

Traditional Aboriginal knowledge and sustained human survival in the face of severe natural hazards in the Australian monsoon region: some lessons from the past for today and tomorrow

For more than 60,000 years Aborigines (Yolngu) living in the tropical monsoon region of northern Australia have sustained their way of life from generation to generation until the arrival of foreigners (Balanda) two centuries ago. Through meticulous observation, learning and memory, and transmitting within their Law and Culture, comprehensive and intimate knowledge of their specific clan estate lands and environments, they have coped with the severe natural hazards of fire, devastating cyclonic winds and rains, extreme floods and food supply fluctuations, in a uniquely successful manner.

In conducting a recent Emergency Management Australia supported assessment of the contemporary situation regarding the hazards and vulnerabilities associated with living in the remote coastal communities of the Northern Territory of Australia, where 95% of the population are of indigenous descent, the well-honed and robust, traditional counter-disaster capabilities of Australia's first settlers were researched and studied in the field. Some details are reported here.

The assured, direct and simple, renewable and enduring, traditional Aboriginal approaches to natural hazard counter-disaster capabilities, contrast markedly with many present-day lifeline and hazard mitigation features and frailties integral to the complex, interlocking, advanced Western services, resources and infrastructure systems, upon which Information Age High Technology Human Settlements are now so critically dependent for survival.

This article outlines the essential elements of the timeless traditional north Australian Aboriginal approach to sustainable living and coping over the many millennia since the Dreamtime. There are valuable lessons that emerge from this study, which if applied

By Allan Skertchly and Kristen Skertchly,
SMILE—Success Management International
Learning Enterprises, Darwin

thoughtfully to the planning, design, construction and management of remote contemporary human settlements, could reduce some of their critical vulnerabilities to dysfunctional natural hazards and thus make them safer. At the same time, their current high levels of depen-

gency upon expensive distant agencies, supplies and emergency services could be substantially reduced.

Background

In examining research and technology relevant to the issue of emergency survival 'lifelines' and cyclone shelter provisions in the tropical coastal communities of the Northern Territory of Australia, we (Skertchly and Skertchly 1999) become aware of several unique features that could affect beneficially key aspects of sustainable contemporary human settle-

A Recent Hazardous Tropical Monsoon Event or 'Sky Fire'

This blue fire, he said. This blue. Burn my heart. It jump! Like fish jumpin straight down sky. Marl-gan! Sky-fire! Cum-oo, he said. Water. He yelled, Go-ah go-ah go-ah! Rain! Talking Gungganyji... Talking language after the big wind come. Shacks blew down. All shacks. In the mornin after they creep out from behind the rocks where they shelter all night, the bodies. Mumma, he whimper, mumma, stickin his pink and brown paw into hers. Uncles killed. Tribal cousins. Even the big house scatter along the rain-soaked grass...the rain still comin...no one now to tell us what to do.

Did they need anyone to tell?

*Mumma, he ask in language,
what we do?*

Find your dadda, Manny.

That what we do.

And later that morning with the steam rising and already the stink starting, there had come his father down from the hills, trailed by Jericho and clutching Billy in a bit of old blanket and yowling fit to bust.

Boss dead. Wife too. Crushed under a ten be eight beam, huge beam hold up the house. Must've gone hide downstairs from the big wind, dadda say, they all say, looking at the body of this once boss/ruler. Silly man, dadda say.

They know better. You can't hide from the wind. You close doors on the big wind it get angry, shake your bones, your house bones, body bones, little sticks it think, it know people little sticks. Flesh fly away like grass in big wind...

So they live traditionally, build up grass humpies, one week, two, dadda fishin, helpin the other men bury the dead. They use the remnants from the boss house. Strongly alive again after many weeks...by their Law and Culture.

With smiles now and then! That we-ra, mumma say, that wind. It reborn us!

Inspired by The Multiple Effects of Rainshadow, Thea Astley 1996

ment arrangements (Marion 1996, Ayres 1999), of social, economic and technological functioning (ASTECC 1993), and of future responses to emergencies (Pickup 1978, Pickup and Minor 1980, IDNDR 1998).

The unpredictable and often severe nature of tropical climates has a major impact on the future development of industrial and residential tropical Australia. Floods and tropical cyclones as well as the pervasive problem of drought occur frequently in one part or another of the vast expanse of tropical Australia. Such events can cause substantial disruption and loss. Particularly vulnerable are biological and agricultural production, water supply and its quality, the rate of degradation and impacts upon buildings and infrastructure (roads, communications, power supplies) and disruption to transportation of goods and people, and to quality of living. (ASTECC 1993)

‘Mother Earth has become a strange and agitated place, with a proliferation of hurricanes, floods, wildfires and droughts. What exactly is happening, and what can be done?’ (Ayres 1999).

This article focuses on traditional Aboriginal Law and Culture and associated appropriate behaviours and technologies for coping with severe weather in tropical monsoon environments and their possible lessons for today. ‘Our ancestors, sheltering in caves, needed to know what risks and dangers existed in their immediate environments as a matter of simple survival. Human beings may be genetically programmed to seek out dangers’ (Hennington 1999). As we will see, Australian Aboriginal people had

refined their survival capabilities to a very high degree before the recent advent of foreign settlers. This discourse assumes that positive Aboriginal advancement is both desirable and possible (Skertchly 1987b, Reynolds 1999, Kelly & Pearson 1999).

Although the direct focus of our work has been on the Northern Territory, our analysis is applicable to any similar monsoon region, and particularly to many island communities of the tropics and Indian and Pacific Oceans.

Australian Aborigines have been called by world-renowned anthropologist Claude Levi-Strauss, ‘intellectual aristocrats’ among early peoples. Outstanding features of traditional Aboriginal society include sophisticated religion, art and social organization, an egalitarian system of justice and decision-making, complex far-flung trading networks, and an ability to adapt and survive in some of the world’s harshest environments (Flood 1995, 1999).

The climate of tropical Australia has defined the features of the physical and historical landscape of the region (Pittock et al. 1999). Factors such as rainfall and soils have restricted human settlement activity to small pockets within the region and have affected the success of European settlements since last century. Tropical Australia has the highest proportion of Aboriginal and Torres Strait Islander people in the country and their different inherited social and cultural values must be properly accommodated in any consideration of emergency management. Although there are many features in common across the coastal communities of the monsoon region, their overall

direction and management has often been fragmented as a result of their diverse histories and of artificially enforced constraints and boundaries of the last century and today. Finally, there have been many attempts to develop or assist Aboriginal Australians, often on the basis of political rhetoric rather than on sound economic and social bases (Rowley 1975, CAR 1998, Kelly & Pearson 1999).

Table 1 portrays some (markedly differing) characteristics of Modern and Aboriginal cultures.

The Aboriginal, Yolgnu (Murri), blackfella way was both simple and rich (Elgin 1981) in marked contrast to the complexities and sophistication of contemporary Westernised, Balanda (Migloo), whitefella communities (Rogers 1997, Hesselbein et al. 1998). For the Aboriginals ‘the natural world around them supplied all that they needed, so they had a special relationship with that world. They saw themselves as one with nature. The land not only belonged to them but they belonged to the land’ (Cole 1982).

Figure 1 shows a typical contemporary small and remote Northern Territory coastal community. It is slightly elevated as is commonplace, and in the cyclone season faces the storm surge hazards of the exposed open sea, with potential for serious inundation by waves up to some 3-4 metres magnitude above high tide levels.

Aboriginals lived predominantly nomadic lives using simple, expendable, shelters, and possessed a detailed knowledge and understanding of their lands, environments and weather cycles. As has been observed, indigenous people have been designated ‘caretakers of all life’.

Prehistoric technology was neither

Feature	Modern	Aboriginal
‘World View’	Fragmented	Comprehensive
Land	Commodity	Living Heartland
‘Being’ and Living	Individualisation	Communitarian
Culture	Diverse	Cohesive
Natural Environment	Detached/Exploited	Integral/Cherished
Resources	External Dependency	Self Sufficiency
Location	Fixed	Mobile on Clan Land
Natural Hazards	Distant Understanding	Detailed Awareness
Emergency Management	Few Professionals Many Volunteers	Total Preparedness, Mobility and Change
Values/Spirituality	Shifting	Enduring

Table 1: Some Characteristics of Modern and Aboriginal Cultures



Figure 1: Warruwi Community, South Goulburn Island, Northern Territory

simple nor primitive...women were equipped with digging sticks, men with spears and boomerangs. A strong, fire-hardened wooden spear was an efficient weapon that has been used throughout Aboriginal history...The returning boomerangs are even more sophisticated... Aborigines caught (fish) with shell fish hooks and vegetable lines or bone-barbed fishing spears (Flood 1995).

The hunt was the instrument of everyday survival, but the camp, the home-base, was the instrument for preserving and continuing the species. The camp in the daytime was the place for the women, the children and the old men. There was work to do—collecting fruit and roots and water, bringing up the children, some rudimentary attention to hygiene and comfort—but it did not have the dangers or rewards of the hunting band. The hunting band consisted of groups of about ten people, nearly always men... Each person in the group reacted or responded to the other persons in the group and together they protected and met their needs as a whole. The successful hunting bands were constantly trying to come together physically, to spend as much time as possible within sight and sound of each other and to keep in constant collective touch with every move. They possessed a common objective, a single criteria for success by which all succeeded or all failed. Within the human walking radius of the camp there was enough food to support a total population of about forty, this being, too, the optimum number for sustainable procreation of the clan. The purposiveness and cohesion of the group was powerfully motivated by the fact that upon the regular supply of game and fish to their base camp depended their clan's very survival. (Jay 1975).

Thus the successful performance of the hunting groups' endeavours was a matter of life or death. Little wonder then that Aboriginal people became so strongly bound to their annual territories and land whose characteristics they knew so intimately. The Aboriginal psyche was permanently embedded and 'encoded, for those with eyes to see and understand them, in the local flora, fauna, and geological features of the land and with a script of sacred geography and sites' (Peterson 1972).

Without the aid of sophisticated radar,

high resolution satellite information and state-of-the-art computer modelling (Chen et al.1995), small Aboriginal groups consistently anticipated changing weather patterns so preserving their clans. 'They implicitly understood the importance of the cycle of the seasons in their hunting calendars as being vital to survival' (Sewell 1998).

Historical records of severe weather tropical monsoon events: current realities

The weather and climate of tropical Australia have a major influence on daily life and on economic activity in the region (Pittock et al.1999). Although there are no detailed and scientific Aboriginal accounts of extreme weather events, there are a number of revealing Dreamtime stories (see later) and the more recent recorded monsoon stories of cyclonic impacts typify similar extreme weather events that occurred over the previous 60+ millennia.

For instance, Murphy (1984) reports on some frightening low-pressure monsoonal depression events over the last one hundred years. In March 1919 a depression formed and rapidly deepened. Bathurst Island Mission took the full brunt of the ensuing extreme weather. As described by Father Francis Xavier:

...During the night the wind and rain doubled in fury as the seas thundered on the beach.... Towards 10 o'clock, trees began falling and it was not long before our more fragile buildings collapsed. That awful night wore on until, at five o'clock in the morning, the elements seemed even more frenzied as more trees and huts fell. Finally a tidal wave came rushing in and carried away the lot....Sitting on a tree trunk at 10 o'clock the next morning, I contemplated the full force of the disaster. There was only one description — a clean sweep...

In early 1948, vast stretches of Arnhem Land were inundated with floods after three cyclones drenched the region. 'At the height of one storm, which raged for four hours, the air was thick with flying branches and spear grass and spinifex were torn from the ground; trees were either uprooted or stripped of all their foliage; the sea rose 3.7 metres above its normal level causing Vanderlin Island to be split in three, the wind having earlier flattened the station homestead.'

Extreme events such as tropical cyclones and severe storms are thus prominent weather features capable of rapidly inflicting severe hardship and

social disruption in the Northern Territory coastal communities. Climate extremes of drought or widespread flooding are equally destructive. The long-term viability of Northern tropical settlements, operating under wet/dry tropic marginal conditions, may be adversely impacted even further in the future by climate changes associated with an enhanced Global Greenhouse Effect. Climate in the Northern Territory appears to be increasingly exacerbated by the La Nina and El Nino Southern Oscillation phenomena-ENSO, the cycle that drives Australia's climate (Flannery1994, Supplee 1999).

For instance, the 1998 Cyclone Les sourced severe Katherine-Daly River region flooding, the 1998–1999 development of most Severe (Category five) Tropical Cyclones Thelma and Vance and the widespread 1999 Queensland and Western Australian floods, probably confirm the arrival of a more dangerous extreme weather epoch. A rise in sea level of 50cm over 100 years (5mm pa) is also expected (Jepma and Munasinghe 1998). This is of particular concern, both in relation to the probability of increasingly severe weather and of the increasing propensities to damage by storm surges at many vulnerable coastal communities.

Apart from the cost of direct damage associated with such tropical cyclones, the threat of their arrival leads routinely to the temporary shutdown of business and social operations, the disruption of transport schedules and the cancellation of settlement activities. In addition to tropical cyclones, severe lightning and rainstorms in the tropics are a major source of disruption to productive commercial and community activities, with a particular impact on aviation, shipping, road transportation and electronic communications. For example, early in 1999, 500mm of rain fell in Nhulunbuy over a 24-hour period. Such heavy rainfall deluges also virtually eliminate modern satellite-mediated electronic data and voice communications, so bringing data transfer based commerce to a standstill.

In the tropical north, flooding along the short rivers that drain to the coast occurs in most years, making many road links impassable, sometimes for days to months on end. The rain associated with tropical cyclones and rain-bearing depressions is often responsible for widespread land flooding. Heavy road transport around the coast and extra-Territorially, to and from Darwin and major settlements, in particular, is often impeded by major rivers in flood after heavy rains, that sometimes wash away bridges and embankments.

The development of appropriate lifestyles, technologies and methodologies to cope optimally with these conditions requires a proper understanding of the weather, climate, terrain and resident people of tropical Australia. Although attempts have been made to do this, there is still a long way to go (CAR 1997).

Aboriginal and western cultural considerations

Before white settlement, Aboriginal Australians were well adapted to their limited range hunter-gatherer living in northern Australia. A typical clan group was restricted to a maximum range of about 5 miles a day due to the needs of women and children (Sewell 1998).

Nomadism was clearly an adaptation to tracking the erratic availability of resources as they were dictated by ENSO. Nomadism has a great cost, for possessions must be kept to a minimum. The Aboriginal tool kit was thus rather limited, consisting of a number of usually light, mostly multi-purpose implements. Investing in shelter construction is likewise constrained by such a lifestyle, for there is no point in building large and complex structures when ENSO may dictate that the area be deserted for an unknown period at any time (Flannery 1994).

Aboriginal population densities were higher in the far north (eg Gidjingali, Arnhem Land, 0.8 persons per square kilometre); nearly 100 times that of the Walberi, in central Australia, with 1 person per 88 square kilometres) (Rose 1987) with land food more plentiful because of heavier rainfall, and there was seafood in abundance (Davis 1984). Table 2 shows the abundance and variety of traditional Aboriginal food on Groote Eylandt in the Gulf of Carpentaria.

Worsley (1961) has provided detailed evidence of the abundance of extraordinarily rich bush foods that were available. Under such diets northern coastal Aborigines maintained high levels of health and fitness. It is evident that these traditional lifestyles were healthy because of the availability nutritious bush foods (Davis 1984, Hiddens 1996), fish and marine species and adequate exercise. In many

ways these lifestyles emulated those now advocated by advocates of sustainable self-renewing Permaculture (Mollison 1990, Mollison and Slay 1994).

This is in marked contrast to the expensive, externally sourced, processed, inadequate and unbalanced foods and diets of today which are amongst key factors contributing to Aboriginal ill-health (THS 1996). As the state of health is a critical determinant of many behaviours and decisions in life, including the capabilities to pro-actively contribute to hazard mitigation, we here highlight endemic poor health as a prime cause of the inability of many Aboriginal people living on remote monsoon-prone communities to adequately address emergency management issues and concerns.

Figure 2 models understanding of key factors contributing to Aboriginal ill health.

However, a few communities have comprehensive, well thought out, fully operational cyclone emergency plans, written for use by their communities. Two such are the Tiwi Islands and the Galiwinku Community on Elcho Island.

The issue of the current uneven provision of lifelines and shelter protection against cyclones is thus better understood against the legacy of the debilitating histories of most of the Aboriginal residents of the remote northern coastal communities of Australia.

Food Types	Varieties	Consumption %
Land animals	15	5
Birds	76	25
Marine and Fish	97	31
Shellfish	39	13
Plants	82	26
Total	309	100

Table 2: Number and consumption of traditional food, Groote Eylandt (Worsley)

Traditional approaches to coping with severe weather

Over the timeless millennia, Aboriginal Australians developed sophisticated approaches to coping with cyclic natural hazards. Many of these are evident in their stories and manifest behaviours.

Aboriginal myths, legends and fables

Long, long ago, before the great flood, the Nurrumbunguttias or spirit men and women lived on earth. Then came the flood. The water rose up quietly from the sea, until it was higher than the highest gum tree... The water kept on rising... and there was no place for the people to live. Many of them drowned and others were caught up in a whirlwind and carried into the sky... some became Gods of the Sky like Pund-jil.

After the great flood, men and women became more numerous on earth. They were to be found everywhere. But wherever they went they did cruel and evil things to the

Underlying factors	Direct causative factors	Ill health
<i>Political, Cultural and Identity</i> History of European/Aboriginal contact	<i>Lifestyle</i> Food and nutrition	Obesity, diabetes, hypertension, heart disease, low birthweight, increased damage caused by infections
Loss of: Own culture, lands & identity, law, family links, power over and responsibility for their own lives, meaningful activities.	Smoking	Increased risk of infections, lung damage, respiratory disease, heart disease, cancer, low birthweight
	Alcohol abuse/misuse High levels of mental stress	Violence, accidents, social disruption hypertension liver damage brain damage, STDs
<i>Demography & Geography</i> small, dispersed, remote, multi-lingual, multi-tribal mobile communities. High cost & difficulties in providing services in remote communities.	<i>Environmental Health</i> Overcrowded housing Inadequate standard of housing Inadequate sewerage Inadequate water supply Poor hygiene	Diarrhoea, trachoma and eye disease, respiratory diseases and infections, renal diseases, skin sores and infections
<i>Education, employment & Economic</i> Lack of relevant and culturally appropriate education lack of meaningful occupation/employment Lack of relevant health knowledge	<i>Health Services</i> Late presentation/diagnosis treatment Underutilisation of Health services	High hospitalisation rates, more severe illness, more chronic illness

Figure 2: Key factors contributing to Aboriginal ill health and disinterest in emergency management (THS)

animals that had been made to share the earth with them.

There were six winds, three of which were male, and three female. The cold west wind is called Gheeger Gheeger. She is guarded by Wahn the Crow, who keeps her confined in a hollow log. It is necessary for him to do this because she has such a turbulent nature. Sometimes she escapes, and Wahn is kept busy trying to bring her back. The log is slowly decaying. When it finally falls to pieces, Wahn will be unable to control the west wind, which will run wild and devastate the earth. The south wind, Gooroondoodilbaydilbay, is accompanied by Mullian, the Eagle Hawk, who can be seen in the sky riding on her back in the form of towering cumulus clouds.

The south-east wind, Yarragah has three wives, the Budtha, Bibbil and Bumble trees. When he makes love to them, they begin to grow and put forth flowers and fruit as a sign that Yarragah, the spirit of spring has arrived.

The north wind, Douran Douran, is also a great lover. From his kisses come the floral dresses of the Coolah, Noogah, and Kurrajong trees. The east wind is Gunyahmoo.

The female winds are unpredictable and wild. They rage through the trees, breaking branches and moaning because their lovers have been stolen from them. In contrast to their behaviour, the male winds, with the exception of Gheeger Gheeger, are gentle. It is their love which cause trees to put on their leaves, and to flower and fruit, and the earth to blossom in its gentle green.

So when the great god Pund-jil becomes angry, first he makes fierce storms and winds which drive the men and women into caves and valleys, where they try in vain to shelter from his wrath. Trees are blown over, and clouds of sand choke the people while they are lying on the ground or crouched at the far end of caves where they can hardly breathe. Pund-jil calls on the wind to carry them far up into the sky...from where pieces that had been men and women fall to the ground.

The boys who were standing on the bank, saw the canoe lifted up into the air by the tidal wave. The still water broke into waves that dashed over the bank, smashing into each other and sending spouts of water high into the air... The canoe was lost to sight in the seething cauldron. The boys feared that their father might be drowned or swallowed by a great fish, but when the tumult of water subsided they saw that their father was still clinging to it doggedly with one hand, his spears in the other... Slowly the flood waters receded, and the sea went back into it's own place, and the land

steamed again under the hot tropical sun.

From **Aboriginal Myths, Legends and Fables** (A. W. Reed 1993)

Blainey (1976) has noted:

By moving about the countryside in small groups, the aboriginals could efficiently harvest the foods of scattered places. There were limits, however, to the territory, which they could exploit. The limits were formally set down by tribal boundaries though these boundaries were not a barrier to everyone. But the tribal boundaries themselves had probably been drawn over a long stretch of time by the facts of geography and economics. In essence a small group of people with no transport other than their feet and with their own children and implements to carry, could travel effectively only over a moderately-sized area. Moreover, they could know the varied resources in detail only if the area was not too large.

Language embraced many shades of meaning, richly describing the environment and its flora, fauna, fish and weather and the Aboriginal modus operandi.

Availability of food depended upon the seasonal cycle. As different foods grew and ripened at different times of the year, so the Aborigines moved from place to place. When the food was exhausted they would move elsewhere. They were nomads of the coastal and adjoining bushlands, fishing, hunting and gathering food as it was available. They would move within the limits of their country unless food was scarce. If they had to

move into the territory of another group with whom they had no close relationship, then they would ask the permission of that group to do so. (Cole 1982)

The seasons of the weather, which they understood and described in fine detail, thus determined their locations and in large part determined how traditional Aborigines coped effectively with natural hazards and risks cycles. As recorded by Press et al (1995):

Gudjewg – Monsoon season, December–March: Monsoon time, continuous low cloud and heavy rains.

Bangerren – Harvest time, March–May: last storms from the coast, ‘knock-em-down’ storms, from the fact that the Savannah grasses are at their highest and these storms can knock them flat. Humidity remains high.

Yegg – Cool weather time, May–June: clear weather getting cooler, humidity drops. SE trades re-establish.

Wurrng – Early dry season, June–August: Cool nights, morning mists.

Gurrung – Hot dry season, August–October: hottest, driest period before it rains, almost cloudless skies.

Gunumeleng – Pre-monsoon season, October–December: irregular easterly storms in the afternoon. Humidity rises.

‘Yolgnu believe that the ‘male’ thunder that comes in early in the pre-wet season shrinks the water holes. When the sky is covered by heavy cloud most of the day, the ‘female’ thunder brings the rain’ (Davis 1985). Figure 3 depicts the seasonal calendar for Kakadu region Gundjeyhmi (Mayali) language.

The intimate traditional Aboriginal

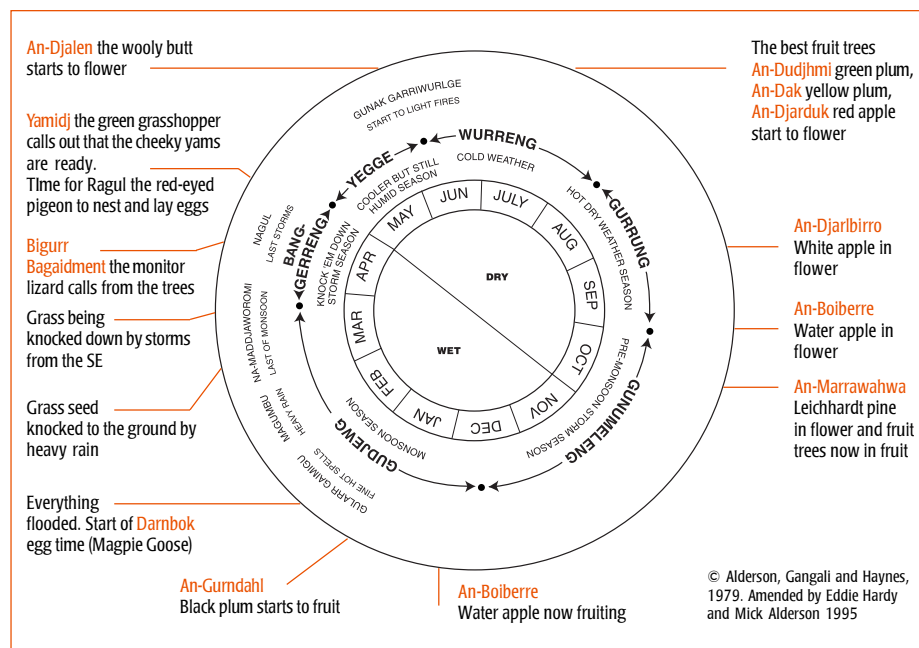


Figure 3: Seasonal calendar for the Kakadu region in Gundjeyhmi (Mayali) language

knowledge of coast and sea is comprehensively described by Davis (1984), Rose (1987) and Flood (1995). As well, there are many general descriptions by many others (THS 1995).

The following details are largely the outcome of the outstanding work of Rose (1984).

In Northern Australia, which is subjected to the south-cast trade wind and north-west monsoon regime, there was a tendency for the population to break down to the individual family (foraging groups/clans) during the dry season, whereas during the summer wet they tended to concentrate. For north-east Arnhem Land the population of the almost sedentary wet season camps might exceed one hundred Aborigines. This would probably have been in the period from January to March. The number equated with approximately 3–4 clans.

The fruit of the cycad had a special value in the native coastal economies, for it enabled the women to maintain an adequate food supply on ceremonial occasions when hundreds of people, who could not otherwise be supported for such periods on local resources, are gathered in one camp for weeks or months at a time. It is clear that two quite separate factors favoured the congregation of the Arnhem Land Aborigines into larger foraging groups in the wet season: the first was the abundance of cycad nuts, particularly in the late dry season, and the other was the heavy rains during the full wet season, which restricted movement.

Before World War 2 on Groote Eylandt, Rose (1987) did not meet any family foraging groups (clans) larger than five or at the outside six married men and their families, which all told would have comprised about forty to fifty Aborigines, men, women and children. But he only visited the Aborigines in their camps when they were accessible to outsiders during the winter, when the clans would have been dispersed.

Tindale (1940) observed wet season stringy bark huts to shelter 30 or more persons which, if more than one such hut were erected, would have implied a considerably larger aggregation than forty or fifty. Rose also observed a group of two or three of such wet season huts on 28 November 1938, but their size was considerably smaller than Tindale reported (10 x 30 feet) and altogether would not have housed more than twenty to thirty Aborigines. Tindale reproduced a photograph showing ten adult men. This would have implied a foraging group numbering between forty and sixty men, women and



Figure 4: Arnhem Land escarpment cyclone and flood refuges (Russell-Smith)

children, a similar size to that calculated by Rose (1987).

As the season changed to **Gudjewg** – the cyclone season, so the clan groups too modified their living patterns to adjust to availability of food, restricted movement and security in larger community gatherings. For these times they left their smaller clan bough and bark shelters and assembled larger houses for the increased numbers of their wet season communities. The annual gatherings of the clans witnessed many corroborees, which were the occasions for passing on of the Law and Culture through verse, song, mime and dance. For periods when the heavy rains caused deep flooding, their land traversing movements were restricted, and **Gudjewg Marl-gan Sky Fires** threatened, Aborigines were in the caring company of kindred clan groups who possessed the capabilities, resources and know-how for escaping big winds and rising waters without harm. Where possible this might include, as for Manny, Mumma and Dadda in ‘**Sky-Fire**’, proactive retreat to familiar caves, or sheltering behind rocks or in shallow pits covered by heavy logs, or more modest protection in the lee of small rises or dunes. A considerable number made annual treks to more distant safer valleys of the Arnhem Land’s escarpment and plateau. (Figure 4).

The Arnhem Land Plateau stretches 260 kms from north to south, and 200 kms from east to west. Its edges form a steep stone escarpment, rising to as much as 250 metres above the alluvial plains. Large rivers flow through the escarpment in spectacular gorges. The rivers are now estuarine and full of barramundi and huge saltwater

crocodiles. The presence of fresh water, abundant food resources and large rock shelters for protection against the elements made this an attractive area for prehistoric settlement. It is therefore not surprising that several rock shelters have been found with occupation extending back well into the Pleistocene (>18,000 years before the present day – BPD), when they would have been some 350 kms inland. (Flood 1995).

Here in Arnhem Land’s rugged, rain-strafted landscapes-its pale weathered cliffs of naked, bone-like sedimentary rock; its thunderous waterfalls; its sun-baked thickets of rain-forest vegetation; its great fetid swamps, choked with decaying vegetation and creased by the gliding forms of ravenous crocodiles—lived the Murngin people in their traditional lands the ultimate spiritual, evolutionary, and ecological source of their lives... They possessed an elemental sense of blood kinship and primordial oneness with the land kept constantly alive in their Law and Culture.

The Rrarigurak Gurumba Gurumba clan is the proud owner of its own estate, a divinely apportioned area of the landscape encompassing major and minor ceremonial sites, the clan having been endowed with a repertoire of sacred songs, rites and paraphernalia that have long constituted the title deeds to their land. At the sacred places (sites), sporadic upwellings of an unseen subterranean current that ultimately animates all forms of life, are the primary foci of collective clan sentiments that lie at the core of the relationship of the

people and the land. The sacred landholdings of the clan border the expansive, stagnant waters of Arafua Swamp. Within the estates boundaries are divers terrains: lowland tropical rain forest, ridges faced by steep cliffs and cut by gurgling streams, and on higher ground, dry plateaus greened by hardy eucalyptus trees. (Peterson 1972).

Arnhem Land now possesses myriad caves in the deeply crevassed, small steep valleys with extensive rock paintings which are vivid testimonials to the lives and skills of their sheltering Aboriginal occupants over the many aeons of past wet seasons. Many of these remote, not readily accessible, sites have yet to be fully explored and documented. Few European people have ever visited these places of archaeological renown (Flood 1995, 1999).

Thus, the behaviour of traditional coastal Aboriginals of the Northern Territory as described above, enabled them to survive from generation to generation using their intimate knowledge of the land and the seasons. Over the millennia, until the disruption to their Culture by the new Balanda, the longstanding indigenes managed to master the savageries of Nature and to thrive. Through possessing a comprehensive understanding of themselves and their environment, they carved for themselves a sustainable, high quality of life in the land that they embraced so masterfully.

Inheritance and possible future

As summarised by Rose (1993) the transcendent rules for traditional Aboriginal culture may be distilled into four broad overarching basic laws:

- **Balance:** A system cannot be life-sustaining if it is out of kilter, and each part shares in the responsibility of sustaining itself and balancing others.
- **Response:** Communication is reciprocal. There is here a moral obligation to learn to understand, to pay attention, and to respond.
- **Symmetry:** In opposing and balancing each other, parts must be equivalent because the purpose is not to 'win' or to dominate, but to block, thereby producing further balance.
- **Autonomy:** No species, no group, or country is 'boss' for another; each adheres to its own Law. Authority and dependence are necessary within parts, but not between parts. These enduring Aboriginal living laws

describe a cohesive interlocking balanced natural system with a paradigm very much along the lines portrayed by contemporary systems analysts (McDermott 1997) and recently re-discovered and espoused for the earth's global commons by Lovelock (1991).

The European settlers were thus seen to be, and most often still are, out of synchronicity with the Aboriginal Dreaming Laws.

Not knowing what to remember and what to forget, they follow dead laws, fail to recognise living ones and in their power and denial promote death. By living for tens of thousands of years in accordance with their Dreaming Laws, the Aboriginal ethos

*Dreamer of dreams, born out of my due time,
Why should I strive to set the crooked straight?
Let it suffice me that my murmuring rhyme
Beats with light wing against the ivory gate,
Telling a tale not too importunate
To those who in the sleepy regions stay,
Lulled by the singer of an empty day.*

The Earthly Paradise William Morris

was one of perpetual human protection, maintenance, and the renewal of the entire natural world, and respectful dialogue with its kindred membership. All that has preceded us and all that comes after depends on us. What we do matters so powerfully that to evade our responsibility is to call down chaos (Rose 1993).

Over an immense span of time the Australian Aboriginals developed effective solutions for living and thriving in their challenging environments, including devising viable means of protection against severe natural hazards. It is most important to recognise this invaluable legacy for all of us, and to incorporate, where appropriate seminal Aboriginal knowledge into our modern-day settlements and counter disaster precautions and emergency management arrangements.

To overcome quick mobility evacuation problems of major communities in the face of imminent severe cyclonic threats, we need to make provision for adequate specifically designed and engineered, robust, multi-purpose, cyclone-safe, community refuges. And on the outstations too, simple expendable shelters

for their part-time residents could be constructed, together with cyclone-robust safe-shelters for the whole clan-group. Such shelters could be, for instance, inexpensive, modified, used, shipping containers, or other suitable protective structures. In such ways, for all sizes of remote human settlements, safety when under threat from severe tropical cyclones, storm surges and inundating rain, could be much facilitated. Use of appropriate, affordable technologies, and solutions to problems, based on proven approaches, is clearly desirable (Panek 1972, Boyle and Harper 1976, Harding 1982, Ayers 1999).

A much higher level of autonomy and governance, along traditional lines, could be accorded to clans and communities, so facilitating their regaining of self-esteem and fostering renewed optimism, hope and commitment for better futures.

The realisation of such initiatives would again harness many timeless invaluable Aboriginal attributes and skills, and would contribute substantially to future well-being of those living in their remote monsoonal homelands, and be a strong motivator of real progress against sound benchmarks (CAR 1998). And in a better state of health, hazard mitigation matters could begin to occupy an appropriate place.

Ten Commandments of traditional Aboriginal settlement survival

From the above outline and consideration of past traditional Aboriginal life-ways in the monsoon region of Australia we have formulated Ten Commandments of Sustainable Settlement and On-going Survival for the Present and the Future (Marion 1996). They in many ways parallel those formulated for the AusTroPolis - Sustainable Tropical Human Settlements Project (Skertchly 1994) and by the approaches of Robertson (1983), Sommerlad, Dawson and Altman (1985), Mollison (1990), Mollison and Slay (1994), and of Roseland (1998).

The Ten Commandments aim to capture the essence of the lessons that can be gleaned from an examination of past Aboriginal wisdom and practices (Clarkson, Morrisette and Regallet 1992). They could form the basis for elaborating future brainstorming workshops and a multiplicity of appropriate future-beneficial development initiatives.

Until most remote Aboriginal monsoon region communities of Australia are lifted out of their currently repressed circum-

stances and really emancipated to raise their overall well-being, quality of life and standing, it will not be possible to develop their counter disaster preparedness and emergency management arrangements in a universally satisfactory manner.

The key to the future satisfactory state of affairs lies in part in the hands of those who could facilitate the resurgent harnessing of pertinent elements of past exemplary Aboriginal praxis. The pressing need is to learn how to cooperate with nature to ensure good living everywhere, as was the case for the past aeons back to the Dreamtime (Clarkson, Moorrisette and Regallet 1992, Burby 1998).

- **Commandment one:** *Utilise and build upon 60,000+ years of sustained successful Aboriginal civilisation.* Use and develop your achieving personal, clan and community futures from knowledge and understanding of the outstanding proven successes of your traditional Law and Culture.
- **Commandment two:** *Set progressively attainable, clear improvement goals.* Formulate a Community Master Plan based incorporating the key features of 60,000+ years of successful Law and Culture expressed in contemporary modern form.
- **Commandment three:** *Know your land and environment.* Acquire the most intimate knowledge of your land and environment possible, understanding nature.
- **Commandment four:** *Work with your land and environment.* Work appreciatively and cooperatively with your land and environment, harnessing for both your and your land's good, affordable, available, sustainable renewable, resources.
- **Commandment five:** *Maximise local/short haul, readily available, resources.* Seek to maximally utilise nearby resources of water, food plants, animals and fish, building materials and all available Do-It-Yourself practical competencies and skills.
- **Commandment six:** *Live and work sharing co-operatively.* Live and work together as a co-operative clan/community group. Foster a synergistic culture.
- **Commandment seven:** *Minimise using inappropriate, expensive outside expertise and resources.* Aim to build up all available internal skills and resources, only using external resources when absolutely necessary.
- **Commandment eight:** *Appropriate settlement structures.* Design, fabricate, construct and manage houses and

community structures that match best available sustainable resources and the specific characteristics of the environment.

- **Commandment nine:** *Appropriate essential community services.* Design and progressively commission those core services essential to present and continuing well being, in both tranquil and stormy weather.
- **Commandment Ten:** *Perpetuation of the life-ways, Law and Culture.* Act to institutionalise and perpetuate your reinvigorated modernised; yet traditionally based life-ways, law and culture sustainably into the many millennia that lie ahead.

Are not these Ten Commandments equally apposite also for other human settlements?

The many island nations of the Pacific and Indian Oceans and of the Equatorial Seas with their thousands of subsistence coastal settlements come readily to mind. Of course it is not now possible to return completely to Aboriginal human habitation arrangements of past, but there is clearly much to learn from the wisdom of the ways of such an enduring Law and Culture (Knudtson and Suzuki 1992) as that of the Australian aborigines.

The references provide rich sources of additional knowledge and inspiration as starting points to assist in overcoming the debilitating national legacy that exists on many remote coastal communities and enabling better public safety futures for all those who live at them.

References

- ABS, 1997, *Census of Population and Housing, Northern Territory*, Australian Bureau of Statistics, Canberra.
- Altman J.C. 1987, *Hunter-gathers today. An Aboriginal Economy in North Australia*, Australian Institute of Aboriginal Studies, Canberra.
- ASTEC 1993, *Research and Technology in Tropical Australia*, AGPS, Canberra.
- Astley T. 1996, *The Multiple Effects of Rain Shadow*, Penguin Books, Ringwood.
- Ayres E. 1999, *God's Last Offer: Negotiating for a Sustainable Future*, Four Walls Eight Windows, New York.
- Beck E.J. 1985, *The Enigma of Aboriginal Health*, Australian Institute of Aboriginal Studies, Canberra.
- Berndt R.M. and Berndt C.H. 1954, *Arnhem Land: Its History and its People*, Cheshire, Melbourne.
- Berndt R.M. and Berndt C.H. 1981, *The World of the First Australians*, Lansdowne, Sydney.
- Blainey G. 1975, *Triumph of the Nomads*,

Sun Books, Melbourne.

Boyle G. and Harper P. *Radical Technology*, Penguin Books, London.

Burby R. 1998, *Cooperating with Nature: Confronting Natural Hazards with Land-use Planning for Sustainable Communities*, Joseph Henry Press, Washington D.C.C.

CAR 1997, *Towards a benchmarking framework for the service delivery to Indigenous Australians*, Council for Aboriginal Reconciliation, Centre for Aboriginal Economics Policy Research, Australian National University, Canberra.

CAR 1999, *Reconciliation Statement (Prime Draft)*, Council for Aboriginal Reconciliation, Canberra.

Carson R. 1962, *The Silent Spring*, Houghton Mifflin, Boston.

Chen D., Zebiak S.F., Busalacchi A.J. and Cane M.A. 1995, 'An improved procedure for El Nino forecasting: Implications for predictability' *Science*, 269, pp. 1699-1702.

Clarkson L., Moorrisette V. and Regallet G. 1992, *Our Responsibility to the Seventh Generation: Indigenous Peoples and Sustainable Development*, International Institute for Sustainable Development, Winnipeg.

Cole K., 1979, *The Aborigines of Arnhem Land*, Rigby, Sydney.

Cole K. 1982, *A History of Numbulwar*, Keith Cole Publications, Bendigo, pp. 9-10.

Davis S. 1985, 'Aboriginal Knowledge and Use of the Coast and Sea in Northern Arnhem Land', in Bardsley K.N., Davie J.D.S. and Woodroffe C.D. *Coasts and Tidal Wetlands of the Australian Monsoon Region*, North Australian Research Unit, Australian National University, Darwin pp. 297-312.

De Shalit A. 1995, *Why Posterity Matters: Environmental Policies and Future Generations*, Routledge, London.

Devitt J. 1995, *Taking Time for People: An Orientation Manual for People Working in the East Arnhem District*, Territory Health Service, Darwin.

Dragun A.K. and Jakobsson K.M. 1997, *Sustainability and Global Environmental Policy: New Perspectives*, Edward Elgar, Cheltenham UK.

Elgin D., *Voluntary Simplicity: Toward a Life that is Outwardly Simple and Inwardly Rich*, William Morrow, New York.

Flannery T. 1994, *The Future Eaters*, Reed New Holland, Sydney, pp. 81, 282.

Flood J. 1995, *Archaeology of the Dreamtime*, Angus and Robertson, Sydney, pp 15, 147, 247.

Flood J. 1999, *The Riches of Ancient Australia*, University of Qld Press, Brisbane.

Gore A. 1992, *Earth in Balance: Ecology and the Human Spirit*, Houghton Mifflin, New York.

- Gunn A. 1909, *The Little Black Princess of the Never-Never*, Hodder & Stoughton, Lon.
- Harding J. 1982, *Tools for the Soft Path*, Friends of the Earth Foundation, San Francisco.
- Health Report 1999, *Report on the Health and Welfare of Aboriginals and Torres Straits Islanders*, Australian Bureau of Statistics, Canberra.
- Hennington J. 1999, *Genetically Programmed Survival Mechanisms in Humans*, World Assoc. of Press Council, Brisbane.
- Hesselbein F. 1998, *The Community of the Future*, Jossey-Bass, San Francisco.
- Hiddens L. 1996 et al., *The Bush Tucker Man*, (CD and Videos) Australian Broadcasting Commission, Sydney.
- IDNDR 1998, *Sixth IDNDR Pacific Regional Disaster Management*, Emergency Management Australia, Canberra.
- Jay A. 1975, *Corporation Man*, Penguin Books, London, pp. 49,108.
- Jepma C.J. and Munasinghe M. 1998, *Climate Change Policy: Facts, Issues and Analysis*, Cambridge University Press, NY.
- Kelly P.; Pearson N. 1999, *The Australian*, August, 1, 4, 12,13.
- Knudtson P. and Suzuki D. 1992, *Wisdom of the Elders*, Allan and Unwin, Toronto.
- Le Breton 1839, in Dumont d'Urville, 'Voyage au pôle sud et dans l'océanie' *Atlas Picturesque*, National Library of Australia, Canberra.
- Lovelock J. 1991, *Gaia: The Practical Science of Planetary Medicine*, Allen and Unwin, Sydney.
- Lockwood D. 1968, *The Front Door*, Rigby, Sydney.
- Pickup G. and Minor J.E. 1980, *Assessment of Research and Practice in Australian Natural Hazards Management*, NARU, ANU, Darwin.
- Macknight C.C. 1969, *The Furthest Coast: A History of Northern Territory Settlement*, Melb. University Press, Melb.
- Marion M. 1996, *Environmental Issues and Sustainable Futures*, World Future Society, Bethesda, Maryland.
- McDermott I. 1997, *The Art of Systems Thinking*, Thorsons, Harper Collins, Lon.
- Mercer J. 1953, *Catholic Missionary Society Station Journal*, Numbulwar.
- Mollison Bill, 1990, *Permaculture: A Practical Guide for a Sustainable Future*, Island Press, Washington DC.
- Mollison Bill, and Slay R.M. 1994, *Introduction to Permaculture*, Tagari Publications, Tyalgum.
- Moran P. 1999, 'Splendour in Isolation' *Australian Geographic*, 53, pp. 36-55.
- Murphy K. 1984, *Big Blow Up North: history of Cyclones in the Northern Territory*, University Planning Authority, Darwin.
- NARU 1989, *Small Towns in Northern Australia*, North Australia Research Unit, Australian National University, Darwin
- Papanek V. 1972, *Design for the Real World*, Thames and Hudson, London
- Peterson N. 1972, 'Totemism Yesterday: Sentiment and Local Organisation among the Australian Aborigines', *Man* Vol. 7, No.1, pp. 13-32
- Pickup G. 1978, *Natural Hazards Management in North Australia*, NARU, ANU, Darwin.
- Pinkerton E. and Weinstein, M. 1995, *Fisheries that Work: Sustainability Through Community-Based Management*, David Suzuki Foundation, Vancouver BC.
- Pittock A.B. et al. 1999, 'Climate Change, Climatic Hazards and Policy Responses in Australia', Downing, T.E., Olsthoorn, A.A. and Tol, R.S.J. *Climate Change and Risk*, Routledge, London.
- Press T., Lea D., Webb A. and Graham A. 1995, *Kakadu: Natural and Cultural Heritage and Management*, ANCA, NARU, Darwin, p. 44.
- Reynolds H. 1999, *Why Weren't We told: A Personal search for the Truth About Our History*, Ringwood: Penguin Books.
- Robertson J. 1983, *The Sane Alternative: A Choice of Futures*, River Basin Publishing Company, St Paul, Minnesota.
- Rogers R. 1997, *Cities for a Small Planet*, Faber and Faber, London.
- Rose F.G.G. 1987, *The Traditional Mode of Production of the Australian Aborigines*, Angus and Robertson, Sydney, p. 22.
- Rose D.B. 1993, *Dingo Makes Us Human: Life and Land in an Aboriginal Culture*, Cambridge University Press, Cambridge MA.
- Roseland M. 1984, *Toward Sustainable Communities for Citizens and their Governments*, New Society Publications, Gabriola Island, BC.
- Rowley C.D. 1975, *The Destruction of Aboriginal Society*, Penguin Books, Ringwood.
- Saggers S. and Gray D. 1991, *Aboriginal health and society: the traditional and contemporary Aboriginal struggle for better health*. Allen and Unwin, Sydney
- Sen A. 1993, 'The Economics of Life and Death' *Scientific American*, Vol. 268, No. 5, pp.18-25.
- Sewell B. 1998, *Goomalling: A Backhand Glimpse*, Goomalling Shire Council, Goomalling, p 3.
- Skertchly A. 1986, *New Towns*, Aboriginal Development Commission, Perth.
- Skertchly A. 1987a, *Aboriginal Youth Development Through Communications*, Office of Youth Affairs, Department of Prime Minister and Cabinet, Canberra.
- Skertchly A. 1987b, *Positive Aboriginal Advancement*, Northern Territory University, Darwin.
- Skertchly A. 1994, *Aus-Tro-Polis: Australasian Tropical Polis*, Northern Territory University, Darwin.
- Skertchly A. and Skertchly, K. 1999, *Cyclone Vulnerability in Remote Coastal Communities of the Northern Territory*, Emergency Management Australia, Canberra.
- Sommerlad E.A., Dawson, P.L. and Altman, J.C. 1985, *Rural Land Sharing Communities: An Alternative Economic Model*, Bureau of Labour Market Research, AGPS, Canberra.
- Suplee C. 1999, 'El Nino/La Nina' *National Geographic*, Vol. 195, No. 3, pp. 72-95.
- Suzuki D. 1998, *Earth Time*, Allan and Unwin, Sydney.
- THS 1996, *Aboriginal Health Policy*, Territory Health Services, Darwin.
- Tindale N. 1940, 'Distribution of Australian Aboriginal Tribes' *Transactions of the Royal Society of South Australia*, LXIV, pp.140-231.
- Tindale N. 1974, *Aboriginal Tribes of Australia, Their terrain, Environmental Controls, Distribution, Limits and Proper Names*, Australian National University Press, Canberra.
- Turner D. H. 1974, *Tradition and Transformation*, Canberra.
- Young E. 1981, 'Numbulwar: From Mission Station to Aboriginal Community' in Young E., *Tribal Communities in Rural Areas*, Australian National University, Canberra.
- Worsley P.M. 1954, *The Changing Social Structure of the Wanindiljaugwa*, Doctoral Dissertation, Australian National University, Canberra.

Authors

Dr Allan Skertchly has qualifications in the biological, physical and social sciences and was until recently a foundation member of the academic staff at the Northern Territory University. He now works with S.M.I.L.E. Darwin on multi-disciplinary hazard mitigation and emergency management projects.

Ms Kristen Skertchly has an honours degree in environmental science and is currently working at the Department of Lands, Planning and Environment of the Northern Territory Government.

Both authors have conjointly completed Emergency Management Australia supported projects on severe tropical cyclone human settlement vulnerability, the 1998 Katherine-Daly Flood Disaster, and Lifelines (NT), for the Counter Disaster Council and Emergency Services of the Northern Territory Government.

