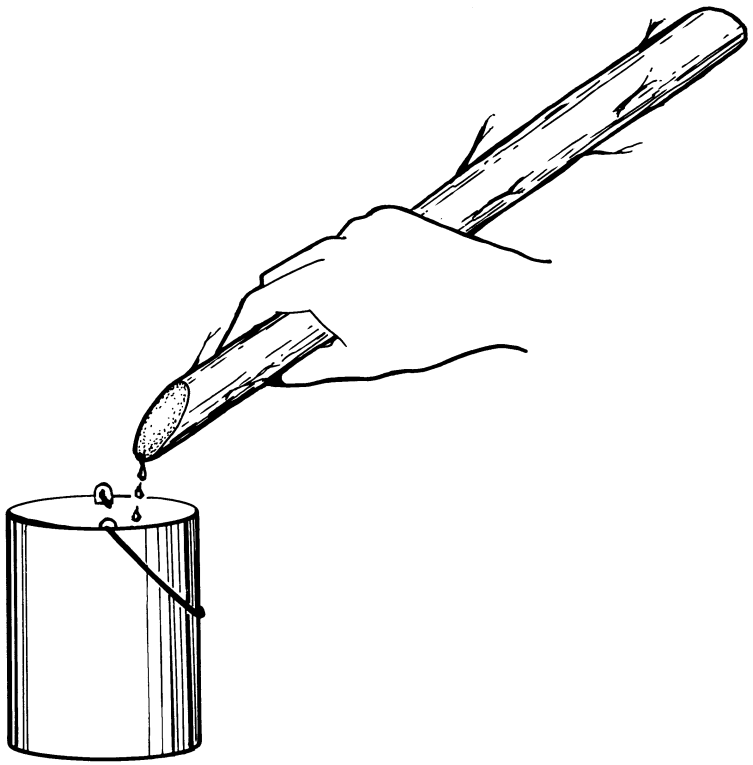


Figure 4–4. Draining Water From Roots

413. In some areas of Australia the main trunks of saplings are found to be good water producers. The saplings are cut at ground level and again just below the branches. The sapling is turned upside down (with the base of the trunk in the air) and allowed to drain. An angled cut of about 60 degrees will assist the draining process.

414. Each of these draining procedures will be more successful if the trees which are used have a healthy green appearance. If a number of trees are available to choose from, the one selected should be isolated from others. This isolated tree will provide a greater volume of water than those found in a group, because it does not have to compete with the others for the available moisture in the soil. Because trees store their water overnight, the best time to carry out this task is early morning. The worst time is around midday.

415. In rainforest areas, water-carrying vines may also be cut and drained, although water is not often difficult to find in such forests.

416. A few simple rules to remember when obtaining drinking water from vegetation are as follows:

a. Trees or plants which have a white sap should not be used:

b. Water should be colourless.

c. Apart from a slight 'woody' taste, the water should be tasteless.

d. Cut vines, roots or saplings should not be placed against the lips unless first tested as detailed in paragraph 616.

e. Whenever possible a container should be used to collect water.

f. Unless there is no alternative supply drained water should not be stored for more than one day as it may go bad.

Geographical Formations

417. Even in desert areas some rainfall will occur. Although the surface water quickly disappears, much of it soaks into the ground. Below ground level, this water is protected from the effects of the sun and evaporation. Often, the water reaches a level of rock or solid clay below which it cannot pass, thereby forming a water table.

418. The water table exists almost everywhere, but the problem is to find it close enough to the surface to enable it to be reached with relatively little effort. Known methods of finding the water table are detailed below:

a. *Dry River Beds.* In the bends of dry river beds (Figure 4–5) water may be found by digging at the lowest point of the river bed, around the bend area. The water will slowly soak into the hole. Damp sand is a clear indication that the water table is nearby.

b. *Rocky Cliff Base.* Because rocky cliff faces extend below the surface of the soil, water is often trapped at the base of the cliff (Figure 4–6). Digging is necessary and time must be allowed for a water soak to develop.

c. *Springs.* Springs occur when the water table is forced to the surface of the earth. In mountainous areas, this may occur because of the underground rock formation of the mountain itself. In arid areas, fresh green vegetation is an indication that a spring may be active in the area.

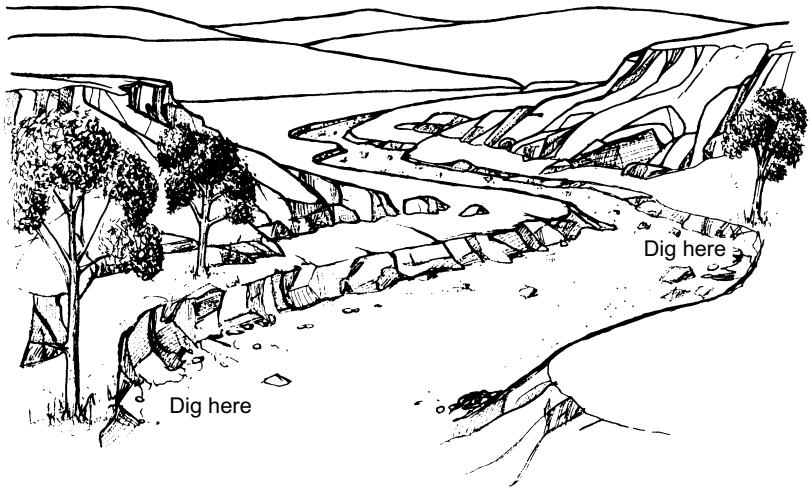


Figure 4–5. Digging in Dry River Beds

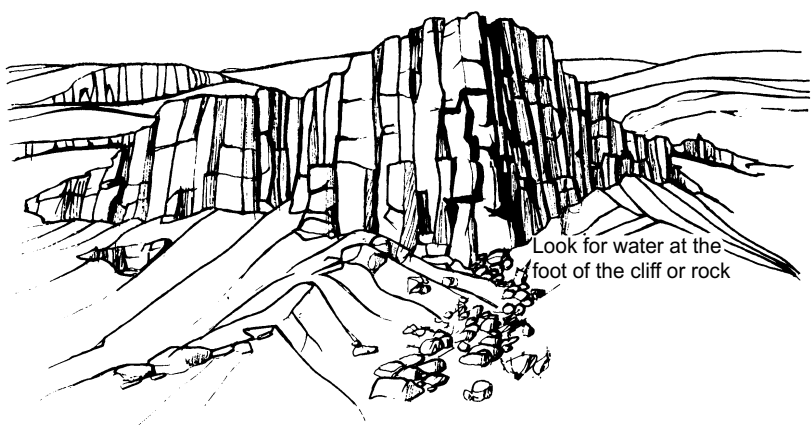


Figure 4–6. Locating Water Near Rocky Escarpments

d. *Ground Formations.* Even in open, relatively flat country, water may be located by digging. Water under the surface of the soil will tend to collect and lie in the lower areas of land formations. Therefore, the valley or depression areas of the countryside may provide water.

e. *Coastal Sand Dunes.* Digging a well on the inland side of coastal sand dunes (Figure 4–7) may be productive. The water table under the sand dune is dominated by the salty sea water, but the top 5 cm or so of this water is quite likely to be fresh because fresh water floats on top of salt water. In some areas fresh water can be obtained by digging a shallow well on the beach shelf, just below the vegetation line (Figure 4–8). Aboriginals identify these likely areas by the presence of vegetation. Heavy outcrops of green vegetation signify the areas with the best potential.

f. *Desert Sand Dunes.* Desert sand dunes in Australia tend to run parallel to each other. In the wide valleys between the dunes, outcrops of vegetation may be found. Where this occurs, it indicates that a water catchment exists (Figure 4–9). Digging in the lower depressions of the sand dune valley system may provide water.

g. *Aboriginal Wells.* In the drier regions of Australia, Aborigines constructed small wells (Figure 4–10), usually about 1 m in diameter and about 2 m deep. Because these wells were often made from solid rock, many still exist. The surface of the well may be covered with a large flat stone or slab to prevent evaporation. The wells are mostly found in isolated areas some distance from natural permanent water supplies. The stone should be replaced after use to stop pollution and evaporation.

h. *Dry (Mud) Soaks.* Dry soaks, often indicated by cracked surface mud, are good locations to dig for water. They are usually found in low depressions and indicate a shallow water table. Soaks should be left to form overnight and used early in the morning, before sunrise.

419. Many of these methods of obtaining water require hard physical work. There is always the possibility that more moisture will be lost through sweat than will be gained from the source. To detect water underground without digging, Aborigines often used a long thin stick. The stick was twirled and forced into the earth or sand for a depth of about 1 m. If the end of the stick became wet, then it was worthwhile digging. At times they avoided the effort of digging by inserting a hollow reed into the

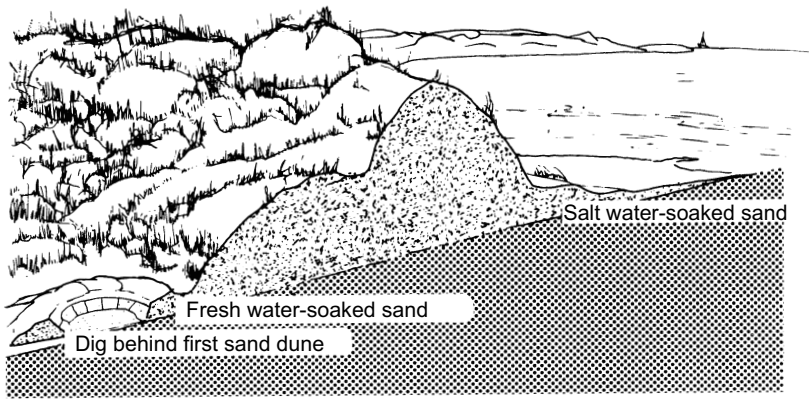


Figure 4–7. Locating Water in Coastal Sand Dunes

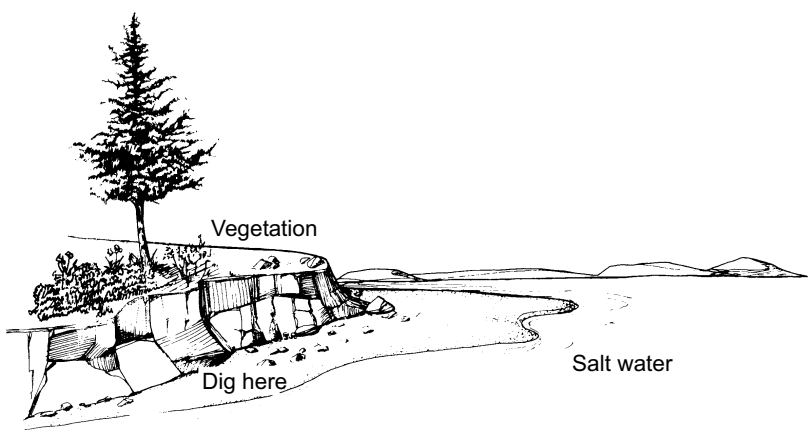


Figure 4–8. Locating Water on the Beach Front

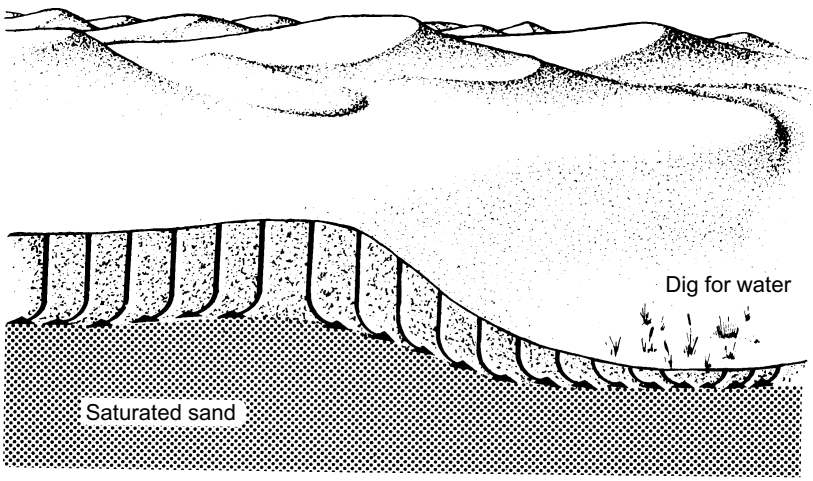


Figure 4–9. Locating Water in Inland Sand Dunes

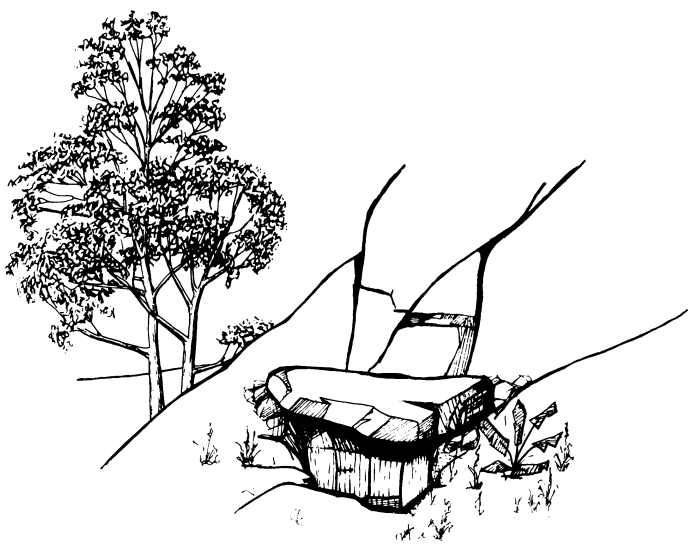


Figure 4–10. Aboriginal Wells

shaft hole, rather like a long drinking straw, and sucking up the water. This technique should also be considered.

Animal Behaviour

420. Like humans, animals require water and their daily behaviour patterns can assist with the location of surface water. Generally, animals drink in the early morning and late afternoon. They also tend to use one particular water-hole. Because of this habit, they often wear a track or 'pad' to and from the watering hole. Such a 'pad', particularly if it is leading downhill, may well lead to accessible water.

421. When surface water is no longer available, animals know by instinct where to dig. On occasion the animals are not able to dig deeply enough to reach the water table, but digging in these areas may produce water in the form of a soak.

422. In Northern and Central Australia, Aborigines also made use of a variety of frog to obtain water. During wet periods, these frogs filled themselves with water and burrowed deeply into the soft mud to hibernate during long periods of drought. During the times when the waterways and billabongs dried up, Aborigines dug up these frogs and squeezed the water from their bodies.

423. Some general rules relating to animals and water are as follows:

a. Animal 'pads' or tracks leading downhill are almost certain to lead to water.

b. Domestic animals such as cattle, horses, sheep, etc, need water daily. Their afternoon movement and their converging 'track plans' indicate the direction in which water may be found.

c. Wild dogs, dingoes and foxes require water daily, and their movement patterns will provide information on water-holes.

d. Kangaroos can go without using a waterhole for long periods at a time, but if they have a regular movement pattern in the afternoon, it is worth investigating.

e. Frogs may be found by digging in dry, muddy creek beds and billabongs. The lowest point in the creek bed is the best location.

f. Ground scratchings or diggings of animals, particularly in dry creek beds, waterways and billabongs, are a good indication of nearby underground water.

424. Small animals such as rabbits, possums, bandicoots, etc, do not require a great deal of water and manage to get most of their water from the vegetation they eat. Therefore, these small animals are not a reliable guide to water.

Bird Behaviour

425. Many birds such as finches, pigeons and galahs mainly feed on grain or grass seed. As there is little moisture contained in grass seed, toward the end of each day these grain-eating birds fly directly to water sources. This flight pattern can be of assistance in the search for water, since the direction of flight in the late afternoon can be observed and followed. However, such birds can be up to 8 km from water.

426. One bird which is a regular user of water is the emu, which walks to a water-hole every afternoon. As a result, the movement of emus in the latter part of the day can provide a useful guide to water.

427. The general rules relating to birds and water are as follows:

a. Grain-eating birds (pigeons, galahs, finches, etc) are the best indicators of water.

b. The smaller the bird, the closer the water. Small birds do not range out feeding as far from water as larger ones.

c. Carnivorous birds such as hawks, kites, eagles, etc, are not reliable water indicators.

d. Water birds such as ducks and geese rely on fresh water for their habitat, but they also have the ability to fly long distances in search of water.

Insect Behaviour

428. Active insect life (Figure 4–11) in an area is an encouraging water sign. Some insects remain close to water sources, while other insects (eg, the common Australian fly) are very wide ranging. Detail on flying insects is as follows:

a. *Bees*. Two types of bees are found in Australia: the domestic bee which stings, and the native bee which does not. Both types require water for their hives, which are usually found in hollow trees. The native bee is quite small and looks like a small fly. The majority of bees leave the hive and fly in all directions in search of nectar. A close study of the movement patterns of such bees may indicate their water source.

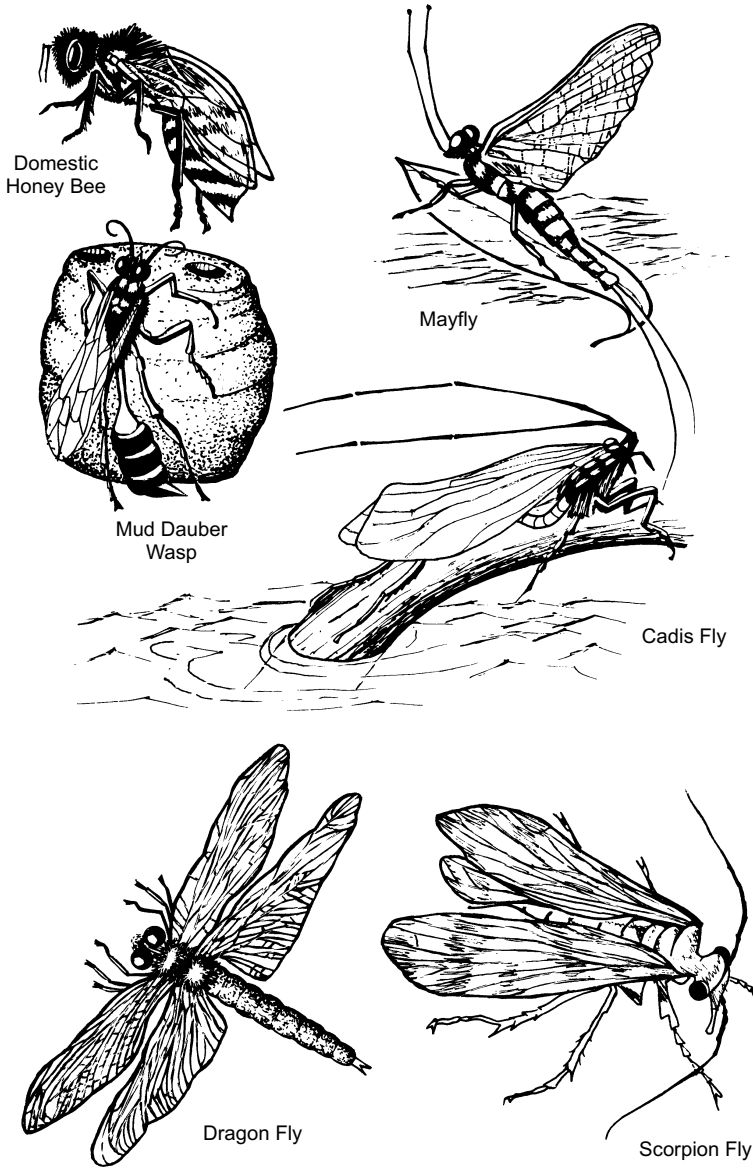


Figure 4–11. Water Indicators – Flying Insects

b. *Wasps.* Like bees, wasps require water to construct their nests. The wasp will fly with a small ball of mud from the water location to the nest. Because of the weight of mud, the wasp flies very slowly and does not travel very far. Wasps (and their nests) are always found close to water, which is likely to be a ground soak or small spring.

c. *Flies.* March-flies, dragon-flies and may-flies are also found in close proximity to water sources. The common Australian bush fly has no particular association with water.

d. *Ants.* A procession of ants (Figure 4–12) moving up the trunk of a tree is a fair indication that water is stored in the cavity of the tree trunk. If water exists within the trunk, it will be well protected from the sun. The ants will indicate the entrance to the cavity. An improvised drinking straw or a sponge fixed to the end of a stick can be used to extract the water.

Figure 4–12. Water Indicators – Ants

SECTION 4–3. ADDITIONAL METHODS OF OBTAINING WATER

429. Additional methods of obtaining water are described in paragraphs 430 to 432. These include:

a. condensation,

b. rainwater, and

c. steam induction.

Condensation

430. **Dew.** At night, when temperatures drop, dew often results. Small droplets of moisture cover the vegetation and earth. This moisture may be collected with the help of a sponge or pieces of cloth (Figure 4–13). Aborigines were known to have collected dew by tying grass around their legs and walking through the heavy dew-laden areas. The moisture collected on the tufts of grass which were then squeezed dry. Artificial surfaces such as metal (motor vehicles, aircraft, etc) and plastics are also reliable dew collectors.

431. One excellent method of collecting dew is to construct a 'dew pit' (Figure 4–14), which consists of plastic (eg, a one-man tent or a ground sheet) draped on the ground in a shallow depression. Overnight dew collects on the upper surface of the smooth plastic. A number of solid smooth objects (eg, plastic water bottles, canteens and even smooth rocks) may be placed on top of the plastic sheet as these will also collect dew on their surfaces. Early in the morning, the dew from the plastic and the other objects is collected before the sun begins to evaporate the moisture.

432. **Solar Still.** A dew pit can be combined with a solar still (Figure 4–15). The solar still is an artificial means of forcing moisture condensation from the earth and vegetation. A dark plastic sheet such as a Shelter Individual works best. A hole 1 m square with sloping sides is dug in the ground. The hole should be about 0.5 m deep. A container such as a steel helmet or steel canteen cup is placed in the hole. Polluted water and waste liquid, including salt water, mud or even urine, should be added to the hole before sealing. Any available green vegetation should be crushed and positioned around the water receptacle at the base of the hole. A long rubber or plastic tube which may act as a drinking straw should now be positioned. The tube is sealed on the outside to prevent evaporation. The plastic sheeting is sealed by piling earth up around its edges. To force the condensed moisture to drip into the catchment container, a heavy object like a rock is placed in the middle of the plastic. Siting of the solar still should take into consideration the moisture content of the soil, which may be indicated by vegetation growth. Care should be taken to ensure the solar still will not be in shade during the day.

433. The heat of the day will cause moisture to evaporate from the moist earth and vegetation. This moisture will collect as condensation on the underside of the plastic sheeting. This condensation forms droplets which run down the sheeting and fall into the collection container. Despite the fact that this water may have originated from urine or salt water, it is now quite pure and drinkable, and may be sucked up the straw from

Figure 4–13. Sponges

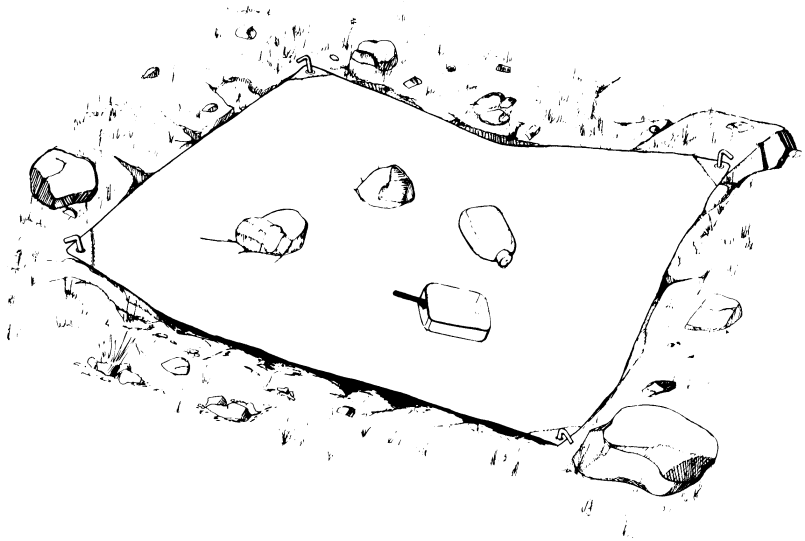


Figure 4–14. Dew Pit

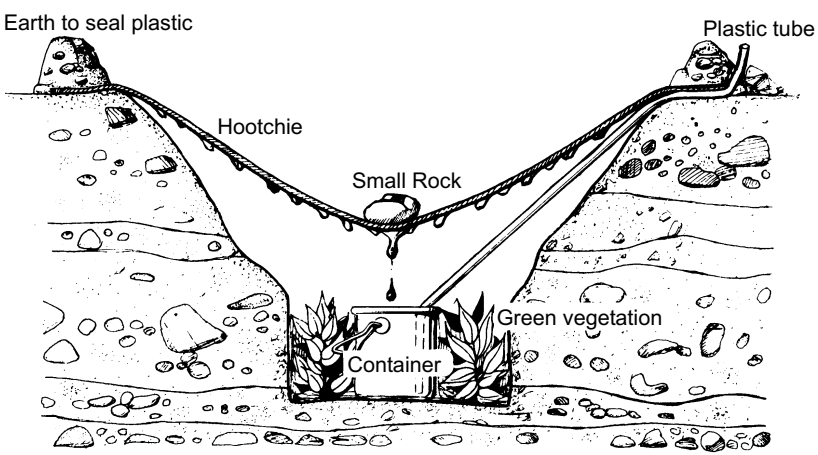


Figure 4–15. Solar Still

the collection container. The solar still should produce at least one litre of water per day, but may have to be reconstructed in a new location every 2 or 3 days. Solar stills should be constructed during the cool of the evening.

434. **Water Transpiration.** Trees release moisture into the atmosphere via their leaves. Water can be extracted by placing a clear plastic bag, about the size of a garbage bag, over a bunch of leaves. Secure the neck of the bag firmly around the branch to prevent evaporation and to stop ants and other insects crawling inside the bag. Over a period of 24 hours the bag should collect about a litre of water through condensation (Figure 4–16). In Australia, not all vegetation produces water which is drinkable. There are a few species which produce toxic or poisonous water. Most of these species are shrubs or bushes and the poison is due to alkaloids in the water which give it a bitter taste. This risk may be reduced by applying the following basic principles:

a. If in doubt, make use of trees such as any of the numerous varieties of eucalyptus and wattles rather than shrubs and bushes.

b. Try to avoid 'stewing' the leaves in the plastic bag by ensuring the leaves do not soak in collected water.

c. Do not use plants which give off a pungent/offensive smell when the leaves are crushed.

d. All water collected should be 'taste tested' before drinking (paragraph 616 refers).

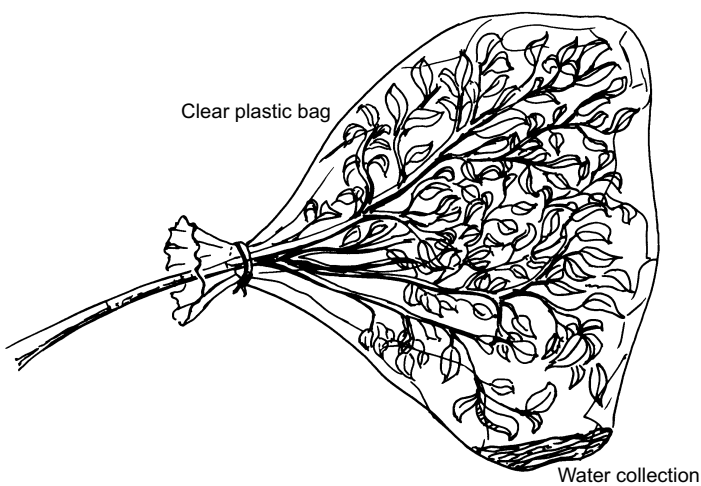


Figure 4–16. Foliage Transpiration

435. Unusable water collected by transpiration may be purified of poisons and toxins by using the evaporation process in a solar still (paragraph 432). Water transpiration has a number of advantages over the solar still because:

a. it requires less energy to construct,

b. it does not have to be rebuilt after a couple of days, and

c. it does not destroy the source of water during the process of transpiration.

Rainwater

436. The Shelter Individual is an excellent means of catching rainwater. Clothing placed in the open during rain can also contribute quite a few litres when squeezed dry. Trees are also good collectors of rainwater. The leaves, branches and trunk collect water and direct it to the root system. Water flows down the surface of the trunk and onto the ground. A band of material such as a sweat rag tied around the trunk allows the flow of water to be directed into a container positioned under the lowest point of the knot in the rag (Figure 4–17). Smooth barked trees such as Ghost and River Gums are the most useful for this method. The same results can be achieved by cutting a channel or groove into the bark of the tree.

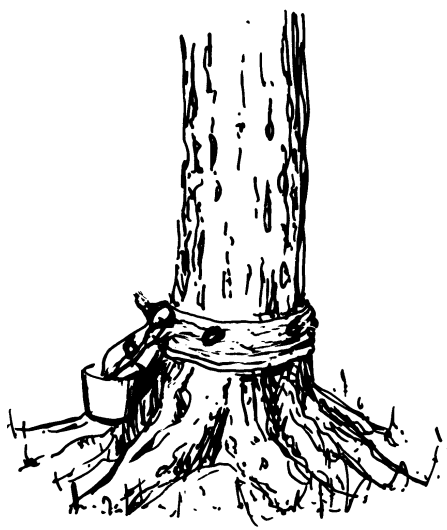


Figure 4–17. Catching Water Running Down a Tree

Steam Induction

437. By using a process of steam induction, polluted water such as brackish or salty water may be purified. The process is simple. A container of the polluted water is continuously boiled over a fire. As the steam rises it is collected on a plastic sheet held in position above the fireplace. The steam condenses on the sheet and runs to one corner where the water droplets are collected. If plastic sheeting is not available, clothing or other material may be used to collect the steam. When the material becomes saturated, it is wrung out into a container. The collected water is quite safe to drink.

SECTION 4–4. WATER CONSERVATION

Sterilisation

438. All water gathered from streams, billabongs, catchment areas, etc, should be sterilised before drinking. The two basic methods of sterilising water are:

a. to use water purification tablets as directed, or

b. to boil the water for at least five minutes.

439. Water can also be sterilised using six drops of iodine per litre. The water and iodine should be mixed thoroughly and allowed to stand for 30 minutes before drinking.

Filtration

440. Sterilisation does not get rid of suspended particles such as dirt. Polluted water must be filtered. If no Milbank Filter bag is available, a filter can easily be improvised using a trouser leg or shirt sleeve. A cord is tied tightly around the bottom of the sleeve or leg. About 15 cm of coarse sand, charcoal or soil is placed in the bottom and the polluted water is poured into the opening at the top (Figure 4–18). The filtered water trickles through the knotted area into a collection container. Even though the water has been filtered, it must still be purified by using tablets or by boiling. Urine or salt water cannot be filtered and made into drinking water using this method.

441. Similarly, water can be filtered using a variety of improvised sand filters. Containers such as tin cans or plastic containers may be used as a filter by filling them to two thirds of their capacity with sand. An outlet hole is then made at the bottom of the container. The polluted water is then inserted into the top of the container and the filtered water collected via the hole at the bottom.

442. Muddy water can be clarified by allowing the water to stand in a container for several hours until suspended matter settles to the bottom. Clear water can then be carefully decanted or syphoned from the container.

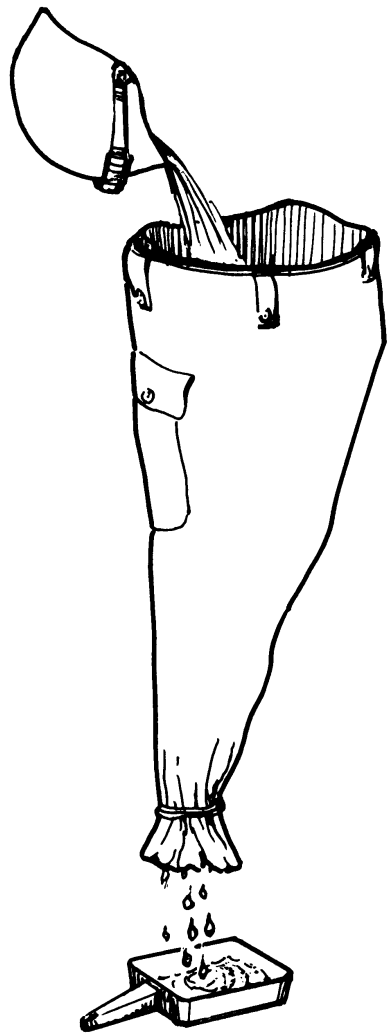


Figure 4–18. Filtering Water Using Field Expedient

Guidelines for Conserving Water

443. The basic rule for conserving water is, 'RATION SWEAT, NOT WATER'. To achieve this, personal activity must be closely monitored. The following guidelines should be observed:

a. During the first 24 hours, water consumption should be kept to a minimum.

b. The heat of the day should be a rest period and work should be done during the cool of the evening.

c. Clothing should be kept on, with belts, cuffs, etc loosened.

d. The shade of the rest area should be increased if possible.

e. Headdress should be worn and exposed areas of skin kept to a minimum.

f. Smoking should be stopped altogether.

g. The mouth should be kept closed and talking avoided.

h. Urination should not occur more than once or twice per day.

i. If water is available, thirst should be quenched whenever necessary.

j. Foods which are sweet or contain a high degree of moisture, are better eaten than protein foods such as meat, eggs, cheese, fish, etc.

Salt Water and Urine

444. Both salt water and urine contain substances which the human body cannot withstand (eg, excess salt in salt water and poisons such as ammonia and urea in urine). Drinking salt water or urine will only increase the problems already experienced. The body can only tolerate so much salt and urea in the system. If more is added, death may result. It is far better to use urine and salt water in solar stills and water condensation activities. In this way drinking water can be obtained.

Medical Considerations

445. Effort should be made to avoid medical conditions such as heat exhaustion, dehydration and those conditions which cause the body to use excessive amounts of water such as dysentry, vomiting and sunburn. If these conditions do occur, the treatments described should be administered as soon as possible to minimise their effects.

CHAPTER 5

SHELTER

SECTION 5–1. INTRODUCTION

501. In some survival situations the provision of shelter will be an immediate priority, ahead of water and food. Without shelter, in extreme conditions, death can result within hours. The provision of shelter will greatly improve survival prospects because adequate rest and sleep are as necessary as food and water.

Factors in Design

502. The three basic environmental factors which influence shelter design are:

a. temperature,

b. wind, and

c. water from rain and floods.

503. Shelter construction must take these factors into account. In some instances, all three factors may have to be considered (eg, in an alpine environment).

504. **Selection of Sites.** Careful attention should be paid to the selection of camp sites and to making yourself as comfortable as possible. In selecting the site try to choose one which provides:

a. concealment if required,

b. protection from natural hazards,

c. availability of drinking water and food,

d. materials for making shelters and beds, and

e. some freedom from insect pests.

SECTION 5–2. SHELTER DESIGN AND CONSTRUCTION

General

505. Shelter design and construction should make economical use of the natural resources available. A shelter constructed in a windy environment should be in a location which is affected least by that wind (eg, in a depression or behind a wind-break). In an arid area, a shelter should be built in existing shade areas.

506. In addition to the natural assets, any available manufactured items should be utilised. Corrugated iron, vehicles, old water tanks and the Shelter Individual are all excellent materials to use in shelter construction.

The Considerations of Shelter Construction

507. The basic considerations which guide the sighting, design and construction of shelters are described in paragraphs 509 to 516.

508. **Shelter Location – General.** Shelters should **NOT** be constructed:

a. on the shoreline of a lake or beach area;

b. on the windward side of a hill;

c. in a dry creek or river bed;

d. below trees containing dead-fall (including coconut palms);

e. in drafty gullies;

f. at the base of a cliff face;

g. near ant nests or insect hives; or

h. under isolated trees, near rocky outcrops or near wire fences when electrical storms threaten.

Shelters – Arid Areas.

509. Aboriginal desert shelters are basic constructions. Overnight shelters act as both a windbreak and a method of providing some form of shade. These shelters are constructed using branches from trees or shrubs and quite often make use of standing vegetation. The standing vegetation provides the basic structure for shade, and the broken branches, etc, provide the necessary wind-break and help to thicken up the shade. (Figure 5–1)

510. These days a more permanent form of shelter is commonly seen in Aboriginal communities (bough shelters) which allow good breeze flow and provide thick shade at the same time. The roof of these bough shelters is covered with gum tree branches or spinifex. (Figure 5–2)

511. In arid regions, the following should be considered when constructing shelters:

a. Existing shade, eg, trees, shrubs, rock outcrops, etc should be used.

b. The overhead shade of the shelter can be increased by adding vegetation, and any man-made materials available.

c. The wind (but not air flow) should be blocked out.

d. A sleeping platform should be constructed at least 15 cm above ground level to improve air circulation.

e. A flat shade roof is preferable.

f. Ravines and canyons will be cooler during the day and at night.

g. Shelters should not be constructed near water holes as close proximity to water holes would have the effect of scaring away animal life from the area.

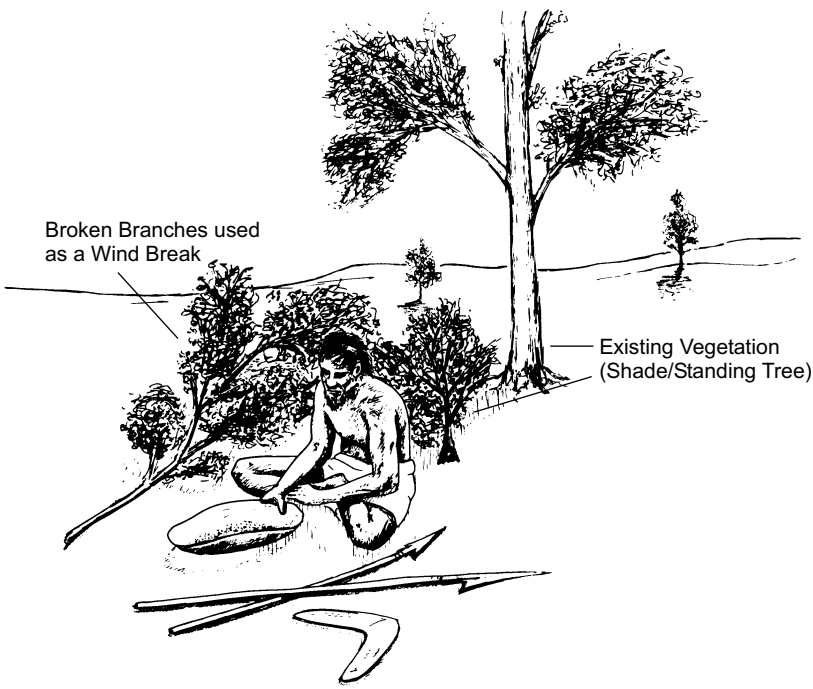


Figure 5–1. Simple Overnight Shelter

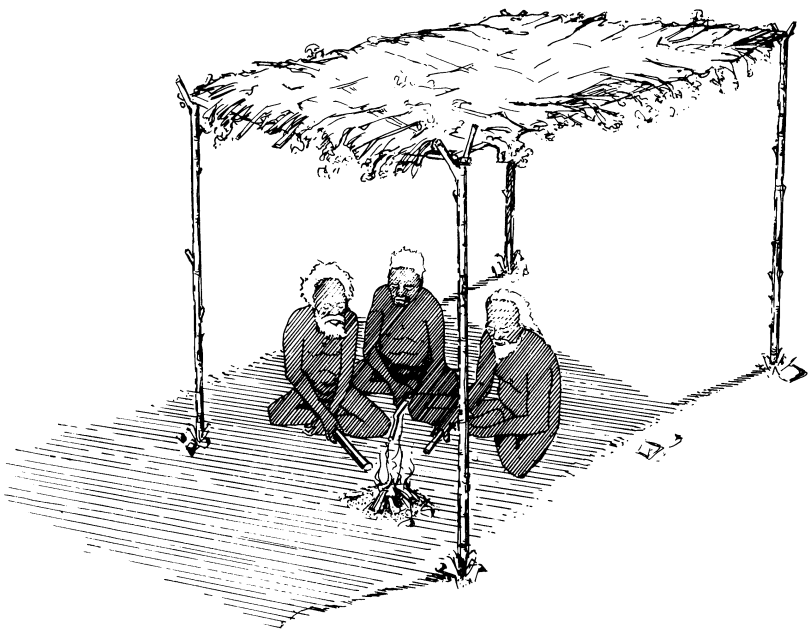


Figure 5–2. Bough Shelter – Roofing made from Gum Leaves or Spinifex

512. In arid areas, loose fitting clothing should be worn to allow air to circulate freely around the body without exposing the surface area to evaporation.

Shelters – Tropical Regions

513. In Australia tropical environments take two forms:

a. tropical rainforest, and

b. tropical woodland.

514. Most of Northern Australia can be classified as tropical woodland while only a very small percentage can be called rainforest. These environments will dictate the natural resources that can be utilised for shelter construction. For instance, in a tropical rainforest environment, broad leaves such as banana and palm fronds are easily adapted to provide shelter; in a tropical woodland, paperbark and grass would fill this role. An example of these two types of shelter are shown in Figures 5–3 and 5–4.

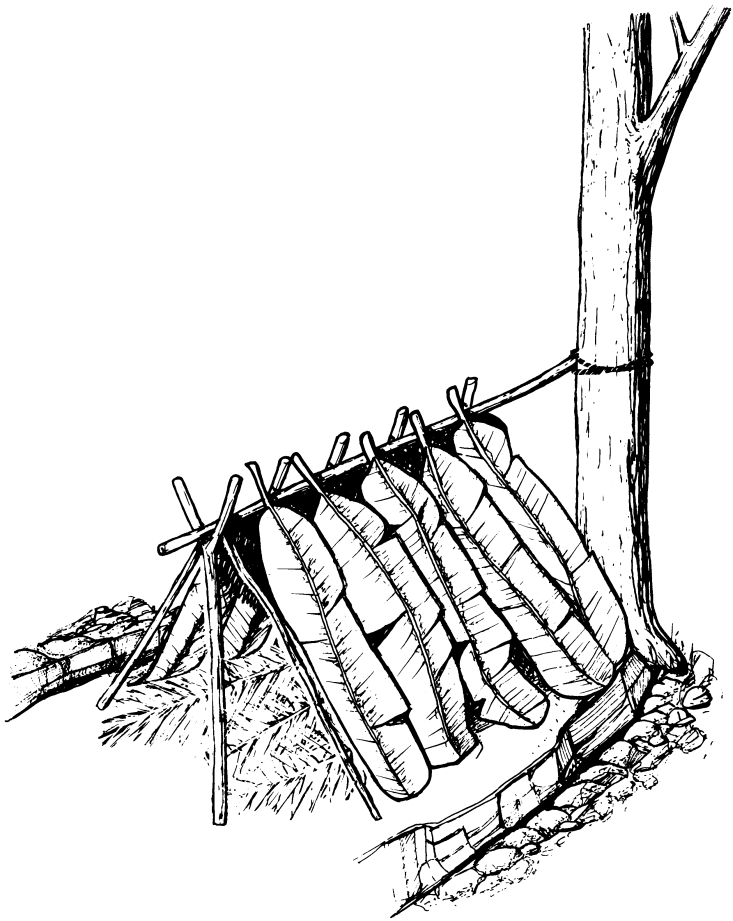


Figure 5–3. Improvised Tropical Shelter

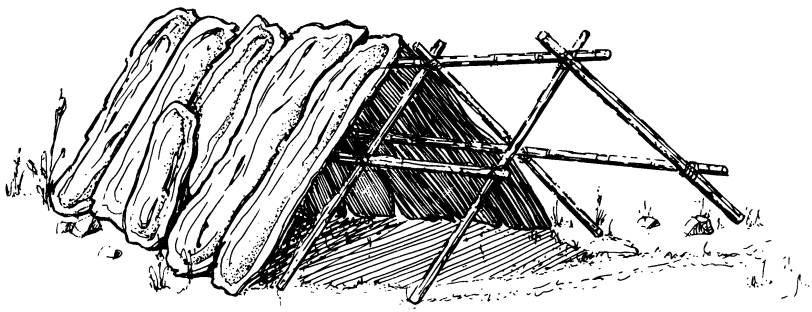


Figure 5–4. Tropical Woodland Shelter

515. For many months of the year, shelter in Australian tropical regions will not pose any great problem. However, for a period of three or four months the wet season brings heavy rainfall and cyclonic winds, during which time shelter becomes a major consideration. The following points should be noted when constructing a tropical shelter:

a. The location should be well drained.

b. The site should have protection from prevailing seasonal winds.

c. Overhead protection should be waterproof and allow for quick run-off. Roofing should be constructed at an angle of about 800 mils.

d. A water drainage trench should be dug around the shelter.

e. Vegetation (grass, leaves, etc) can be used to insulate against ground dampness and seepage.

Shelters – Alpine Areas

516. Shelters in an alpine environment will basically fall into two categories:

a. *Snowbank Shelter.* The snowbank shelter, or snowcave, is carved into the side of firm packed snow. (Figure 5–5). It relies entirely on snow to provide the basic structure and material.

Figure 5–5. Snowbank Shelter

b. Improvised Alpine Shelter. Improvised alpine shelters utilise ground form, obstacles (rocks, logs, etc) and whatever resources are available at the time, to help form the shelter (Figure 5–6).

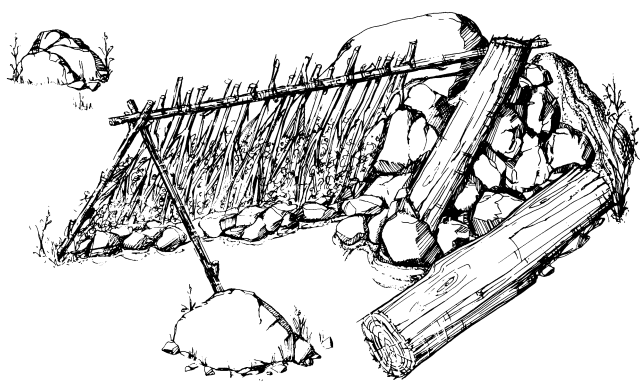


Figure 5–6. Improvised Shelter – Alpine

517. Construction of any type of alpine shelter should take the following guidelines into consideration:

a. The location should be protected from the wind.

b. The shelter should have a low profile and be small in size.

c. The shelter should aim to keep cold air out and warm air in.

d. Construction materials should be solid, ie rocks, packed mud, snow or logs.

e. Natural features such as tree stumps, rocky outcrops, large fallen logs can be incorporated into the structure of the shelter.

f. With the exception of a small airhole or vent, alpine shelters should be totally sealed (including the entrance).

SECTION 5–3. FIRE

General

518. In many environments, particularly in cold and alpine regions, fire is a necessary and integral part of shelter, since it provides the warmth necessary to sustain life. Fire also provides:

a. a means of cooking,

b. a signalling capability,

c. a means of water purification and condensation,

d. a drying capability,

e. a degree of protection from animals and insects,

f. light, and

g. psychological comfort.

519. Because of the many uses of fire the skills and knowledge necessary to produce fire, with or without matches, are essential for survivors. Making fire by friction and other means is not easy, but when the skill has been mastered, the person acquiring the skill gains greater knowledge of himself and greater confidence in his ability to survive.

520. **Size.** The most efficient fires are small ones. They require less maintenance and are much more easily managed than large fires. Aborigines use a number of small fires for warmth rather than a single large fire.

521. **Location.** Fires should be located on cleared ground. Flammable materials such as grass, twigs and wood should be cleared for a radius of at least 1 m. On wet ground it may become necessary to build the fire on top of a rocky base, (see paragraph 536) or even upon an elevated wooden platform (Figure 5–7). A layer of green bark or mud beneath the fire will prevent it from burning through the platform. In the swamplands of Northern Australia, Aborigines made their fire platforms large enough to sleep on as well as build a fire. These platforms were constructed in the forks of trees.

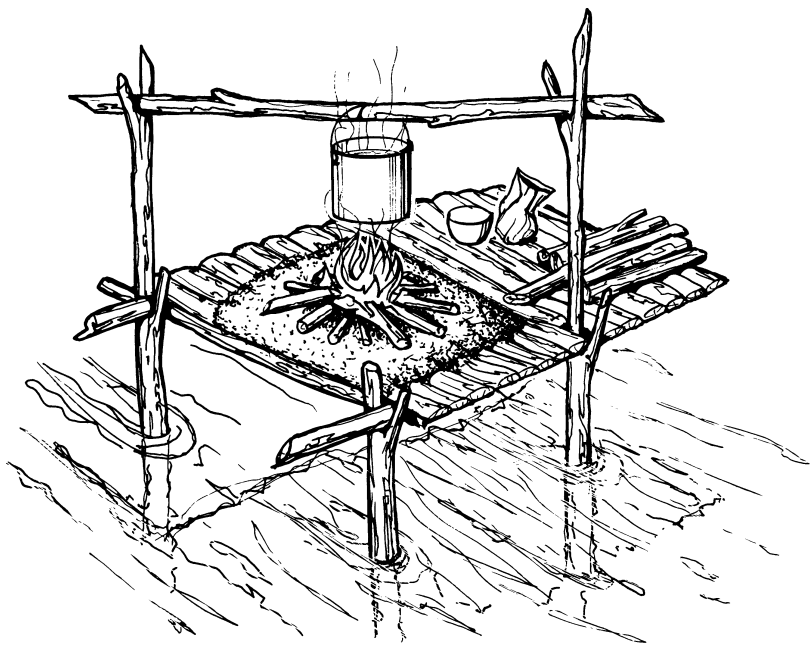


Figure 5–7. Fire Building in Wet Areas

522. **Tinder and Firewood.** A fire must be constructed using tinder as the basis. This may consist of brittle strands of grass, dry leaves, twigs or even crushed animal dung. Tinder is any fuel which can be ignited by a spark or small flame. It must be small, dry and flammable.

523. As the tinder is ignited, larger portions of fuel are progressively added to the fire, thereby building up the flame. Finally, the main fuel (probably firewood) is added. Because small fires are the most economical, only medium sized pieces of firewood are required. The harder a wood is, the more intense the heat produced when burnt. Hardwood produces hot coals and soft, white wood produces ash. Softwood is much easier to light than hardwood and is most suitable for use as tinder.

524. During wet conditions, dry tinder and firewood may be obtained by splitting dry standing timber. Standing firewood such as dead branches and trees will provide drier fuel than wood found lying on the ground. Some wood will burn even when green because the tree has a flammable resin (sap). Examples of such trees are pine trees, grass trees, and some species found in tropical rainforests.

Methods of Starting Fire

525. **Using Matches and Lighters.** Matches and lighter fluid should be preserved as long as possible. The use of three or four matches to start a fire is wasteful and can be overcome by first lighting a small candle. The flame of the candle is then applied to the tinder. The same process applies when using a cigarette lighter. In this way, the precious resources of matches and lighter fluid are used sparingly. If matches are in short supply, they may be split in two using the sharp point of a knife immediately below the head of the match. Likewise, paper matches may be peeled into halves starting at the butt end of the match. Kindling a fire using half matches is a tricky process and should be practised in training for survival.

526. **Fire Without Matches.** Lighting a fire without the aid of matches or a cigarette lighter is difficult but can be achieved using the methods outlined in paragraphs 527 to 531.

527. **Electrical Spark.** A spark may be produced from a battery by attaching a wire to each pole (terminal) of the battery and allowing the two loose wire ends to touch. The resulting spark is directed onto prepared tinder. This process can be assisted by the addition of a teaspoonful of petrol or gun powder to the tinder (Figure 5–8).

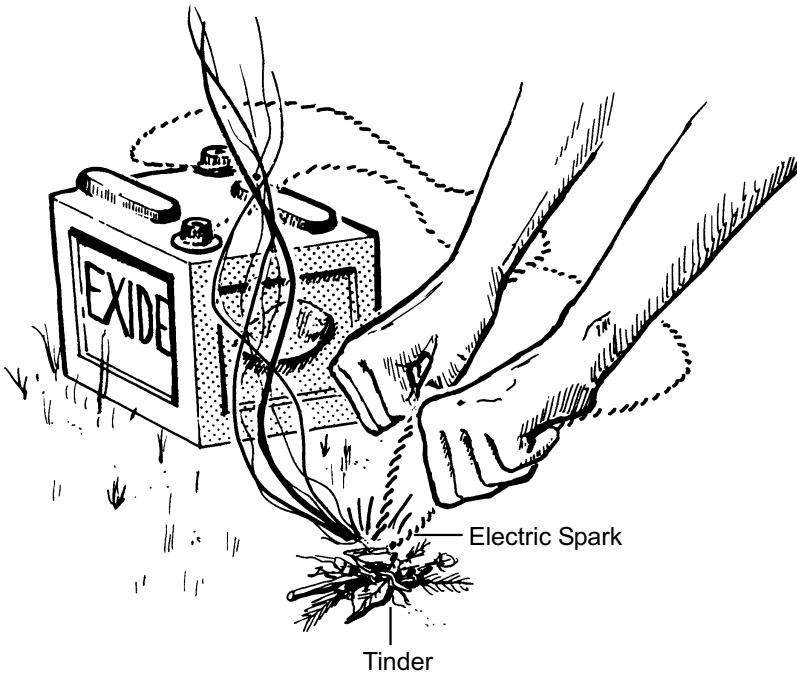


Figure 5–8. Lighting a Fire Using Electrical Sparks

528. **Sun and Glass.** Figure 5–9 illustrates a fire being started by concentrating the rays of the sun through a lens onto a dry thin piece of tinder. Camera lenses, spectacles, binoculars, torch lenses and magnifying glasses are suitable. The best tinder to use is dry grass, paper bark or dry leaves. Once the tinder is smoking, blowing on it gently will encourage the flame.

529. **Chemical.** Condy's Crystals (Potassium Permanganate) is useful not only for medical purposes but also for starting a fire. A small amount of Condy's Crystals is mixed with sugar or any sugar-coated tablet. The relative quantities of Condy's Crystals and sugar used are not important, however, all ingredients used must be dry. Moisture is indicated by sugar absorbing purple colour from the crystals. A small amount of mixed crystals are placed on a rock and are crushed and mixed together using the blade of a knife or bayonet in a stroking motion. The two crystals and the force of the knife blade will cause a chemical reaction which produces sparks, igniting the mixture and producing a flame which can be built into a fire.

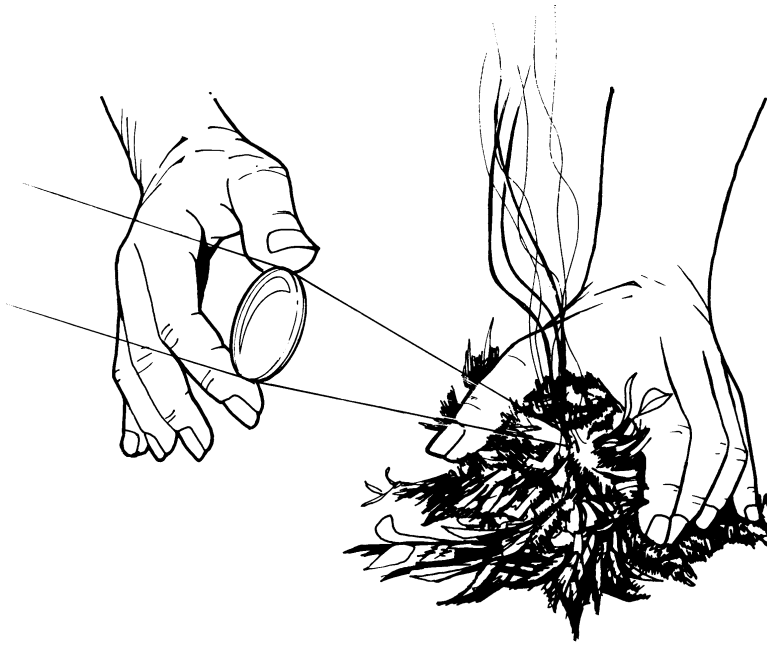


Figure 5–9. Lighting a Fire Using the Sun and Glass Method

530. **Ammunition Propellant.** Ammunition propellant can be used in much the same manner as Condy's Crystals. A cartridge is broken open and a small quantity of the propellant sprinkled onto the kindling. Sparks resulting from the grinding process are dropped onto the kindling and ignite the propellant. This technique must be used with caution and only as a last resort. Minute quantities only of rifle ammunition or discarded charge bags from mortar/artillery rounds should be used. This is an extremely dangerous practice if excessive amounts are used.

531. **Friction.** Friction causes heat. If enough heat can be generated, fire will result. The following methods can be employed to obtain fire from friction:

a. *Fire Bow and Drill.* The fire bow (Figure 5–10) enables the spinning of a shaft of wood fast enough to generate fire. The shaft should be of hardwood and the receiver of softwood. The bow can be constructed from any wood which is bent or will bend. A cord (eg, a boot lace) is tied between the ends to form a bow. A block of wood is held down on the top of the shaft with

firm pressure and, at the same time, the bow is worked backward and forward. The underside of the head piece has a shallow hole bored into it, and this is lubricated, preferably with lead from a pencil. A smear of fat will also serve as a lubricant, or if this is not available, wax from the ear can be used. This will quickly create a burnt depression in the piece of softwood. The process will be aided if the depression is occasionally dusted with fine sand or charcoal powder. The powdered dust will soon begin to smoke and should be tipped onto the tinder. These particles can be coaxed into flame by gentle blowing.

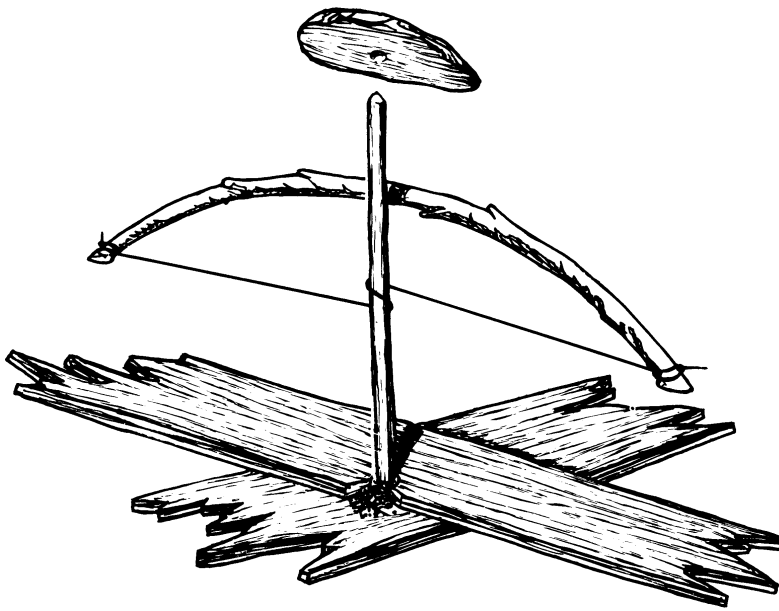


Figure 5–10. Fire Bow and Drill Method

b. *Fire Sticks.* Fire sticks (Figure 5–11) were the most common method used by Aborigines to create fire. In principle this method is very similar to the fire bow and drill, except that the drill or shaft is rotated using the hands only. The drill should be of hardwood, and the receiver of softwood. Two pieces of softwood will work, but the task is more difficult. The aim is to concentrate the heat of the twirling drill onto a particular spot. It is helpful to cut a small depression in the receiver to allow the drill tip to sit firmly. The twirling drill will quickly burn into this depression.

Like the fire and drill, this method is assisted by adding fine sand or powdered charcoal to the drill tip or depression. The drill is set upright with the tip seated in the depression. It is then rubbed between the hands so that it twists rapidly, in alternate directions, at the same time being pressed hard into the depression. The twisting tip of the drill creates a small pile of hot sawdust. After a short time the friction of the drill is sufficient to ignite the sawdust. With gentle blowing, the smouldering heap of sawdust will ignite small particles of tinder.

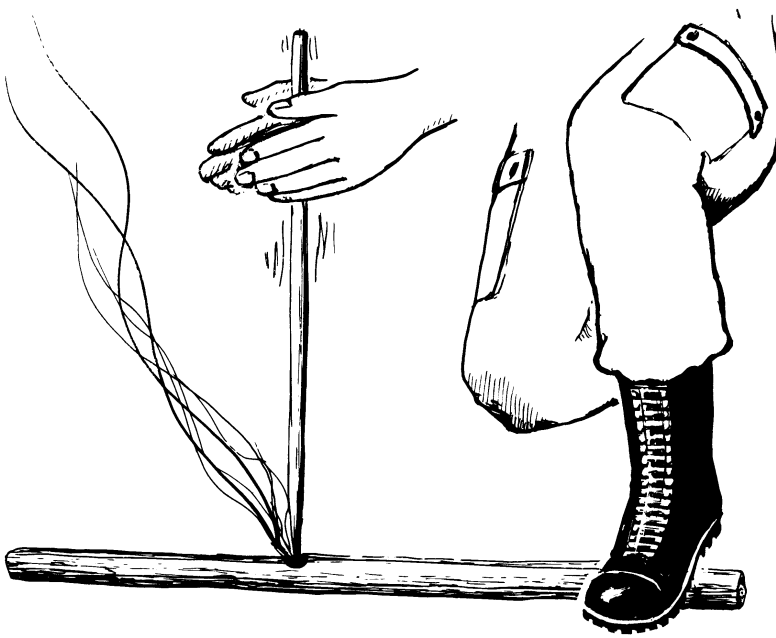


Figure 5–11. Fire Sticks Method

c. *Fire Thong or Rope.* A dry piece of wood about 2 m long is split at one end. The split ends are held apart using a rock as a wedge. The saw or thong may be made from leather or Lawyer Cane, about as thick as a boot lace. The split wood is then elevated above the ground at one end and a small parcel of tinder placed inside the split. The thong is threaded through the split and worked vigorously to and fro above the tinder. Hot particles fall from the saw onto the tinder, which with careful nurturing and blowing can be made to produce a flame (Figure 5–12).

Figure 5–12. Fire Thong Method

d. A similar method (Figure 5–13) which is still being used in remote areas of the world involves using a piece of split bamboo, about 1 m long. The bamboo has a hole drilled through it so that it just begins to show on the inner surface. On the outer side, a groove is cut across the hole. This allows the thong to sit firmly across the hole. The thong is usually a piece of split Lawyer Cane about as thick as a boot lace. As the thong is rapidly pulled backward and forward across the hole, it wears away the bamboo and hot particles are forced through the hole. These particles form a smoking tinder.

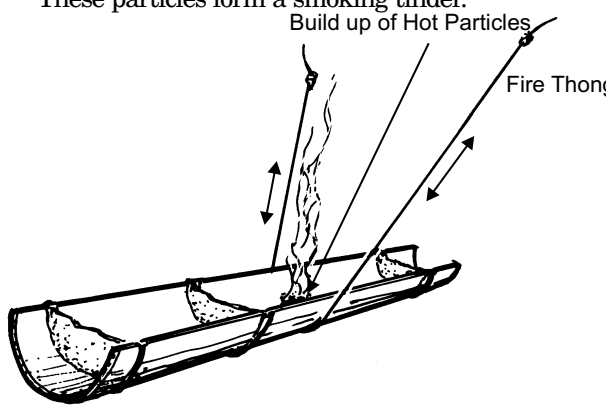


Figure 5–13. Split Bamboo Method

e. *Fire Plough.* The fire plough (Figure 5–14) involves rubbing a hardwood stick or plough rapidly up and down a softwood base. Tinder is positioned at the open end of the base where it can collect the hot particles generated by the plough. The plough should use a single trough if this method is to be successful.

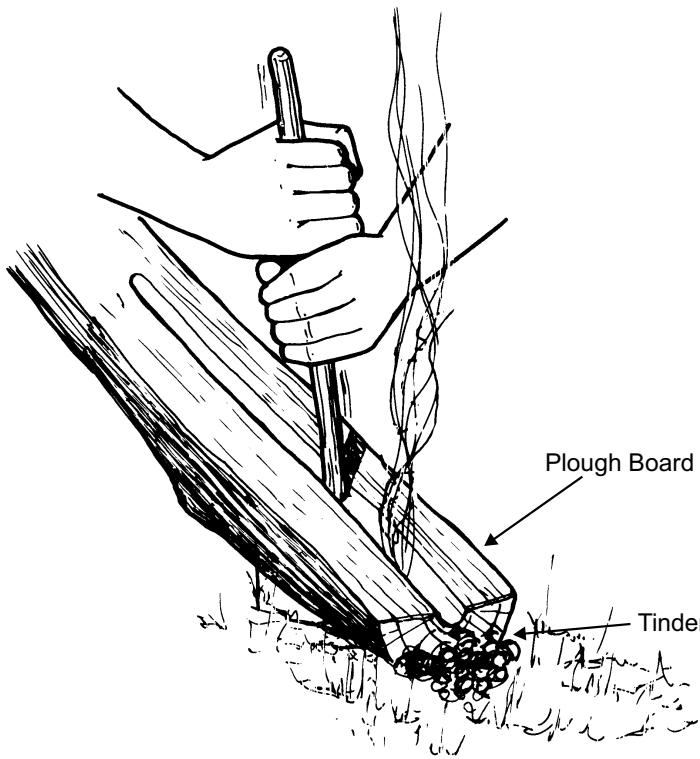


Figure 5–14. Fire Plough Method

f. *Fire Saw.* The fire saw (Figure 5–15) consists of two pieces of wood which are rubbed against each other. One piece should be of hardwood (eg, Acacia) and the other of softwood. The best method is to cut and shape the hardwood so that it resembles a ruler or small sword. Then the cutting edge of the sword is quickly rubbed backward and forward on the softwood, creating hot sawdust. Gently nurturing and blowing on this hot sawdust should result in fire.

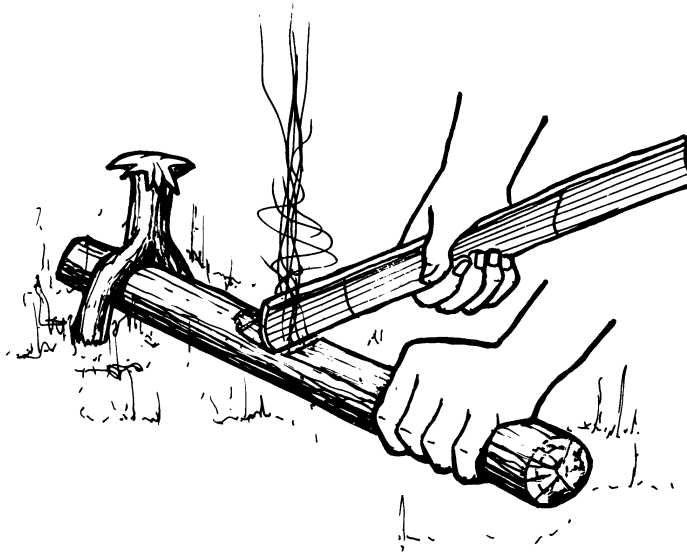


Figure 5–15. Fire Saw Method

g. *Flint and Steel.* Striking a very hard rock with a thin piece of steel produces sparks. It is not an easy task to get the sparks to flame without the help of a flammable substance such as propellent or petrol. There are a number of different rock types which will provide the desired results. Any rock which scratches or shatters when struck with a knife or bayonet is of no use. Something harder must be found (eg, quartz). If a knife scraped downward against the hard rock produces some flying sparks, the rock is suitable. The sparks are aimed toward the tinder and then gently fanned to produce a flame.

Other Factors

532. **Fires and Smoke.** In some cases it may be necessary to produce fire, but no visible smoke. On other occasions smoke may be a highly desirable resource. A fire can be made to produce smoke by using:

a. wet wood or tinder;

b. green wood, leaves, grass, etc; and

c. restricted ventilation.

533. **Fire and Flame.** A fire which is fuelled from old pieces of charcoal will produce very little flame. The charcoal may be gathered from the burnt remnants of previous bushfires.

534. **Tactical Cooking Fire.** A small cooking fire may be constructed by digging a small slit trench in the ground. The earth from the trench should be piled at the sides of the trench. This will protect the fire and, at the same time, provide a quick means of extinguishing the fire if necessary. The fire should be positioned in the base of the trench and allowed to develop into hot coals. The meal should be wrapped in leaves, grass, etc and placed on the hot coals, and the trench filled in using the soil from the sides. The hot coals will continue to cook the food for another hour or so.

535. **Heat Reflectors.** The warmth of afire can be prevented from radiating in all directions by a heat reflector. A reflector may be constructed from logs of wood piled up to form a wall, or even heavy clothing such as a field jacket hung up between two stakes (Figure 5–16).

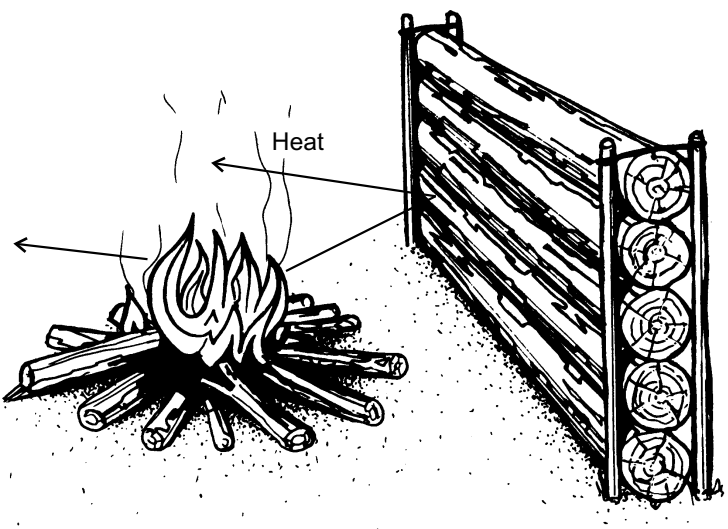


Figure 5–16. Improvised Heat Reflector

536. The use of hot rocks buried in a shallow hole makes a warm bed. The rocks are heated by the fire during the daylight hours and placed in a suitably shaped hole and covered over with earth. Care must be taken not to use river stones as they may explode while being heated.

CHAPTER 6

FOOD

SECTION 6–1. INTRODUCTION

General

601. Although the human body can do without food for a considerable time, it begins to degenerate without adequate nutrition. This in turn affects bodily functions and efficiency. Within a short time the individual will have difficulty carrying out other basic survival activities such as shelter construction and water collection. This chapter discusses the human diet requirements, types of foods, hunting for food and food handling techniques.

SECTION 6–2. THE HUMAN DIET

Diet

602. Because the body has such a wide range of functions to perform, it requires a variety of fuels. These fuels are broadly called nutritional requirements and are comprised of various vitamins, minerals, acids and energy components. The human body cannot rely on one food alone, but needs a proportion of all food types in order to function. Some of the body's nutritional requirements and their functions are listed in Table 6–1.

TABLE 6–1. NUTRITIONAL REQUIREMENTS AND THEIR FUNCTIONS

Serial	*Component*	*Function*
(a)	*(b)*	*(c)*
1	Ascorbic Acid (Vitamin C)	Aids wound healing and formation of bones, teeth, tendons and ligaments.
2	Fat	A concentrated source of energy, regulates and maintains body temperature.
3	Protein	Provides for growth of new tissue, supports normal growth and replaces worn out or damaged body cell tissue.
4	Thiamine (Vitamin B1)	Helps convert food into energy and assists nerve functions.

General

603. Survival may often entail long journeys on foot without adequate food. In the jungle particularly, the food available may be abundant, but care in the choice is essential. In most situations the survivor must forget normal ideas and prejudices and bend his mind to the task of finding life supporting food. Generally speaking, most kinds of food found will appear and taste unusual. It is possible that some individuals may react with vomiting or show signs of diarrhoea during the initial stages. These symptoms should quickly disappear once the body has adjusted to the new food intake.

SECTION 6–3. BUSH FOOD

Bush Food and Nutrition

604. Scientific analysis of Australian bush foods has shown that some of these foods have a nutritional value much greater than normal processed foods and, consequently, have acquired a world-wide reputation.

605. **Taste**. Bush food does not taste like normal processed food since it does not contain any taste additives such as sugar, salt, and pepper. Initially, therefore, it may seem bland. This blandness can best be relieved by variety or, if available, food additives such as wild chillies or salt. Very few bush foods have an unpalatable taste.

606. **Types.** Apart from the animal and bird foods such as kangaroos, bandicoots, ducks and emus, there are also vegetation type foods which include fruit, nuts, roots, tubers, berries, flowers and foliage. Also there are various types of fish and molluscs (both fresh and salt water varieties) including crabs, crayfish, lobster, shrimps, prawns, yabbies and snails. The foods fall into two separate categories, hunted food and gathered food.

Hunted Food

607. Hunted foods can be expected to supply only about 20 per cent of the total diet. The remaining 80 per cent of the diet will come from the gathered foods. The reason for this is that hunting takes a degree of skill and luck, and is often not very productive.

608. **Australian Species.** Hunted foods may be divided into two categories: native species and species which have been introduced into the Australian environment. Both groups are excellent sources of food. The introduced species have survived in the Australian environment particularly well and, like the native species, are often widely distributed throughout the continent. Examples of each group are:

a. *Native.* Native species include kangaroos, wallabies, emus, parrots, bandicoots, snakes and lizards.

b. *Introduced.* Introduced species include rabbits, hares, pigs, donkeys, buffalo, goats and camels.

609. **Poisons, Parasites and Disease.** Few species within the hunted food group are poisonous to eat, but some carry parasites and disease. A brief summary of animals in this category is as follows:

a. *Poisonous Species.* Animals which may be poisonous are:

(1) *Land-based.* Although not all land-based frogs and toads contain poisonous glands or sacks, it is probably best to avoid eating any of them.

(2) *Water-based.* Some species of salt water fish found around the Australian coastline may be hazardous to capture or eat. pufferfish, toadfish and some reef fishes may have poisonous flesh, while others, such as the stonefish and butterfly cod, possess venomous spines. In addition, some coral reef fish may contain the toxin ciguatera. Areas where this is known to be prevalent are indicated in the survival resource guides (para 707). There are no toxic freshwater species in Australia, although the Bullrout and some varieties of catfish have venomous spines.

b. *Disease and Parasites.* Although some diseases and parasites exist in wild animals (eg, the feral pig), these diseases present no problem if the meat is thoroughly cooked and normal personal hygiene standards are applied during and after butchering the animals.

Gathered Food

610. Foods such as roots, tubers, nuts, berries, fruit and eggs provide a large portion of the bush food diet. They are classed as gathered foods and most of them are derived from plants. Some, however, such as ant larvae and eggs, come from other sources. A considerable amount of effort should be directed toward collecting these food items. They are much more difficult to identify than hunted foods (paragraph 615).

611. **Distribution.** Gathered foods are a regional resource, with considerable variation throughout the continent (eg, those found in North Queensland are quite different from those of New South Wales or even Southern Queensland). More than 600 varieties of gathered food are known to exist in Australia, but few of these are widely distributed across the continent.

612. **Seasonal Factors.** Climate and season can affect the prevalence of some food sources. Some species appear only after rainfall and others occur only during certain months of the year.

613. **Toxic Species.** Very few species of vegetation found in Australia are regarded as deadly poisonous, however, many are considered dangerous. A comprehensive set of rules cannot be provided as there will always be exceptions. Some broad guidelines in relation to plants are:

a. Sap from trees, bushes, vines, etc, should be kept away from skin, eyes and mouth.

b. White sap often irritates the skin and may be associated with toxic fruit, although this is not always the case, eg, wild figs.

c. The fact that birds or animals may eat a particular type of a wild fruit does not mean that the fruit is safe for human consumption as the digestive system of animals and birds is different to that of humans.

d. The external colour of a fruit is not an indication of its edibility (ie, red does not necessarily mean danger).

614. Because of fear of poisoning, people in survival situations tend to avoid collecting plants and concentrate their energies on hunted foods. This is a mistake for the following reasons:

a. Hunted foods are unlikely to provide the bulk of food required.

b. No use is made of the wide variety of gathered foods available.

c. Hunted foods fail to provide a nutritional balance in the diet. Over an extended period of time total reliance on hunted food would result in death.

615. **Identification.** To assist in the identification of suitable gathered foods, a number of field guides are being produced. The information supplied by these field guides should be followed closely. Field guides are further discussed in paragraphs 707 and 708.

616. **Experimentation.** Experimenting with wild fruits and berries to determine their suitability for eating is not encouraged. It is better to positively identify a food item using the field guides. If experimentation is unavoidable, the 'taste test' should be used. This test is a controlled, gradual introduction of an unknown species into the body's system. Throughout the period of introduction, close observation should be kept for any abnormal reaction. If there is any reaction, the species should be discarded. The test is made up of the following steps:

a.

Step One – Smell. The leaves of the plant should be crushed and smelt. If an almond or peach smell is evident, it may be due to Prussic Acid, and the species should be discarded.

b. *Step Two – Touch.* A small amount of the fruit/berries should be rubbed lightly on an area of tender skin (eg, under the arm). If irritation or a rash results, the species should be discarded.

c. *Step Three – Taste.* The food should be touched with the lips, the corners of the mouth and the tip of tongue. If there is no reaction after two minutes, a small amount should be chewed and spat out. If any irritation or an extremely bitter taste results within 30 minutes, the species should be discarded.

d. *Step Four – Eating.* If possible, the food should be boiled in several changes of water before swallowing. Only a small portion of the species should be chewed and swallowed. The food should be discarded if within 4 hours it produces:

(1) a sore mouth, tongue or throat;

(2) repeated belching;

(3) nausea or sickness;

(4) hallucination or dizziness; or

(5) pain in the lower stomach or abdomen.

617. Providing there have been no adverse reactions to any of the previous tests, the food may be eaten in quantity.

WARNING

Using the taste test to determine edible species should be viewed as a last resort. The following points must be noted:
(a) Never short-cut the tests.
(b) Learn and remember the sequence.
(c) If in doubt, do not eat.

SECTION 6–4. HUNTING TECHNIQUES

618. A number of hunting techniques have proven successful in the Australian environment. Varying techniques involve the use of traps, snares and the exploitation of animal behaviour. One principle remains constant; the simplest method is often the best. Complex trap systems are prone to malfunction and failure. This section includes examples of techniques which have proven successful.

Birds

619. **Flying Stick.** Flocks of low flying birds such as pigeons, galahs and ducks can be struck down in flight by a stick thrown in the midst of the flock. The throwing stick should be about 1 m long and slightly curved. When thrown, the stick must turn end over end in flight. The same method can be used successfully on birds perched in trees.

620. **Underwater swimmer.** A camouflaged swimmer may quietly approach a group of ducks or other waterfowl., When the swimmer is close enough, a bird is pulled underwater by the feet and drowned.

621. **Netting.** Whole flocks of birds may be caught by stretching a large net across a river. As the birds take off from the water, they fly into the net. An Army camouflage net (without the scrim) would be ideal for this purpose.

622. **Fish Hook Trap.** A baited fish hook tied to a balancing rock is also a very effective bird trap (Figure 6–1). The feeding bird eats the bait and is caught on the fish hook. The bird dislodges the balanced rock and is drowned.

623. **Wedge trap.** On the banks of rivers and lagoons, ducks may be lured into tight channels dug into the earth. The sides of these channels act like a wedge and narrow as the channel progresses. As the duck forces its way up the channel in search of bait (worms, etc), it becomes wedged and unable to reverse out of the channel.

624. **Simple Traps.** In the drier areas of Australia, other birds such as cockatoos, pigeons and lorikeets, may be captured around watering areas using very simple trap systems. These traps rely on the following basic points:

a. A single, isolated water source which attracts grain-eating birds toward the end of the day, is the most suitable location.

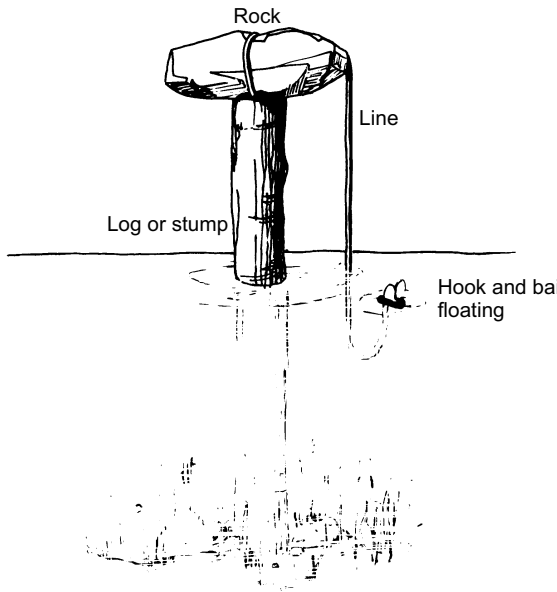


Figure 6–1. Fish Hook Trap

b. Birds prefer to land on a perch prior to going to ground and watering.

c. Once a bird is captured, its cries will attract others which may also be caught.

625. The most successful trapping techniques provide some form of perch on which the birds can land prior to watering. A number of slipknot loops can be positioned along the perch to catch the birds around the legs (Figure 6–2a and 6–2b).

626. Emus may be ambushed at watering holes and killed using sticks and waddies. In some areas, poisonous bushes may be found, pounded and washed into the watering hole. Emus, cattle and even camels are quickly overcome by the poisoned water. The poison is based on nicotine and attacks the nervous system within seconds. The flesh remains edible and safe to eat when cooked.

Fish – Salt Water

627. Various methods which may be used to catch salt water fish are outlined in the following paragraphs.

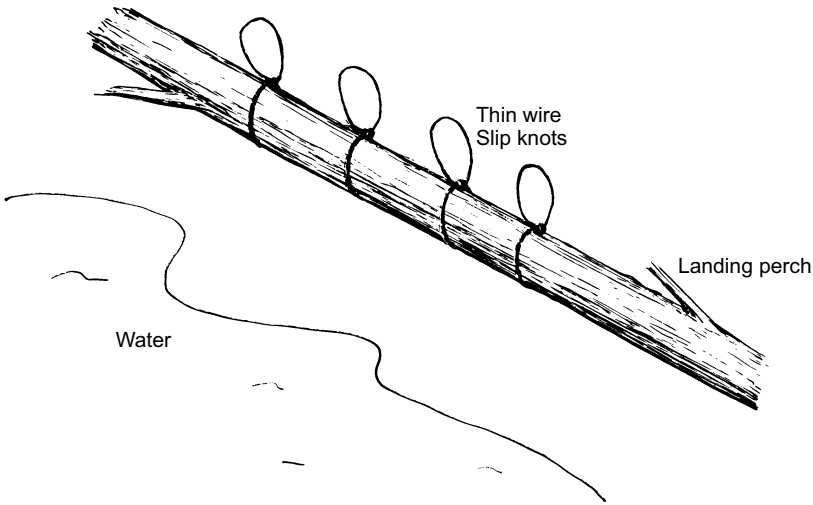


Figure 6–2a. Snaring Waterbirds – Technique A

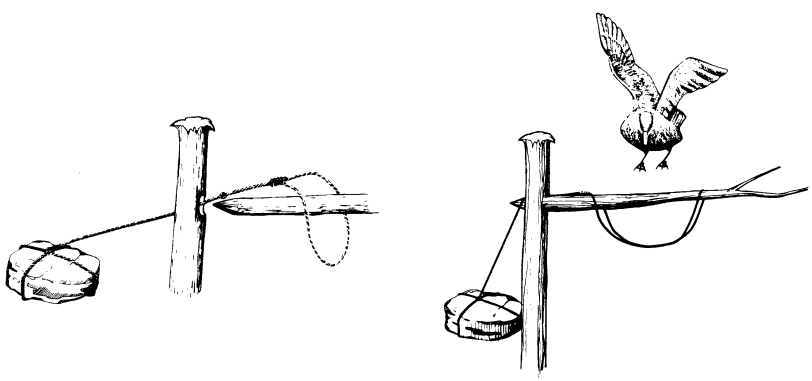


Figure 6–2b. Snaring Waterbirds – Technique B

628. **Line and Hook.** The most economical technique is the 'fixed line' (Figure 6–3). This consists of along line with several baited hooks which is fixed at either end to a solid object such as a rock or coral outcrop. The fixed line is positioned at low tide and, if possible, is run at right angles from the shore. The line should be checked and the hooks re-baited at low tide. If possible, several of these lines should be positioned from the shore line. This method of fishing is usually very productive as well as labour saving.

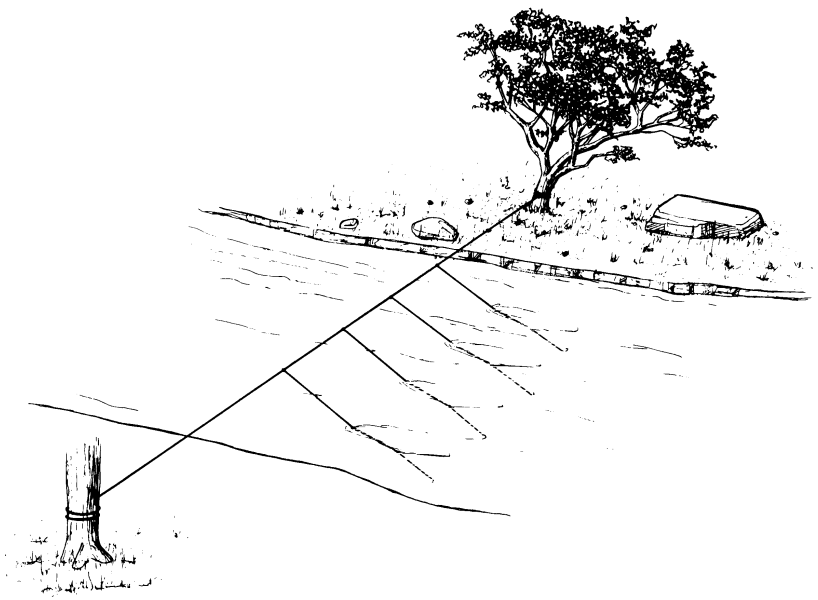


Figure 6–3. Fixed Line Fishing

629. **Permanent Traps.** A much more labour intensive but long-lasting method of obtaining fish involves fish traps. The traps are constructed close to the shore so that they are completely exposed at low tide. The traps may be constructed from rocks piled one on another, or from saplings placed like a picket fence to form a barrier (Figure 6–4). If possible, these permanent fish traps should be positioned near a mangrove system or near a rocky or coral outcrop which encourage fish feeding activity. Army camouflage nets make excellent fish traps or nets.

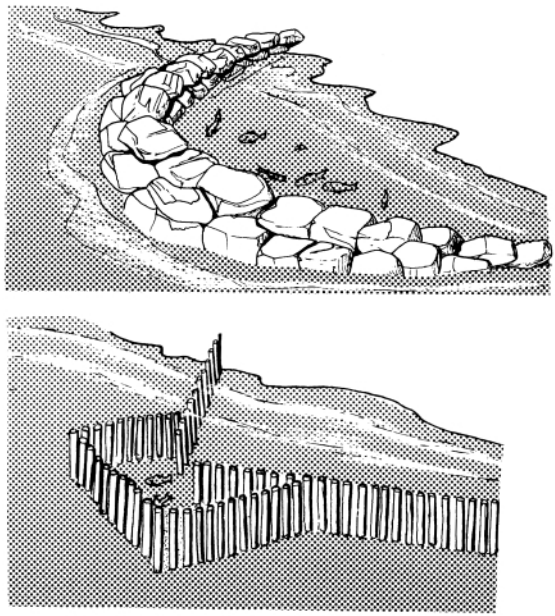


Figure 6–4. Permanent (Indian) Traps

630. **Mobile Traps.** Some smaller traps which can be moved from place to place (Figure 6–5) can be constructed using sticks, cane, etc. These traps require bait to entice the fish into them. Their greatest advantage is that they can be moved from one location to another. Fish traps may be of box, drum or cone construction. Once the traps have been built, they can be very productive.

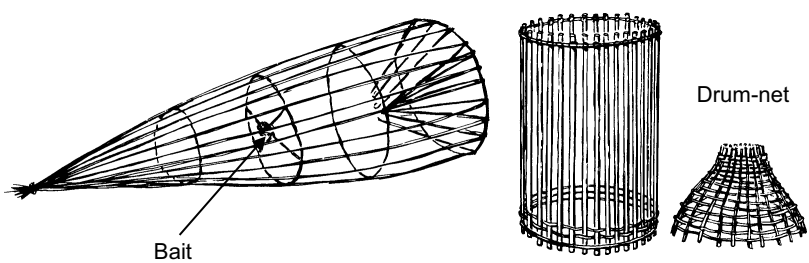


Figure 6–5. Mobile Fish Traps

631. **Poisoning.** Small fish left stranded in rocky pools at low tide may be poisoned by throwing lime into the water. Lime may be obtained by burning clumps of coral and crushing the residue between two rocks. The poisoned fish may be eaten or used as bait.

632. **Hand Spear.** Although some skill is necessary to use a hand spear accurately, it is not difficult to spear stingrays, etc in shallow water. The hand spear is constructed in the same way as a hunting spear. It is about 2 m long and should have three or four prongs made of wire or sharpened hardwood spikes. The prongs are tightly bound to the end of the spear shaft.

Fish – Fresh Water

633. Fresh water fish may be caught using a number of methods, some of which are outlined in paragraphs 634 to 638.

634. **Line and Net.** The line and net method uses fixed lines with a number of baited hooks attached across a river or lagoon, preferably just below rapids or waterfall areas. Nets strung across a swiftly moving section of water or used as drag nets through a lagoon can be most productive. A camouflage net with the scrim removed would be suitable for this purpose.

635. **Dams and Weirs.** An earth and rock weir, used to channel a stream over a wooden platform, is an excellent method of catching fish. Fish which are forced through the dam spillway are caught and suspended on the wooden platform constructed on the downstream side of the dam (Figure 6–6).

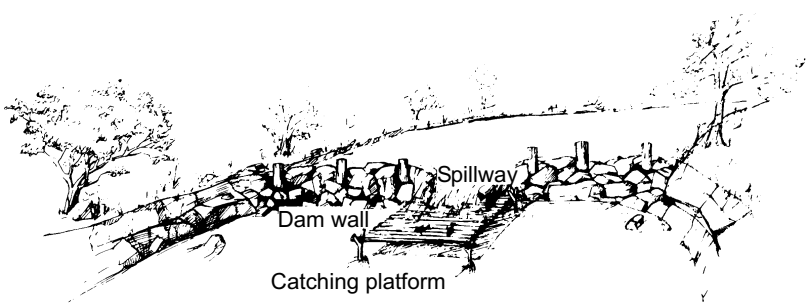


Figure 6–6. Fish Catching Weir

636. **Poisoning.** A number of plant species found in Australia will poison fish in a waterhole or slow-moving stream. These species are identified on survival resource sheets. In all cases, the bark and root system of the plants are crushed and the sap washed in the pool of water. In some instances, this process works very quickly. In other cases it may take a few hours or even a day or so to take effect. The fish become stunned and float to the surface of the water from where they can be scooped onto the bank. The process has no affect upon the edibility of the flesh. The effectiveness is dependent upon the bulk of poison available and the volume of water to be treated. In some circumstances the water may not be used for any other purpose, including drinking, for a considerable period of time or until fresh rains come and flush out the contaminated water.

637. **Muddying.** Another form of poisoning is to muddy a pool of water. The mud bottom is stirred up so that the fish are forced to flap around the surface to escape the pollutant effects. The fish are caught by hand near the water surface and thrown onto the bank.

638. **Hollow Logs.** Fresh water fish will inhabit hollow logs placed underwater. This can be encouraged if some form of bait is placed inside the log and left overnight. One end of the log should be blocked off before it is placed in the water. The hollow log fish trap (Figure 6–7) should be quickly pulled from the water onto the bank so that trapped fish will not escape.

Animals

639. Many of Australia's animals may be caught using traps and snares. Some of the simplest and most effective trap systems are described in the following paragraphs.

640. **Traps and Snares.** A variety of simple traps and snares are detailed in paragraphs 643 to 650.

641. All traps and snares should be simple in construction and should be made after the camp has been completed and before darkness. Any spot that is used as a butchering place will attract other animals and is a good place to watch for game during the next 24 hours. Use entrails as bait.

642. Place traps where the trail is narrow. Arrange pickets, brush or obstacles in such a manner as to compel animals to pass through the snare. Be sure the loop is large enough for the head to pass through, but not so large that the body can pass through. Care must be taken to ensure that the natural surroundings are disturbed as little as possible.

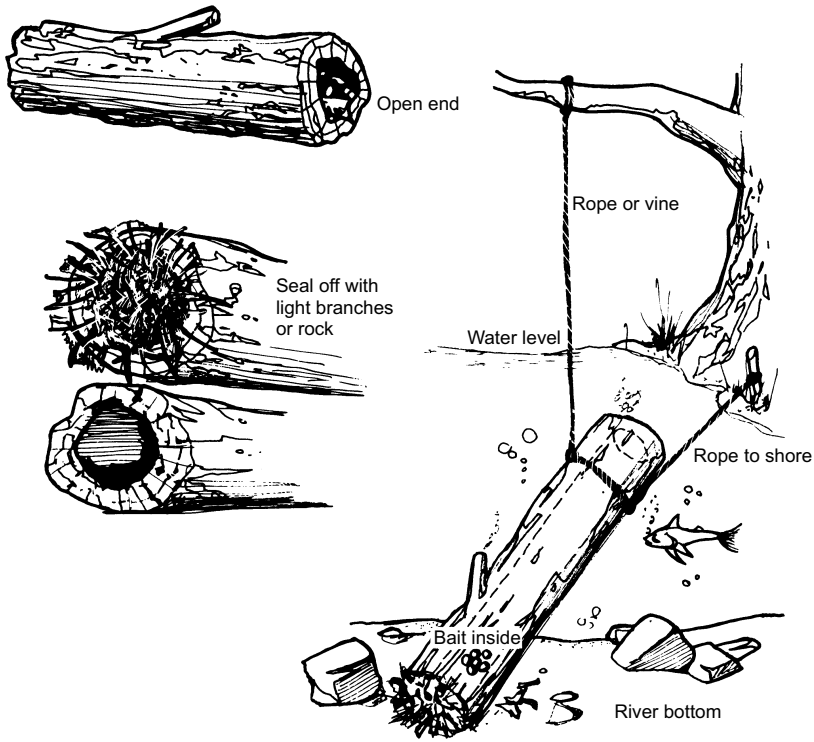


Figure 6–7. Hollow Log Fish Traps

643. **The Fixed Noose.** The fixed noose (Figure 6–8) is designed to hold animals around the neck and, therefore, should be set in a position and height above ground level, suitable for the type of animal being pursued. The noose should be placed along a regular animal pad and may be held in position by upright sticks, or by suspension from an overhanging branch. The noose is best constructed using pliable wire such as picture hanging wire. The wire should be blackened over a fire or rubbed with charcoal before being used. If wire is not available, substitutes such as twine will work but may not be as effective. The slipknot should become increasingly tight and remain tight once tension has been applied to the noose. The free end of the noose must be secured to an immobile object.

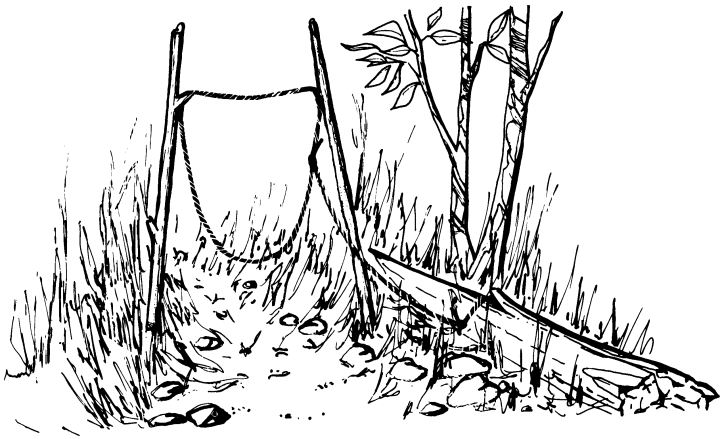


Figure 6–8. Fixed Noose

644. **The Lattice Noose** The lattice noose (Figure 6–9) works particularly well with cloven-hoofed animals such as pigs and goats. It relies on the animal placing its leg or hoof onto a lattice-work frame on the ground which, for a few seconds, remains attached around the animal's leg. As the animal attempts to continue walking, the noose tightens around the leg. The trap is set over a small hole or depression dug in the soil. A lattice work 'top plate' constructed of sticks and twigs, with square gaps about 2 or 3 fingers width is positioned over the depression.

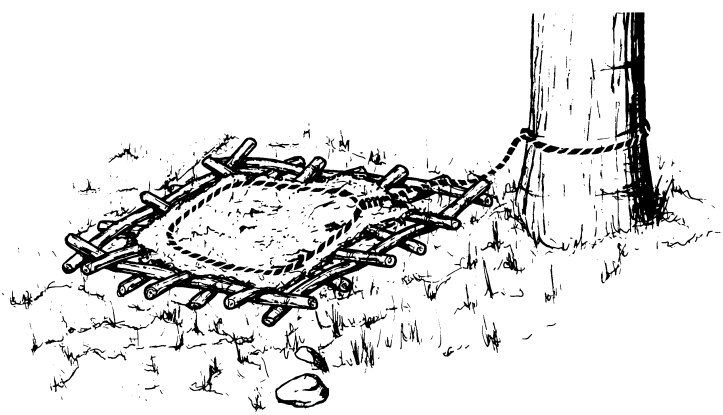


Figure 6–9. Lattice Noose

645. A strong noose is placed on top of the lattice which is securely fastened to a tree, rock or large stake. The lattice and noose may be covered with leaves and camouflaged to resemble the surrounding earth. As the animal stands on the lattice work, its leg should penetrate through. The rough framework should remain attached around the leg for a couple of seconds which is all the time required for the noose to tighten. The size and strength of the trap is dependent upon the animal being hunted.

646. The Spring Noose. The spring noose (Figure 6–10) relies on the strength of a springy overhanging sapling, or the branch of an upright tree, to hold captured game. A noose made of wire or twine is set slightly above ground level. It is attached to a wooden trigger mechanism which, when pulled, will automatically release. The release activates a sapling which has been placed under tension for this purpose. Ideally, captive game is suspended in mid air, however in Australia very few trees/saplings are capable of producing this effect. More likely, the game will be held, but remain on the ground.

647. The spring noose should be set on a well defined animal pad and checked twice a day. The person checking the trap must avoid walking along the animal pad.

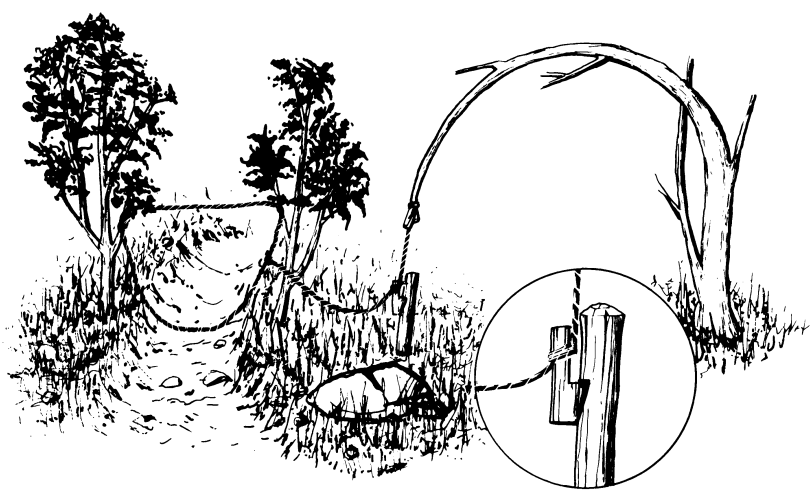
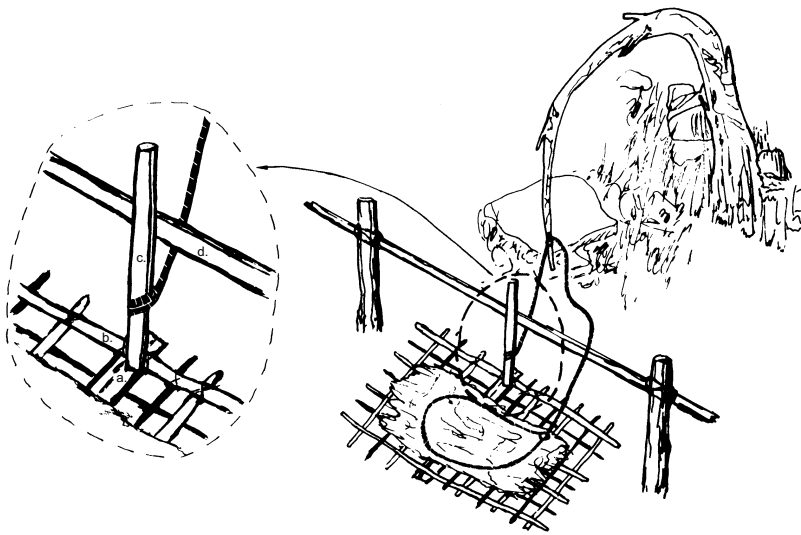


Figure 6–10. Spring Noose

648. **The Pressure-plate Noose.** The pressure-plate noose (Figure 6–11) is very similar to the spring noose, except that the animal releases the trigger mechanism by standing on a plate constructed of twigs and leaves. The noose captures the game in a manner similar to the spring noose.



Note

No notches required. Lever c is held in place against crossbars b and d by pressure from string tied to bent sapling. Pressure from animal's foot on a forces crossbar b down thereby releasing lever c. The sapling springs upright tightening the noose around the animal's foot.

Figure 6–11. Pressure-plate Noose

649. **The Simple Deadfall Trap.** The simple deadfall trap (Figure 6–12) is one of the most basic trap systems. Its main disadvantage is that it requires someone to constantly monitor it and set it off. It consists of a large rock or log, one end of which is raised from the ground and balanced on top of a vertical stick. A pull cord is then tied to the stick. Some form of bait, eg, meat or grass seed is placed under the deadfall. When animals approach to feed on the bait under the deadfall, the string is pulled sharply

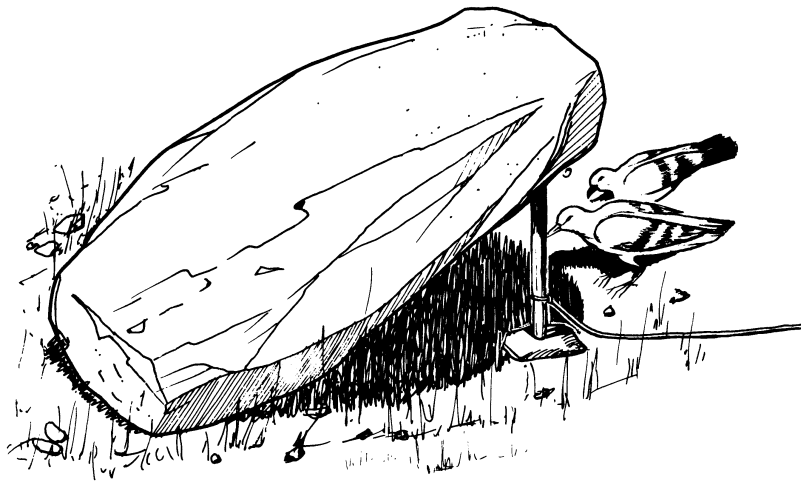


Figure 6–12. Simple Deadfall Trap

650. **Deadfall Trap With Trigger.** A modification of this trap is to use a figure 4 release. The upright stick is cut with a chisel edge at the top, and about seven centimetres from the bottom end it is squared on all four sides. The support stick is sharpened to a chisel edge at one end, and where it will cross the top of the upright, a nick is cut parallel to the chisel edge. The bait stick has a nick undercut at the thickest end, and at the place where it will cross the upright it has a cut made with a square face at the end of the cut farthest from the undercut nick. Setting the trap is achieved by standing the upright in front of the trap and placing the support stick with its nick on the chisel edge of the upright, and the upper end supporting the raised end of the box. The chisel end of the support stick is placed in the undercut nick at the end of the bait stick. The squared cut in the bait stick should now engage with the squared face of the support stick, and with the baited end of the stick well under the trap (Figure 6–13).

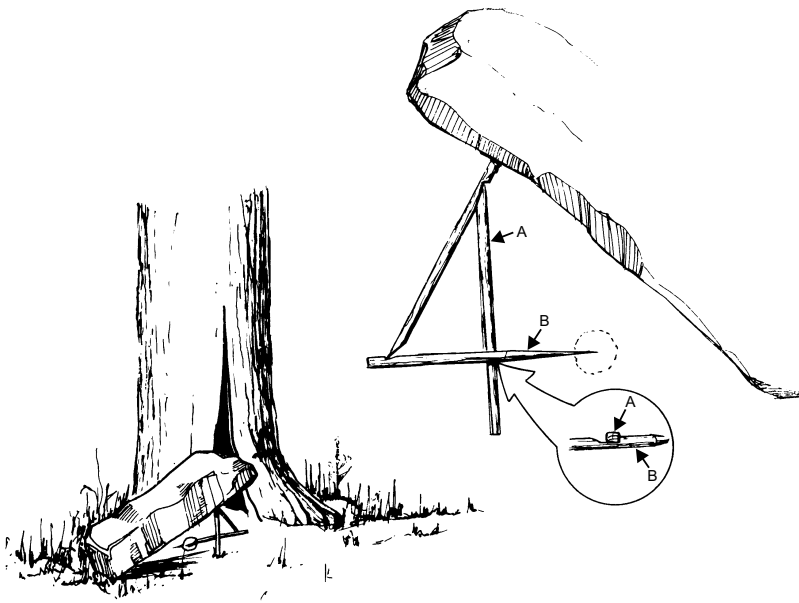


Figure 6–13. Deadfall Trap with Trigger

SECTION 6–5. FOOD PREPARATION AND COOKING

General

651. Many survival publications contain elaborate information on the manner in which food should be prepared before cooking. Much of this work is unnecessary, but corresponds with social ideas regarding food presentation. For example, cooking a rabbit without first removing the gut and skin would normally be quite unacceptable, yet the work of gutting and skinning adds nothing to the food value or the cooking process. The flesh can be cooked without this process being carried out.

652. **Butchering.** Larger animal species such as feral pigs may need to be butchered prior to cooking. Butchering is a simple process and may be done using the following steps:

a. Cut the throat to bleed the carcass.

b. String the animal up by the hind legs.

c. Remove the gut and head.

d. Skin the carcass (except in the case of pigs, whose hair can be removed by first immersing the carcass in hot water and then scraping it). The skin should be retained to protect the meat from flies.

e. Cut the carcass into joints, as required.

653. After the butchering has been completed, ensure that hands are thoroughly cleansed of all traces of blood and meat. This is a very important hygiene rule in dealing with feral animals.

654. Even though all animal parasites found in Australia will be neutralised after thorough cooking, an inspection of the carcass should be carried out before the meat is cooked and eaten. Some simple rules to follow are:

a. Do not eat sick or lame animals.

b. Do not eat a carcass which smells 'off when butchering.

c. Do not eat meat from a carcass which has bone or joint deformities.

d. Do not eat meat from a carcass from which the hair or fur may be easily pulled or plucked.

e. Do not eat meat which has small white nodules growing inside the rib cage or on the kidneys.

f. Do not eat meat which has a watery or slimy feel.

g. Worm infested meat may be eaten provided it is very thoroughly cooked and does not contravene the other rules.

Cooking

655. All meat and some species of gathered foods must be cooked before being eaten. Cooking helps destroy bacteria, parasites and toxins and makes the food more palatable. In this regard baking and boiling are the most efficient methods. Four basic methods which may be used to cook food are described in paragraphs 656 to 659.

656. **Roasting.** Larger portions of meat, such as joints, may be roasted (Figure 6–14). A strong stake is forced through the joint, which is then suspended over a hot fire. Safe timber such as wattle or gum should be chosen for the stake to avoid the possibility of toxic sap entering the joint during cooking. The joint must be firmly secured to the stake so that it can be continuously turned. Turning allows an even and complete heat coverage of the joint. Roasting is a labour-intensive and time-consuming

cooking method. It may take up to four hours to cook a joint of meat thoroughly using this method. Roasting of joints can result in uneven cooking which may not destroy all bacteria, parasites and toxins.

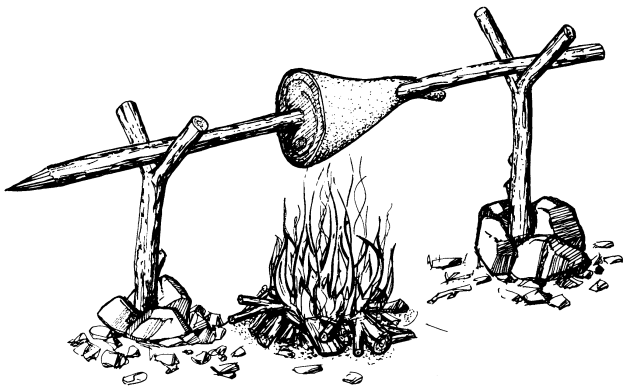


Figure 6–14. Roasting

657. **Grilling (Barbecuing).** Thin slices of meat (steaks) may be grilled over a fire using a variety of objects as the grilling plate (Figure 6–15). An army mess tin, a flat slab of rock or even a forked toasting stick will serve the purpose. To ensure thorough cooking, grilled meat must be turned over at regular intervals. Grilling is an economical way to cook slices of meat quickly.

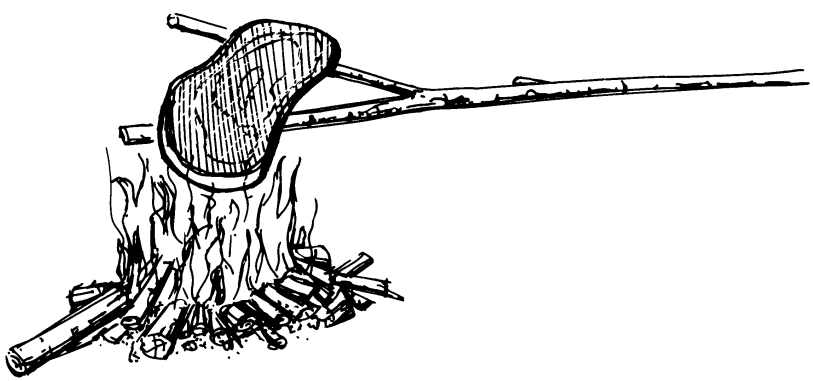


Figure 6–15. Grilling

658. **Boiling.** Some plants eg, yams, require boiling before consumption. Boiling also helps tenderise tough meat. Containers which may be used to boil water include steel helmet outers, dixies, cups canteen, empty clam shells, and empty coconut shells. Meals which result from boiling (stews) generally retain a greater nutritional value than meals cooked using other methods. Boiling has two drawbacks. Firstly, it requires some form of container and, secondly, it requires a good supply of fresh water. Small pools of water may be brought to the boil by dropping hot rocks into them. This is not a good practical solution for the boiling of tough meat due to the cooking time involved.

659. **Baking.** Baking is the most basic cooking method available and it was widely used by the Australian Aborigines. There are two methods of baking food, these are:

a. *Hot Coals.* A carcass may be baked on the hot coals of a fire. The carcass is placed directly over the fire and is turned over from time to time. When completely cooked, the carcass may be taken from the fireplace and the meat easily pulled from the bones. The charred skin of the animal will separate from the cooked flesh when pulled. This method is particularly effective with small animals and fish.

b. *Earth Oven Cooking.* The earth oven is an extremely efficient means of cooking. The fire is allowed to settle until it is reduced to a mass of hot coals. Small rocks should be added to the coals to assist heat retention during the cooking process. Rocks should not be gathered from river beds or water ways as these may explode when hot. The hot coals and rocks are covered with a mass of green leaves and the food is placed on top of the pile of leaves. Further leaves are added to cover the food. Once the food has been covered by a protective layer of leaves, the complete fire is covered with soil or sand. This earth covering is piled upon the fireplace to build up a smouldering mound. Any heat or steam outlets should be plugged. Cooking time varies according to the size and bulk of the food item. Small fish for example take about 45 minutes, while large joints of meat may take up to 2 hours.

Food Preservation

660. There will be occasions when an excess food supply will be won. In this situation excess food should be preserved, if possible, for later use. Most preserving techniques are directed toward extracting the moisture content from the food. The only exception to this is the technique of freezing, which retains the moisture but in a solid form. Techniques for preserving food are outlined in the following paragraphs.

661. **Drying.** Drying can be achieved using the following techniques:

a. *Sun and Wind.* In arid areas, meat and vegetable foods may be dried using the sun and hot dry winds of the region. The meat should have all traces of fat removed, be cut along the 'grain' and thinly sliced so that maximum exposure to the elements is achieved. It will also help if the food items are placed on some heat retaining object such as a rock and turned over at various intervals.

b. *Smoke and Fire.* The meat should be cut into thin strips and all traces of fat removed. The meat is suspended over a fire in an earth pit, using a frame as a drying rack. The fire should be made to produce smoke rather than flame. This can best be done by using green wood as fuel. The rising smoke should be concentrated around the hanging meat by stacking branches of leaves against the drying rack to form a rough chimney. The strips of meat will gradually become dry and brittle but will retain their taste and nutritional value. These smoked pieces of meat may be reconstituted by adding water. Two days of smoking will preserve meat for two to three weeks (Figure 6–16).

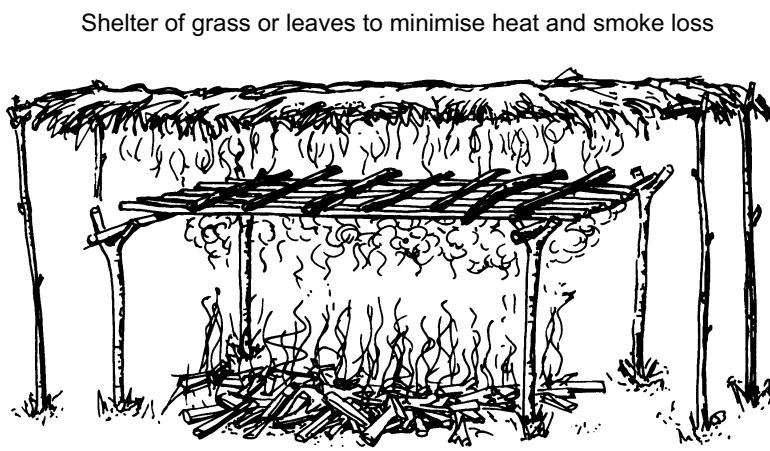


Figure 6–16. Smoking

662. **Freezing.** Meat and vegetables foods may be frozen by burying them in hard packed ice/snow or exposing them overnight to strong chilly winds.

663. **Other Techniques.** The following additional preserving techniques used by Australian Aborigines could be useful:

a. Some fruits and vegetables which are low in moisture content may be preserved over several weeks by burying them deep in the ground. The coolness of the soil and the lack of moisture in the fruit produces a preserving reaction.

b. Excess fish meat may be preserved for short periods of time by compounding the raw flesh to form a rough ball and singeing the outside of the ball over a fire. This singeing action produces an outer binding and, at the same time, provides a protective coating for the raw flesh contained in the ball.

CHAPTER 7

SURVIVAL RESOURCES

SECTION 7–1. INTRODUCTION

701. The survival resources which are found occurring naturally in any environment will fall into at least one of the following categories:

a. bush food,

b. bush medicine, and

c. bush technique.

702. The three resource categories listed in paragraph 701 are, in turn, complementary to the three elements of survival, as demonstrated in Figure 7–1.

Figure 7–1. Resources to Elements

SECTION 7–2. THE RESOURCES

703. The three natural survival resources are described in paragraphs 704 to 706.

704. **Bush Food.** Bush food includes the hunted and gathered food resources previously discussed in Chapter 6.

705. **Bush Medicine.** A large percentage of modern drugs are derived from plants. Many of these plant medicines have been scientifically analysed and found to be suitable substitutes for commercially produced drugs and medicines. This explains why bush medicines have been successfully used by Aborigines to help cure a range of illnesses. If first aid supplies are not available, bush medicines may prove useful substitutes.

706. **Bush Technique.** Bush technique employs natural resources, which are neither food or medical resources, to assist in survival. Such resources include bark from trees which may be used for shelter, or when crushed may provide a fish poison. Thatching for shelter and string fibre for tying also come into this category.

Resource Identification

707. Many survival resources exist within the Australian environment. It is not practicable to list every type of resource in this pamphlet. To assist in acquiring the ability to identify and use the various resources available, three types of field resource guides are being produced as a supplement to this pamphlet, and should be referred to as required. They will assist in the identification of species available in Northern and Central Australia. The three field guides are:

a. *Survival Resource Sheets (Snack Maps).* Survival resource sheets consist of a standard topographical map with survival resource information printed on the reverse side. Survival information is displayed as a colour photograph and description of the particular species, including its preparation, use, and nutritional value. Survival resource sheets will be produced to cover the following regions:

(1) The Pilbara,

(2) The Kimberleys,

(3) The Northern Territory,

(4) The Gulf Country,

(5) North Queensland, and

(6) Central Australia.

b. *Regional Survival Booklets.* These booklets cover the same regions as listed above and supplement the information contained on survival resource sheets.

c. *Survival Card Packs.* Survival card packs resemble a pack of normal playing cards. Each card contains a photograph of a particular survival resource with a description on the reverse side of the card.

Using the Field Guides

708. Identifying survival resources in the bush using the field guides is a simple process. General guidelines for identifying such resources are as follows:

a. The entire text relating to a species should be read when trying to identify a resource.

b. The specimen should match the description closely. If not, exercise caution, eg, if the text describes a fruit as having a large hard seed, and the specimen has a small soft seed, the specimen may not be what it seems.

c. Photographic details of the species must correspond with the sample, eg, leaf shape, colour, size and shape of species.

d. Follow directions on preparation and/or use closely.

e. In the case of bush food, the taste and texture must correspond with the text description. If not, the identification process must be repeated. If still in doubt, discard the resource.

f. Information on seasonal variation and the geographical distribution data is provided as a general guide only and should be regarded with some degree of flexibility.

g. The nutritional value of each food species should be compared with those common foods listed in the legend. Nutritional intake must be balanced by eating a range of bush foods and not just those which are preferred through taste or convenience.

SECTION 7–3. SURVIVAL KITS

709. Although not on current issue, the preparation and carrying of survival kits into remote areas should be considered. It is an asset which must be carefully contrived before its user enters an area of operations. The following factors must be considered when preparing a survival kit:

a. The kit must be prepared for the environment concerned (eg, a coastal survival kit would be of limited assistance in Central Australia).

b. Wherever possible, items used in a survival kit should have more than one use, eg, Condy's Crystals may be used medically or as a fire-starting aid.

c. Matches must always be included.

710. Survival kits should be carried in the basic webbing, not the backpack. This may be done by:

a. attaching an additional basic pouch to the pistol belt, or

b. distributing the survival kit items in existing webbing.

711. **Individual Kits.** Individual survival kits should be light, compact, basic and versatile. Some items which may be considered for inclusion are listed in Table 7–1.

TABLE 7–1. INDIVIDUAL SURVIVAL KIT ITEMS AND THEIR USES

Serial	*Item*	*Use*
(a)	*(b)*	*(c)*
1	Army clasp knife	Cutting, gouging, prising etc.
2	Picture frame wire or trip wire	Traps, snares, fishing trace, tying.
3	Hollow elastic surgical tube	Water sucking tube, sling-shot rubber (using general purpose (GP) boot leather tongue as sling pouch).
4	Condy's Crystals	Medical use and fire starting.
5	Cotton wool	Fire tinder, medical use.
6	Magnetised needle	Medical use, repairing of clothing, improvised compass.
7	Parachute Cord	Heavy tying, inner cords (2 m approx) may be extracted and used as tying fibre, fishing line or sewing thread.
8	Matches/disposable lighter	Fire lighting, contained illumination.
9	Fishing hooks	Fishing, waterfowl/duck capture.
10	Needle and thread	Repair of clothing, minor surgery.

TABLE 7–2. ADDITIONAL ITEMS FOR SURVIVAL KIT

Serial	*Item*	*Use*
(a)	*(b)*	*(c)*
1	Fishing line (6 kg breaking strain)	Fishing and tying.
2	Signal mirror	Air-to-ground recognition.
3	Signal flares	Air-to-ground recognition.
4	Magnifying glass	Fire-starting aid.
5	First aid equipment	Medical care.
6	Clear plas tic bags	Water storage and collection.
7	Flexible saw	Ground clearing, construction, cutting food.
8	2% Iodine	Medical care/water sterilisation.

712. **Improvised Items.** In some situations it may become necessary to improvise or manufacture survival items such as locally made fish hooks (Figure 7–2). Improvisation is often limited more by the imagination than by the availability of materials (eg, the lack of a knife can be overcome by grinding or flaking a rock to form a sharp cutting edge). A list of some improvisation possibilities is given in Table 7–3.

713. Improvisation should make maximum use of the resources which are already present. Equipment should be assessed for any additional use that can be made of it. A wrecked vehicle or aircraft can provide numerous aids to survival.

SECTION 7–4. IMPROVISED NAVIGATION

714. There are several methods of improvised navigation. These are detailed in paragraphs 716-722.

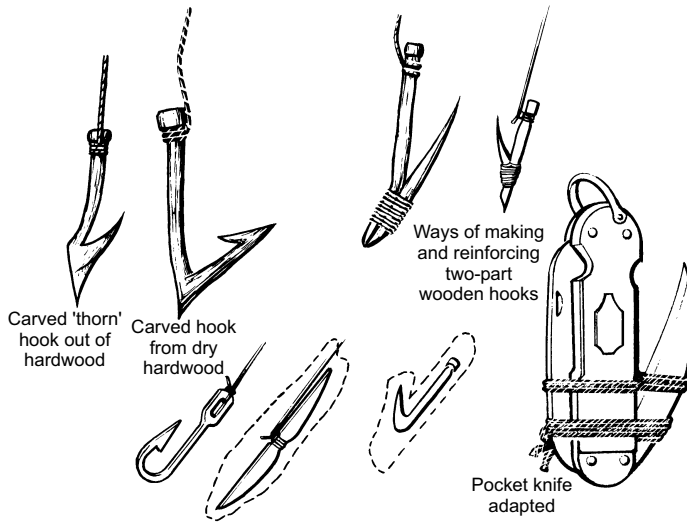


Figure 7–2. Improvised Fish Hooks

TABLE 7–3. IMPROVISED SURVIVAL KIT ITEMS

Serial	*Item*	*Improvised Material*
(a)	*(b)*	*(c)*
1	Fish hooks	Fencing wire, old carved bones, carved wood.
2	String/twine	Inner bark of trees, animal sinew (eg, kangaroo tail sinew), vines, etc.
3	Knife	Ground rock, ground metal (tin or iron), flaked quartz or rock, ground shell edges.
4	Fish spear prongs	Sharpened animal bone, sharpened hardwood prongs, stingray barbs.
5	Water containers	Bark trough from tree, empty seashells (eg, clam shells or bailer shells), coconut shells.

Finding Direction by the Sun

715. **Shadow-stick and Tip Method.** The shadow-stick and tip method of finding direction (Figure 7–3) is a simple technique which uses the sun and its shadow. Accuracy varies depending on latitude and time of day. Readings taken close to the midday period are more accurate, while early morning and late evening readings are less accurate. If readings are taken throughout the day, errors will cancel each other out, thus enabling an accurate determination of direction. The following steps are taken to determine direction:

a. *Step 1.* Drive a stake vertically into the ground in a flat, clean spot in direct sunlight and mark the tip of the stick's shadow with a small peg.

b. *Step 2.* Wait about 15 minutes and peg the tip of the shadow again. Draw and extend a straight line that passes through the two pegs. This line runs east-west.

c. *Step 3.* From the stake, draw a line intersecting the east-west line at right angles. Mark an arrow at the far end of the line. This arrow indicates north in the northern hemisphere and south in the southern hemisphere.

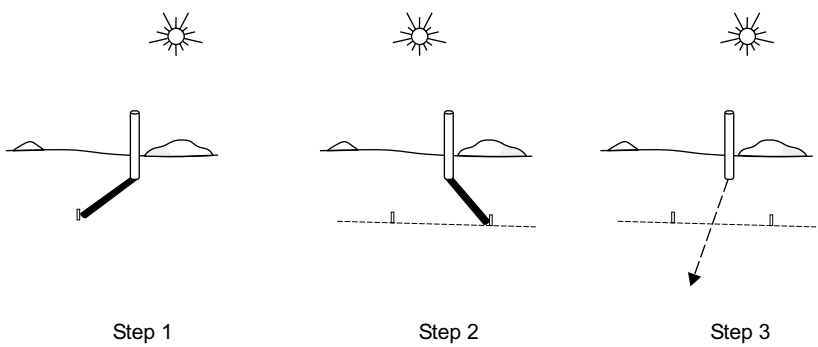


Figure 7–3. Shadow-stick and Tip Method

716. **Watch and Sun Method.** The watch and sun method (Figure 7–4) uses an analog watch face to determine north and south. In the southern hemisphere, the hour of 12 is directed at the sun. Halfway between the hour hand and 12 o'clock is north. In the northern hemisphere, the hour hand is pointed directly at the sun. Halfway between 12 o'clock and the hour hand is south.

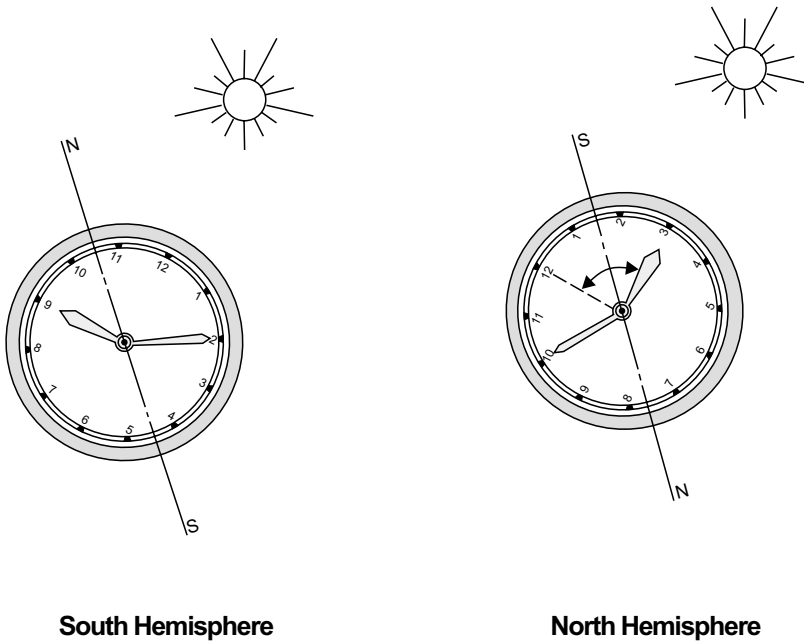


Figure 7–4. Watch and Sun Method

Finding Direction by the Stars

717. **The Southern Cross Method.** The Southern Cross (Figure 7–5) is the most widely known constellation south of the equator. The direction of south can be determined as follows:

a. Extend an imaginary line along the long axis of the cross.

b. Assess the length of the cross along its long axis.

c. From the bottom of the cross, determine the point four and a half times the cross length, along the long axis.

d. The point on the horizon vertically below this point is approximately south.

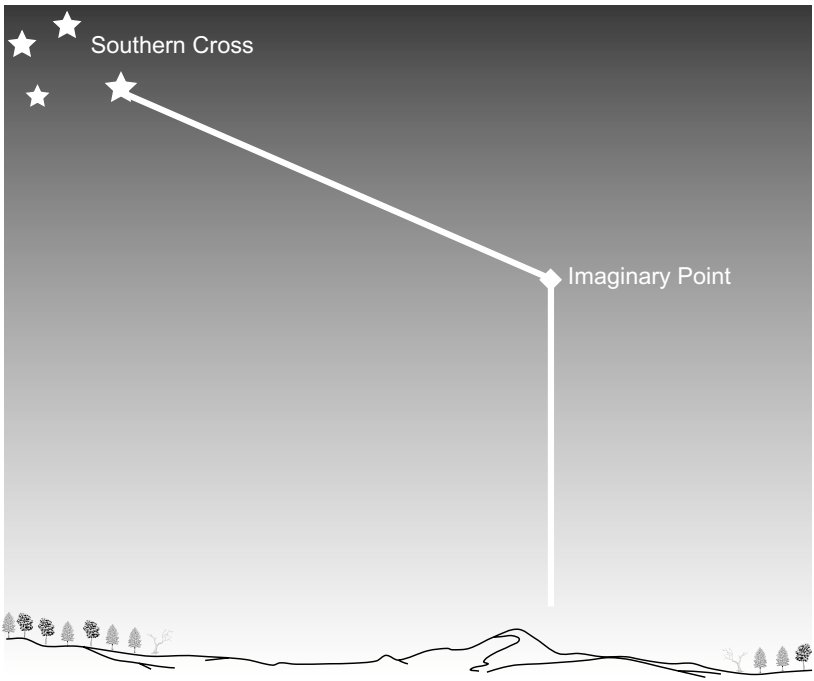


Figure 7–5. The Southern Cross Method

718. **The North Star Method.** In the northern hemisphere, the North Star shows true north. The North Star can be located by observing the Big Dipper. The two stars at the end of the bowl of the Big Dipper are called 'pointers'. In a straight line out from the 'pointers', in the direction that water would pour from the dipper, is the North Star.

719. **The Orion Method.** In the tropics, identification of the celestial poles may be impossible because of the low latitude. The constellation of Orion rises due east and sets due west. A line joining the two northern stars of Orion runs east-west (Figure 7–6).

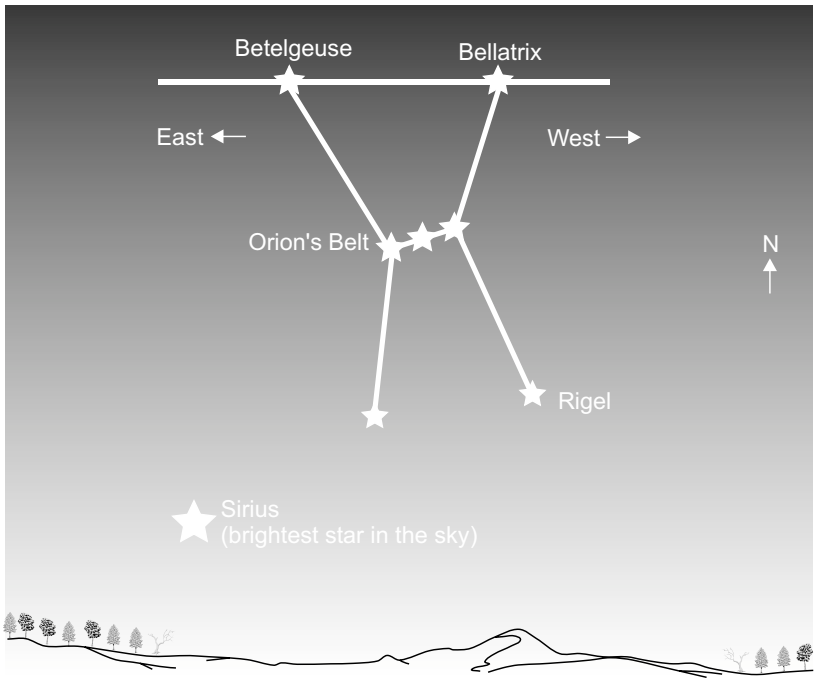


Figure 7–6. Stars – The Orion Method

Direction by Improvised Magnetic Compass

720. An improvised magnetic compass can be made by magnetising a needle. The two methods which can be employed to magnetise a needle or pin are described as follows:

a. *Magnet.* A needle will become magnetised if its point is rubbed on a magnet.

b. *Electric Current.* If bare electric wire is wound around a needle and connected to a battery, thereby producing a current which is diverted through the needle, the point will become magnetised. A piece of fibre such as a hair attached centrally to the needle will allow the needle to be freely suspended. The point of the needle will swing around and point north.

Natural Indicators

721. A natural direction-finding aid is the sun itself, which rises in the east and sets in the west. In some areas of Australia, large, flat-sided 'magnetic anthills' (Figure 7–7) are found. The flat sides of these anthills face east-west, and give some general indication of magnetic direction. Also, in Australia, moss grows on the southern side of tree trunks and provides a ready indication of direction.

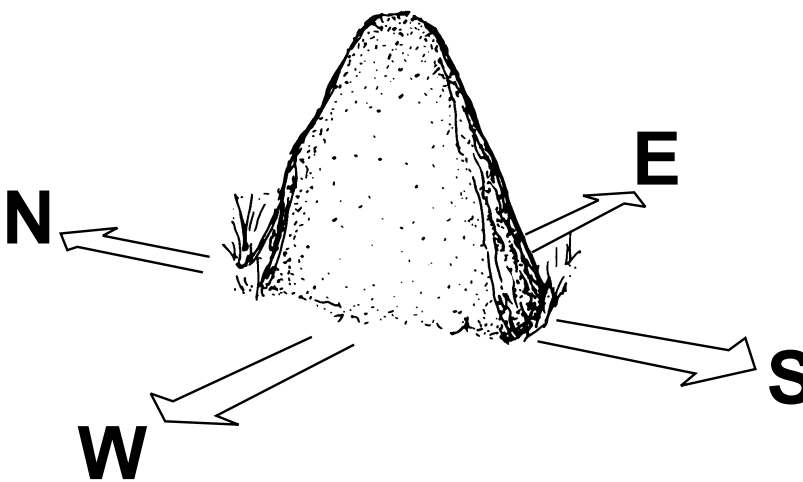


Figure 7–7. Magnetic Anthills

SECTION 7–5. EMERGENCY SIGNALS

722. Table 7–4 and Figures 7–8 and 7–9 below illustrate emergency signals that should be used by survivors to communicate with aircraft and details of standard aircraft acknowledgements.

TABLE 7–4. GROUND-AIR VISUAL SIGNAL CODE

GROUND-AIR VISUAL SIGNAL CODE FOR USE BY SURVIVORS		
No.	*Message*	*Code Symbol*
1	Require doctor – serious injuries	**I**
2	Require medical supplies	**I I**
3	Unable to proceed	**X**
4	Require food and water	**F**
5	Require firearms and ammunition	**V**
6	Require map and compass	□
7	Require signal lamp with battery and radio	**I** **I**
8	Indicate direction to proceed	**K**
9	Am proceeding in this direction	↑
10	Will attempt take-off	**I>**
11	Aircraft seriously damaged	⌊⌉
12	Probably safe to land here	△
13	Require fuel and oil	**L**
14	All well	**L L**
15	No	**N**
16	Yes	**Y**
17	Not understood	⌟⌞
18	Require engineer	**W**
	IF IN DOUBT USE INTERNATIONAL SYSMBOL	**SOS**

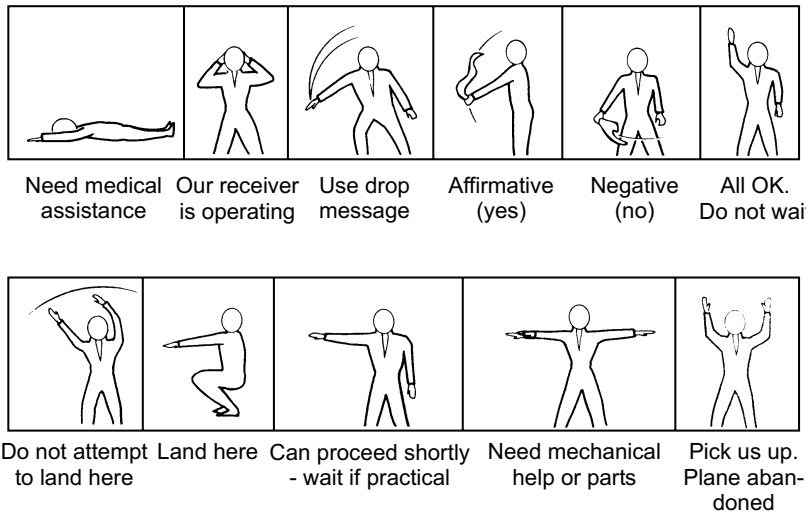


Figure 7–8. Ground-Air Visual Body Signals

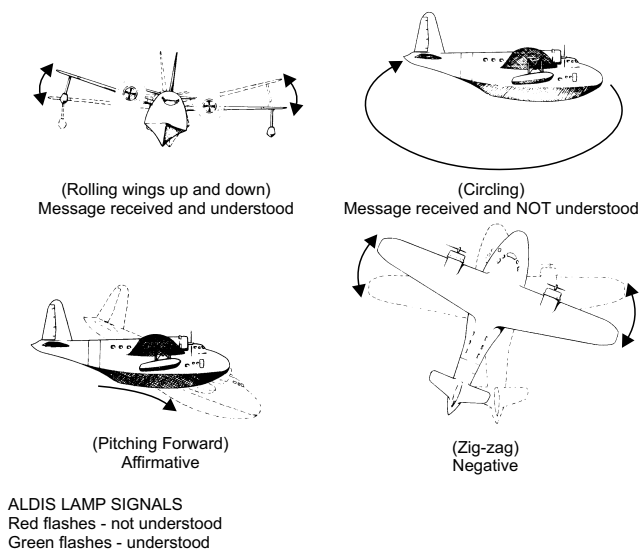


Figure 7–9. Standard Aircraft Acknowledgements

ANNEX A
TO CHAPTER 7

A GUIDE TO FURTHER STUDY

1. The following sources may be referred to for supplementary information:

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