Section 6
Extreme weather impacts - old

This section draws on collected Australian Aboriginal stories of extreme weather impacts -mainly floods- and contrasts the embedded lessons with detailed descriptions from two more recent Australian events in Section 7. This helps inform what might happen in populated regions which may experience Probable Maximum Floods anywhere in the Pacific.

In Dreamtime Australian Aboriginal stories, the recurrent theme is that nearly every-one drowns, while Section 7 details reports from Cyclone Tracy's physical and psychological impact on Darwin in 1974 and the Brisbane flood impacts of 1974. These two sections carry powerful messages for emergency planners in this third millennium. These Sections also detail third millennium approaches to disaster preparedness, response and recovery.

The messages are well developed in this major report on Indigenous weather issues: nurture aware and prepared communities to respond in a precautionary and active way to any likely threat. In more vulnerable communities, make sure residents are informed, and preferably practised in either staying safely or evacuating to safety early. Community safety is the umbrella under which we encourage all threatened individuals to shelter.

In the "Understanding community risk" session of the 2003 Australian Disaster Conference, an Emergency Management Australia (EMA) representative told us that we deal with very rare events, so values are important, that inputs need to be credible. How people manage their own lives, their relationship with their local environment and their own community become central to good risk reduction - very clear and current thinking. We need to make and encourage choices which are robust and produce legitimate outcomes.

Old stories from across Australia

The first two stories are included to help show the skeptical reader that Australian Aborigines have had and still have; a most powerful and accurate oral knowledge and skill which has travelled through many thousand years. Some of the following stories long predate the rise of Egyptian culture, before Rome existed, before China began its civilisation. The evidence of the first two stories is that detail of prior landscape and extreme events has transmitted accurately through many millennia. When it is repeatedly said that traditional Aboriginal culture had intimate links with their environment, like true geographers, this was so in space and time.

Some of the flood stories seem to illustrate how it is unwise to not respect and care for old people, others as chilling tales of what can happen if children disobey their parents, or tease animals.

First story group:
establishing the past for the present to admire and learn from

From:
Dixon RMW 1991. *Words Of Our Country. Stories, Place Names and Vocabulary in Yidiny, the Aboriginal Language of the Cairns-Yarrabah Region*. University of Queensland Press. 312 Pages. Pages 41 to 42 and 90 to 91

Text 3 – The Origin of Lake Eacham
"I first recorded an account of the origin of the three crater lakes on the Atherton Tableland (Lake Eacham, Lake Barrine and The Crater) from George Watson, in the Mamu dialect of Dyirbal. The story he told was very similar to the Yidiny one given here – how two newly-initiated men broke important taboos and so angered the rainbow-serpent. This spirit then caused the earth to erupt, bringing about the formation of several deep lakes. Both texts (Dyirbal and Yidiny) provide a plausible account of volcanic eruption.

After telling the story, in 1964, George Watson remarked that when this happened the country around the lakes was 'not jungle – just open scrub.' The volcanic eruptions that formed the lakes are said by scientists to have been at least 13,000 years in the past. George was saying that at this time there was no rain forest on the Atherton Tableland. In 1968 a dated pollen diagram from the organic sediments of Lake Euramoo by Peter Kershaw showed that the rain forest in that area is only about 7,600 years old. This suggests that the story of the volcanic eruptions may have been handed down from generation to generation for something like 13,000 years (which is not implausible, since Aborigines are known to have been in Australia for at least 40,000 years)."

Text 16 – How the Sea Level Rose
"They were particularly taken with a legend which must have been taken down by E.R.B Gribble between 1892 and 1909, while he was at Yarrabah, published on pages 56-7 of his *The Problem of the Australian Aboriginal* (Angus and Robertson, 1932) under the title 'The Great Barrier Reef':

'According to the natives on Cape Grafton, northern Queensland, the Barrier Reef was the original coastline of the country. Goonyah was the first man in that country. One day with his two wives, he went to the coast to catch fish. In some way he offended the Great Spirit Balore. It is said, that he caught and ate a certain kind of fish that was forbidden. Balore in anger caused the sea to rise in order to drown Goonyah and his women, but they fled to the mountains. The waters rose rapidly as the fugitives climbed to the heights of the Murray Prior range. This range is called by the aborigines "Wambilari" [Moses said that this must be a reference to Wumbilgay, a baldy-headed mountain]. The two women became very tired, and stopped running. Goonyah, well ahead of them, stopped on a huge boulder of granite, and called upon them to hurry. The natives took the author to this spot, and showed him the footprint of Goonyah. It is a patch of very dark stone in the granite about fifteen inches long and very wide. It is said that the mark was left by Goonyah's muddy foot. He must have been something of a giant.

They succeeded in reaching the top of the highest peak in the range, and there they made a fire, and heating large stones rolled them down the mountain side, and succeeded in checking the flood. The sea, however, never returned to its original limits. (Goonganjie tribe).'"

Although Moses had never previously heard a story about Gunya the theme was familiar to him – many Yidinyji stories are concerned with rising seas and what olden times people did to try to stop them.
Told by Dick Moses in the coastal dialect; recorded at Yarrabah on 22 August 1973 (duration 10 minutes).

Stories which may not fade

From:
'Old' Gordon with Carise Gordon at Ringer Soaks, East Kimberley, as told to Douglas Goudie October 2003.

Rainbow serpent and the water soaks

near the Community of Ringer Soak (Ring–o'-soaks),

The rainbow serpent would move all around here and form the cloud, and start to make the strong wind blow. The rainbow serpent is still here in the soaks. When a truck came here in the 1980s to drill for water, the drillers felt something moving down there at Banana Springs. They could feel it moving through their drill rig. From deep down they pulled up charcoal. That was from the Dreamtime burning. From the fire Dreaming. Peter Gordon can sing up the rain. When the drillers felt something moving, the old people thought it must be the rainbow serpent.
As told to Douglas Goudie

From: Old Gordon, Angela Gordon and daughter Carise Gordon at Ringer Soaks, East Kimberley, WA, as told to Douglas Goudie October 2003.

The soaks and the sisters

Two sisters were gathering wattle seed to grind one day, and they argued over which sort of seed to get. In the end, one sister got one sort; the other got a different sort. They ground their seeds and made a kind of damper, but when they put them in the fire, one exploded. That explosion made a big hole and made the soak there at Banana Springs, while the rainbow serpent woke and made other soaks in the area. The two sisters turned into trees, and those old trees are still there today.
This story was told to Douglas Goudie by Angella and Carice Gordon.

Two Dingoes and the flood

There were two emu up north from around Inverway Station, from Nungaroo Creek, who were chased by two dingo. A big distance away from Mulan at Nungaroo.

People were walking. The emus were in front. The people were singing and dancing, and they were in between the dingoes and the emus. There were floodwaters behind the dingoes.
When people were camping the flood would stop. There was one old man, he had a string line and he would cut the water while they camped. He would hold the waters back while they camped. While they would sing and dance. Where they camped the water was held up. That is where the billabongs in Sturt Creek are now. Like at Bindalaorro.
The black and white water bird, the one with the long legs, the little bird was with the people. Birds and other animals joined the people as they moved south, singing and dancing.

They were coming down, straight down to the lake on the Sturt River side. But the dingo chased the emu round the other side. Around to number 51 well (water bore) around to Gillang-gillam.

The dingo chased the emu back and forth on the main lake. One dingo was chasing one emu and the other dingo was chasing the second emu. Back and forth. Each dingo grabbed an emu when they passed but they each grabbed the wrong emu. They grabbed ‘em and killed ‘em and ate ‘em.

The people on the other edge of the lake, in the main channel, camped again. In that main camp they sung and danced, that was where we call Lera Yard.

When the two dingo’s were full they walked up the other channel to Mulan. There was a soak there and they dug in. They’re still there.

Then the water came in from both sides and all the people got drowned.

One old man walked off and sang them (he put a deadly curse on them all). They all drowned because they hadn’t shared some food with him. But when he walked off, another old man spat on him, cursed him, so that first old man who walked off died too.

From: Rex Johns, elder and founder of Mulan, Tanami Desert, East Kimberley, WA. as told to Douglas Goudie October 2003.

Commentary

there are variants on the story Rex Johns told of Lake Gregory and the story (below) *Law from the south meets law from the north.* They both, however, convey the message that there was flooding to the extent that Lake Gregory filled right up, something which has not happened in living experience.

Quite a few of the stories of major events seem to have a moral of either people not sharing food (a 'sin' for nomadic, subsistence peoples), or of children being disobedient and tormenting other 'animals'. The latter is the case in *Dumbi the owl.* Here, as is often the case, everyone drowns. In *Eye of the sea*, the vengeance of an old woman for her lost son seems to trigger a tsunami. Nearly everyone was drowned and she was speared to death.

The Introductory notes to Songs from Yarrabah shows that the very Skin or kin groups are categorised to wet and dry season groups of objects or animals. People on NE Coastal Queensland were absolutely steeped in weather as part of their spiritual existence.

The accounts in *The floodmakers of langu narnji* record the living culture of the Mornington Island area, where some individuals or groups were able to control storms. This was a source of intergroup power, but also retribution when a great flood, unsummoned, wreaked havoc on other groups, who then sought vengeance.

Eerie

In the story of the Owl-torment induced great flood of the Kimberley (Utemorrah, 2000), a section reads (p 7): "He got the dragon lizard to go out into the plain and wave his arms around to bring all the clouds. The dragon lizard did that. The rain and lightning came. That scared the children".

In a disaster risk management study in Eidsvold, inland from Gympie, southern Queensland (Map 4.4), I learned: Neville spent time with traditional men in the 1950s. He was shown a local lizard (moos moos in the Wakka Wakka language) slowly waving one 'arm', then the other on front of its face, while standing on a high piece of fallen old branch. These lizards are smooth skinned, not very common, and about 200 mm long. The old fellas said that meant there would be rains soon after. The younger blokes laughed and thought that was not going to happen. According to Neville, "Storms came from all over the place that night. It rained a lot."

From an ancient story of a prior major flood in the Kimberley to living oral traditional knowledge of reptile behaviour preceding flooding rains in southern Queensland, there would appear to be an early, observable warning/forecast of rain.

Can we step into a space that allows BoM to receive input on such behaviour to test, then possibly incorporate tradition knowledge and observation into 'mainstream' forecasting processes?

Weathermen
Rain making at Boulia, Roxburgh, Lake Nash and amongst Kalkadoons, and thunder and lightning making by Kalkadoons.

From:
Roth W. 1897. Ethnological Studies among the North West Central Queensland Aborigines. Queensland government, Brisbane & London.
Pages 167, 168, Chapter 12
Rainmaking, Thunder, and Lightning-Making

The miorli men at Springvale or the Diamantina Gates execute a dance and song to bring rain.
The rain stick (*koo-roo-mun-do*) is made of a thin piece of white wood about 400mm long. Three pieces of white quartz are glued on the end. Beard hair is added and further embellished. More than one stick may be used. Around midday the men go to a secluded water hole where preparations lead to the dance. When the rain falls the koo-roo-mun-do is removed. In the heavy floods of early 1895 the author was assured that all the rain and water was produced by the miorli men. The author notes a variance of this ceremony at Rosburgh at Headingly, Lake Nash Leichardt-Selwyn district.

From:
Roth E 1903. North Queensland Ethnography: Bulletin No. 5. The Northern Protector of Aboriginals, Queensland. Home Secretary's Department, Brisbane.

Superstition, magic, and medicine
Page 8, # 10.

Thunder, Lightning and Storms.

Thunder is the most potent agency known. Thunder and lightning made men and women. At Cape Bedford thunder can produce lightning by the rapid exposure of his generative organ. These stories from north Queensland show that the Aborigines in the early 1900's often believe that men can make thunder and lightning. On the Bloomfield River storms are made by killing a particular kind of lizard. There are other ways of interfering with nature which cause lightning and thunder. Storms can be started and stopped by men. This book has great detail about power and ceremony, but does not have stories of prior extreme events. If you are interested in ceremony, read this book.

People from the Cairns area
From:
Moyle AM. c1970. *Introductory Notes to Songs from Yarrabah*. Canberra: Australian Institute of Aboriginal Studies.

"People of the Kurakulu or Kuraminya moiety" (exogamous groups), "occupied the shores of Mission Bay (*mira wungala),* Palm Beach *(giriga)* and Turtle

Bay. To the Wet Season division belonged water, cloud, rain, thunder, shark, 'alligator' (crocodile), water snake, eel, wild duck, white timber, and other light-coloured things; to the Dry Season division belonged subjects such as rocks, clay, fire, grass, kangaroo, emu, pelican, sun, star and wind (McConnell, 1935)."

The power of the Mornington Island Weathermen

From:
Trezise P. 1993. *The floodmakers of langu narnji (Mornington Island)* in (Ed) P Trezise *Dream Road.* Allen & Unwin Pty Ltd. NSW.

Chapter 7

The floodmakers of langu narnji

This story is about the Lardil peoples of Mornington Island. The stories were gathered by the author in 1964.

"The tidal influences in the Gulf of Carpentaria are similar to those in the Gulf of Mexico, there being usually only one high and one low tide in each twenty-four hours. During certain phases of the moon the tide may 'double', and may also remain high or low for longer than the average period. Strong winds also have a marked effect on the tides; a strong persistent south-easter may create an abnormally low tide in southern reaches, whereas a strong northerly wind, usually associated with a cyclonic disturbance, may cause the tide to back up in southern reaches and cause extensive flooding in low-lying areas."

"The Lardil" of Mornington Island "have many legends of great floods that occurred in the past. One story relates that during one great flood only the trees on low ridges of Forsythe Island remained above water, and the Jungarl people survived by tying their rafts to the trees. On Langu Narnji only the top of a twenty-metre-high sand ridge could be seen.

In 1948 a tidal surge which rose three metres above king tide level was said to have been caused by Shilling, a Lurrumbanda man, who, after a quarrel with the missionary, had gone to Langu Narnji to make a flood in revenge."

"The Lurrumbanda say they were blamed by surrounding people for every flood which occurred, whether they had made the flood ceremony or not, and united war parties often came to attack the Lurrumbanda after disastrous floods. The Lurrumbanda exacted tribute from adjacent island and mainland clans by promising not to cause any more floods."

"The floodmakers do not speak as they rejoin their families to prepare for the coming flood."

"The flood may come in different ways, it may come as a giant tidal wave in clear weather, or as a series of tides, each mounting higher and higher; but it usually comes with a cyclone. The first sign from Dewallewul may be a large ring around the sun by day, and the moon at night.

Then the air becomes hot and still. The clouds become denser and darker, and the wind begins, soft and sighing at first then becoming stronger and more gusty by the hour. The rain commences and increases to a steady downpour. Gusting winds get stronger, then cease abruptly and the moaning roar of the next gust can be heard coming far off. Finally a distant roaring is heard, getting louder and louder until a powerful wind engulfs the whole island with horizontal rain and a thunderstorm roaring as it smashes all the trees. It may last for many hours and all the people can do is roll up in paperbark and huddle together on the ground until it is over.

Due to a much lower barometric pressure, the main flood surge is contained within the central eye of the cyclone, and if its arrival coincides with a king tide it produces a flood from which nightmares and legends stem.

When the people consider they have caused enough trouble they have a meeting and ask the flood men to stop the storm. They gather up stones on the beach, make a big fire and heat them. When the stones are very hot the flood men rake them out, and using bark to protect their hands, pick up the stones one at a time and run down the beach to cast it into the tunnel of a wave as it curls over to crash on the beach. They continue until all the stones are gone and the waves know they must go back."

There are or were many Aboriginal groups who could exercise control over the weather (ie Mornington Island), but the following story gives one of many spiritual or Dreamtime explanations of the weather, particularly heavy rain. With much time for contemplation, and the human desire to explain every-thing (the modern approach it through science), there are Aboriginal stories explaining just about everything:

Making humans, getting children and causing flooding rains
From:
Mowanjum. 1980. *Visions of Mowanjum: Aboriginal writings from the Kimberley.* Rigby Adelaide.

Elkin Umbagai
The Spirit Water P 77.
Wandjina, or Ngarjaia made the world and everything in it including man and woman whom he made from two of his own ribs, one large and one small, which he threw into two separate pools in which they were created. Man went back to the pools in his dreams to get children, to give to woman, to bring into the world.
"When a child is stolen from the pool, both the Snake," which protect the child spirits of the pools, "and Wandjina are angry, and the water is stirred up to form clouds. Then there are always big rains and floods during which Wandjina and Wundgudja, the Snake, think they might find the spirit child and bring it back to the pool."

Second story group – extreme impacts and older people

From:
Napurrurlarlu NO & Jakamarrarlu NP 1988. *Ngawarra-Kurlu*. The flood. Yuendumu B.R.D.U. Darwin. p19.

Ngawarra-kurlu
The Flood
In this story an old Aboriginal man has a dream of a big flood. He tells all his people of the dream and that they should not sleep in the creek but they don't listen to him. He leaves to escape the flood. When he comes back after the flood there is no one around. During the night it rained heavily a long way up river. When the flood waters reached the camp all the people in the creek bed had to run to higher ground in the middle of the night leaving all their belongings behind. If they had've listened to the old man they would not have lost all their stuff.

Tsunami?

From:
Utemorrah D & Clendon M. 2000. Maambulbarda. Eye-of-the-sea.
In (Ed) Kimberley Language Resource Centre*. Worrorra Lalai. Worrorra Dreamtime Stories*. Kimberley Language Resource Centre. 113.

Eye-of-the-sea Pp 95
A long time ago a woman lived in the Montgomery islands with only one son. She was persuaded to let her only son go fishing with others. The son was washed overboard in a storm and drowned. She was very distressed and sought vengeance. " 'Karraai! Karraai!' she cried. 'My only son, why did they let him die?' Then she thought, 'So what can I do to them?'"

There was an Eye-of-the-Sea which she decided to stab. At night when the others were all asleep she paddled out and, stabbing the eye, caused the sea to rise "boiling up after her."

She climbed a mountain while nearly all the others were drowned by the rising sea. Some escaped and climbed the mountain too. When it was all over they stabbed her with many spears. Then they left and she is still there, on top of Mt. Wundamarro.

As with a further example about Lake Gregory, this is a version of the previous story, to show how the telling may be different, but the message is the same for oral history.
From:
Mowanjum. 1980. *Visions of Mowanjum: Aboriginal writings from the Kimberley.* Rigby Adelaide.

The Woman Who Destroyed the Old World
Near Montgomery Island, [generally north of Broome, Western Australia, now with a large Aboriginal Reserve on the mainland to both east and west], people could live all year round as there was plenty of food. An old woman and her people lived there hunting and fishing. Her husband would not share his food with her so she went to live alone vowing to "destroy these people, because they don't give me any of their meat."

She set out in her canoe. At two blow-holes on the reef "She picked up her wooden spear and stirred and poked the waters with it. Immediately the waters started to bubble and rise. She walked across the reef and climbed the highest hill she could see. The water rose and rose and flooded over the land.

Some of the men saw the woman on the hill and decided that she was causing all this trouble. They chased her with their spears and killed her. But they were too late - everyone was drowned.

And that is the story of the great flood. Even today our people are afraid to go near that place where the waters boil over."

Flood

From:
Robinson R 1968. *Aboriginal Myths and Legends*. Sun, Melbourne.

The Flood and the Bird-Men
Related by Kianoo Tjeemairee, Murinbata tribe. Pp 85.

"This Northern Territory narrative tells of the time called Kardoorair, which means 'at first all things were men'. It tells how a heavy and continuous rain fell day and night until the land was flooded by both the rain and the rising of the sea."

During Kardoorair, "a big rain began to fall. It fell all night, all day, all night, all day." It didn't stop and "covered all the country, the hills, the trees, everything. There was only water."

From:
Unaipon D. 2001. *The flood and its result.* Edited by Muecke S. & Shoemaker A. Legendary Tales of the Australian Aborigines. Melbourne University Press.

The flood and its result is a flood story of the Berrwerina people of Darling River.

The flood and its result
A long time ago there were so many families of animals they found it difficult to live together and so they had a great conference to try and address the situation. One particular tribe related to the reptiles had rainmaking abilities and their "totems were the elements Lightning, Thunder, Rain, Hail, and Wind. They were becoming important. They resolved that they would not consult anyone, but act as they pleased. This selfish family was the Frilled Lizard. They sent representatives to various parts of the country with the instruction: 'On days and evenings of the week preceding the new moon, let every Thunk cum bulli (Lizard) begin the singing of the Storm Song.'

And when the time arrived, they took their flint knives and cut the body, causing the blood, and then they smeared the body with fat and red ochre and daubed the face with pipe clay, and then began chanting their prayer song, pleading that the Great Spirit of the Lightning, Thunder, Rain, Hail, and Wind should grant this their humble request:
'Come oh Thildarrin (Lightning), come oh Rroararund (Thunder), Pa noondi and Miyundi, come with all thy force and destroy the Platypus family, they have become too numerous and they are more easily overtaken in the flood than any other tribe.'

And they sang and sang their song of the Storm until the last few days and evenings before the appearing of the new moon. Then great dark clouds began to mantle the clear sky, and out of the black cloud the lightning flashed and rent the darkened sky and earth, and struck terror into the hearts of the Animals, Birds, and Reptiles. And the thunder roared its reply to the angry lightning flash, and the winds came hurrying, all in response to the thunder's voice, tearing the limbs from the huge towering gum trees, uprooting smaller trees and shrubs, strewing them along its path, driving the rain and hail into every hiding place of Animal, Bird, and Reptile.

When the Bird tribe saw what was coming, they took to their wings, and mounted upon the wind, up and up, until they were far beyond cloud and storm, into lands beyond the sea. The Animals struggled into the blinding storm, seeking shelter up and up, dodging behind the trees and rock boulders of the mountain-side, until they reached the summit, seeking a place of safety. Thus ended the conference with no satisfaction but desolation and death.
It rained and rained. The valleys and low-lying countries were deluged, life living therein was nearly all destroyed in the great flood."

From:
Greene G., Tramacchi J. & Gill L. 1992. *Roughtail: the dreaming of the Roughtail Lizard and other stories told by the Kukatja*. Magabala Books, Broome.

Kalpartu the Dreamtime Snake

[From Billiluna country south of Halls Creek. Kalpartu the Dreamtime Snake is a flood story, recounted in English and Kukatja.]

"The Willy Wagtail man came for a visit but the people tried to keep him out of the dances. They teased him and made him feel unwelcome.
So Willy Wagtail man went for help to his cousin brothers, who were Dreamtime snakes.

You know what they did?

The snakes surrounded the dancers. They made a big flood, which killed all of the people except for one, who changed into a white corella. Now you can see these white corellas. They stay near the rockhole. They are the people who lived there in the Dreamtime."

Flooding of Sturt Creek and Lake Gregory

Compare the following 'Law from the south meets law from the north' with the oral version supplied to Goudie given at the beginning of this section.

From:
George Nunkiarry, Jara. 1996, Gurliliyin, gayiliyin mitim traibul lo -
Law from the south meets law from the north. In (Eds) Hunter A and Bin Salleh R, 1996. Moola *Bulla. In the shadow of the mountain.* Kimberley Language Resource Centre. Magabala Books, Broome WA. P 258.

"In the Dreamtime there came a huge flood from the east. It brought my ancestors from the east to Lake Gregory. It came downstream straight for where Inverway Station now stands. The flood came from Gulbulundu and headed down towards Birrindudu. It filled Sturt Creek to overflowing. Just the tips of the river gums along the bank stuck out of the water. White people, if they had seen it, would have said it was just like a tide coming in. From bank to bank it swept down to where Gordon Downs is today, to the south of the river. As it ran it met up with other floodwater from the north and west. That was where the crocodile and the goanna fought over their teeth.

The flood kept sweeping downstream and met smaller floods at Bindi Bindi or Sturt Creek Station. It filled up all the big waterholes along the river as it passed by Sturt Creek Station. As it went, the flood swept up birds of all kinds, ducks, guluyu – bush fowl, white people call them. It swept them all downstream towards Lake Gregory in the south, where two pelicans saw the flood and all these birds approaching. One of the pelicans said, 'I'll go north

and meet all these birds and bring them into the lake.' We say dabarunga but white people say pelican.

The two pelicans came up from the south and met the duck, and the bush fowl, and the brolga, and all the other birds caught in the flood. And that is how tribal laws from the south and the north met at Lake Gregory. In the Dreamtime the two pelicans brought all the birds together at Lake Gregory.

Billiluna used to be beside the lake; Billiluna old station, which we call Warngu. They moved Billiluna north to the higher ridges, and they built new houses. It used to be much closer to the lake. From Warngu, in the Dreamtime, two white dogs started to chase an emu. They chased it for along way to the west. White people might say they chased it for twenty or a hundred miles. We just say that they chased it for a long way west.

After some time, the emu started to swing around and run back the way it had come. Back towards the lake which is called Barugu. Finally, at the lakeside, the dogs caught the emu and cooked it and ate it. You have to remember in all these stories that the animals in those times were like people. After that the lake began to fill up from the south bank to the north. Barugu is huge. It might stretch as far as from Old Town to Palm Springs 1. To go around it is like going from Halls Creek to Fitzroy or perhaps to Wyndham.

Well, the whole lake started to fill up. White people would say it is like an ocean. We went round it once and it took us two nights camping to get around. My grandfather, grandmother and my father lived there and that is where they are buried.

The Sturt Creek is a central link for the desert communities in the East Kimberley. It is now common knowledge around Mulan that if the early floodwaters were a milky colour passing through the Balgo area, it means a major flooding rain north, about 5 days earlier, and the creek would probably stay up for months. If the water was red, it means local rains (from the smaller, near catchment), so the creek would probably go down again in a few days.

Floods and discipline lessons for children

From:
Mowanjum 1980. *Visions of Mowanjum: Aboriginal writings from the Kimberley.* Rigby Adelaide. Page 46, 47 and 48

How The People Were All Drowned

In Aboriginal Dreaming a tribe called Dillangari from NW Australia had huge dogs "as big as calves." Wandjina didn't want the dogs to talk and if they did he would drown everyone.

"So parents were very careful to tell their children never to tease a dog." The tribe went to hunt at a place with plenty of food, the men telling the women to make sure the children didn't tease the dogs, "and the women gathered the children together and warned them, 'First of all, you must not hit any special bird which belongs to Wandjina, such as Dumbi, the Owl. If you do, the Wandjina will send rain and storms and we all will be drowned. And the second thing is that you must not tease the dogs. Don't try to make them talk like us because Wandjina has told the dogs that they are only allowed to bark.'

The children asked why they couldn't play with the dogs, and the women answered, 'If you do, and a dog answers you, we will all be swallowed up by water. No one will survive. The Wandjina will cause the water to rise and drown us all.'"

Some of the women went to gather waterlillies leaving the children who began to tease the dogs. "Suddenly one of the dogs answered back, speaking like a human.

As soon as that happened, Wandjina caused the whole tribe to disappear under the ground and under the water. Only the Wandjina themselves were left."

From:
Utemorrah D and Clendon M, 2000. *Dumbi the owl*. In (Ed) Kimberley Language Resource Centre. *Worrorra Lalai. Worrorra Dreamtime Stories.* KLRC. Halls Creek WA Pp 113.

Dumbi the owl Pp 5

Young children were told not to torment the owl. One of the boys decided to kill the owl. Others tried to stop him but he climbed into the tree, grabbed the owl, pulled out all his feathers and threw him down. They stabbed the owl and tormented him in many ways. The Wandjina (spirit being) wanted to know from the owl what happened. When the Wandjina found out he decided to punish the children by getting rain. He got the dragon lizard to go out into the plain and wave his arms around to bring all the clouds. The dragon lizard did that. The rain and lightning came. That scared the children. Their parents

came back and asked, ‘What’s this rain doing,’ and figured out what had happened. The children said, ‘We were only playing with the owl.’

‘Well we told you and told you, when you see the owl you mustn’t hurt it. But you just wouldn’t believe us.’

The rain kept falling. The rain fell and lightening fell all around them. They swam about in the floodwaters, trying desperately to climb up into the highest hills. But the flood rose up higher and they all perished.” Only two children survived by climbing onto a kangaroo, but “the Wanddjina destroyed all the other people. They all drowned and the land was left empty”.

Lightning

From:
Ellis J. 1991. From the Dreamtime: Australian Aboriginal Legends. Collins Dove, Melbourne.

The lightning man
A lightning man called Wala-Unayua lived deep in a waterhole in the Liverpool River in Arnhem Land. Local people knew he was easily angered and would strike people down with lightning. “He was at his most dangerous, however, during the wet heat of the monsoon season. As soon as the monsoon rain began to fall, Wala-Unayua would fly into an uncontrollable rage. In that rage he would travel across the sky, hiding in thick clouds, and his angry voice would thunder, crashing and echoing across the land.

Flashing the lightning of his long arms and legs he would savagely attack the earth, throwing down the trees and leaving a stricken landscape in his path. As soon as the monsoon season came to an end he would gradually become calmer, eventually returning quietly to his own waterhole. There he would stay, always on the watch, ready to strike out again if anyone or anything dared disturb him.”

From:
Roe P. 1983. *Duegara* in (Ed) Muecke S. *Gularabulu: Stories from the West Kimberley.* Fremantle Arts Centre Press.

Duegara
“’All right that old man said no more he –
he don’t want any trouble –
no fight no nothing-
so you keep the woman’-
‘Aah all right’ he say –
but this man know too –‘”

“’oh big rain you know cloud coming up –
biig cloud –
biig cloud –
soon as he come close you know ooh lightnings

everywhere –
biig lightning –
strike everywhere –
“Oh we better rush back” these fellas said –
big rain comin’ they had lotta fish too –
they all run back this five man –
and five woman there too –‘”

“’so this lightning now –
rain rain rain rain rain jus’ pouring –
now ONE LIGHTNING COME –
he strike –
he strike right underneath this woman –
you know ah –
lift ‘im up –
chuck ‘im outside –
pieces and guts head –
oh liver heart everything –
aall pieces everywhere –
and this woman was in the middle –
this two –
four woman here you see they put ‘im in the middle –
but the lightning come from right underneath him –
lift ‘im up just chuck ‘im through the door in pieces and
finish – ‘”

Nearly all the above stories directly describe a major event of some type – flood, cyclone, tsunami, thunder or lightening. They too nearly all have a morality play or lesson attached, with death for the disobedient or those lacking in morals. They are included in this study as an anthology, a record, and to show that, along with clear geomorphologic evidence (ie Bryant and Nott 2001) about the realities of prior extreme events, the stories strongly support the idea that there will be more extremes – reinforcement of the ‘not if but when’ precautionary approach to preparing for impacts of extreme natural hazards.

The next Section moves into the period of recorded history in Australia, from the wild weather extremes of the Darwin area in the early 1800s, through the formation of BoM in 1908 to two highlights, and sets of lessons for planners and weather information managers from extreme events in the north during 1974.

Section 7
Extreme weather impacts - recent

The lessons from the following are developed though the remainder of the report. Since these documents were generated, by 2004 we have fantastic and reliable extreme weather information sources, giving us workable lead-times for physical responses on a community, family and personal level to ensure relative safety.

We learned much from the Brisbane floods of 1974. Much of our current procedures and approaches seem to stem from the national extremes of 1974, especially Cyclone Tracy. In reports there are themes of needing more knowledge about the vulnerable public, greater community awareness and involvement in the preparation of their own safety; of their own community's safety.

This resonated, as if news, at the National Disaster Conference in Canberra in 2003 - http://www.ema.gov.au/ema/emaInternet.nsf/AllDocs/RWPCF58C27A2F8961D3CA256CDF007BD1AC?OpenDocument . We are progressing into the realm of 'Safe, aware communities' more than indicated in 1981 by the surveys conducted after the 1974 Brisbane floods. However, when I surveyed post flood 'victims' in Cloncurry in early 1997 (King and Goudie 1998), the most common responses were that flooded residents thought '..the flood would not get me.' Most were aware of it, watching and drinking beer on the Saturday afternoon.

Emergency managers are vested with the responsibility of 'educating, preparing and helping', but BoM have the unique role of informing people of the likely severity of an extreme weather impact.

Major natural disasters cause major stress. The Cyclone Tracy report (below) shows that encouraging families to keep together should be part of the information in the blurry boundaries between where BoM have done their best to warn and inform, and the various SES are helping motivate people to act in a precautionary way with safety and wellbeing central to preferred behaviour.

The following gutsy reports of the 1800s and early 1900s, and development of BoM from then onward reminds us how timeless and devastating are the extremes of nature; how long we have been developing ways to 'read' and convey information about extreme weather.

Recorded history of cyclones in Northern Australia

From:
Larrakia 2001. *Saltwater People: Larrakia Stories from around Darwin.* Larrakia Nation Aboriginal Corporation, Casuarina, NT.

1897 Cyclone killed many Chinese and Aboriginal people in Darwin.
1905 landslide destroyed the Lameroo Beach camp.
1931 Reported from the S.A. Advertiser 31/3/31 the Larrakia theory of the cause of the earthquake. "At Casuarina is a large stone close to the sea. They believe this to be the King God, the first Aborigine and the creator of all others. Occasionally the tides reach up to the stone, and the aborigines state that the King God must have turned over in his sleep – 'big fish been bite um', thus causing the earthquake."
1973 cyclone destroyed Kahlin Aboriginal compound near Ludmilla Creek.
1942 Bombing resulted in the evacuation of 'mixed descent' Aboriginal people to SA and NSW and 'full descent' Aborigines to camps south of Darwin.
1974 Tracy. "The Larrakia say that this cyclone was made by the anger of Daribah Nungalinya or 'Old Man Rock'. He sits in the sea out from Casuarina Beach. No one should damage this rock in any way by chipping off shell fish, turning over stones or drilling holes. It is the body of a powerful ancestor."
Bunji January 1982.
Copy of text of Trevor Reid's and Lorna Talbot's stories of Tracy.

From:
Murphy K. 1984. *Big Blow Up North - A history of Tropical Cyclones in Australia's Northern Territory.* University Planning Authority, Darwin.

Chapter 1
First Experiences
In April 1827 a severe storm hit Melville Island. The following is an account of the aftermath by Major J. Campbell in a report to the Colonial Secretary.

"My returns of the 24th of March will show the then state of the gardens, but I am sorry to state that our exertions have been nearly all rendered vain by a very severe gale or tempest on the 2nd of April, accompanied with torrents of rain. It commenced a little after midnight on the first, and lasted without any abatement of its violence until after sunset on the 3rd. It threw down all our fences, either broke or rooted up mostly every fruit tree, destroyed a great part of our only present vegetable, the Bringit, completely destroyed all the corn that was planted in November and December, and unroofed all our huts and sheds. The sea rolled in with such violence that it swept away the wharf, foundered and deprived us of a new boat, and stove in the bottom of our only remaining one. I am happy to say that neither the Anne or Isabella sustained any injury, although the latter drove within a few yards of the rocks."

On 24th November 1839, just twelve months after the establishment of the township Victoria it was devastated by a severe tropical cyclone. "The wind was rising to a tremendous hurricane from the east, …the seas thundered,

…with the barometer plummeting to 965 millibars and the hurricane reaching its peak."

"The wind shifted to all parts of the compass before tearing in with renewed vigor from the north."

In November 1839 a similar event occurred at the Victoria Township of Port Essington when a severe tropical cyclone devastated the town killing 8 people.

"The scene ashore at the" Port Essington "settlement was one of complete devastation. Everywhere the trees had been either uprooted or stripped of their foliage. All the gardens lay in ruin, and many of the stores and provisions had been lost or rendered useless, including those previously salvaged from the wreck of the naval storeship *Orontes.* The cottages were either levelled to the ground or left uninhabitable by the tempest. The solidly built pier was totally destroyed, as was the newly erected church. The Government House, a sturdy building on stone piers, had been bodily removed about nine feet from its foundations. Most other buildings were demolished or badly damaged. The boathouses were gone, and of the twenty boats between the settlement and the ships-of-war, only the whaleboat and gig aboard *Britomart* remained."

In January 1882 at Palmerston another tropical cyclone passed by.

"..The barometer continued falling rapidly, and at three p.m. on Monday stood at 29.351, (994mb) the lowest we remember having seen it in the Territory. About this time the wind veered round to the west and west-southwest, and the gale reached its height, blowing with terrific squalls of almost hurricane force."
"The rainfall for the next three days was nearly nine inches."

Chapter 2
The Great Hurricane
In January 1897 Hugh Christie, the head lightkeeper of the Charles Point Lighthouse, near the town of Palmerston, Port Darwin, recalls the frightening events when the eye of a tropical cyclone passed over Charles Point.

"The wind however became stronger as the night advanced, and at 8pm the barometer was 29.20, at this time I went down to see the dinghy, but could see nothing, the tide being too high. At 10pm I attempted to go down again, but was fairly beaten back by the force of the wind, the glass had then fallen to 28.60, branches of trees were flying about and the houses as well as the lantern were wet with rain driving in."

And later "…when shortly before 3am the full force struck us, the front part of my roof with verandah was torn off and thrown over the cliff into the sea. The ridge of 2nd keepers cottage torn off and every house was filled with water.

Inside the house was a chaos of flying books, papers, photographic items etc. and outside was flying iron, stones and trees. I made for the lighthouse and had great difficulty in getting to it.

The 2nd keeper I found holding on to the lamp cylinder to prevent it being broken by the violent vibration of the structure. The way it oscillated was alarming, and our greatest anxiety was, that the Lens would shake out of their settings. However, I am glad to say, the lighthouse is not injured…."

And in the Northern Territory Gazette reporting on the same event it was written that: "The cyclone reached its highest pitch between 3.30 and 4.30, and in that hour it was impossible for human beings to stand erect against it. The crash of buildings and rattle of iron and timber falling about, combined with the blinding rain and roaring of the tempest, was an experience which those who underwent it will never forget to their dying day. Strongly built houses collapsed like houses of cards; roofs blew bodily away; lamp and telegraph posts were bent or torn up; immense beams of timber were hurled away like chaff; trees were uprooted; in many instances large houses were lifted bodily from their foundations and deposited ten and twelve feet away; and in short the night was one of terrifying destructiveness that made the stoutest heart quail. How it was that hundreds were not killed outright is one of those inscrutable mysteries which will never be explained..

When daylight broke on Thursday morning the scene presented was one of indescribable chaos and desolation. Words cannot do justice to the awful spectacle of ruin and devastation. Nothing but jumbled up heaps of broken and twisted material represented what the day before were comfortable and in some cases handsome buildings…."

In 12 hours "rain recorded was 11.670 inches (296 millimetres)….."

"The town of Palmerston lay in ruins," and in the days that followed, the towns' residents, due to being "homeless, and with poor hygiene and saturated clothing," "began to come down with fever."

Of the 28 people who lost their lives during the cyclone most were killed by the fever and 15 men died on the vessels that were sunk or stranded in the harbour.

Chapter 3
An Active Decade

"A significant event, in the context of this story, was the establishment by Act of Parliament of the Bureau of Meteorology in 1908. At this time the responsibility for matters meteorological in the Northern Territory was transferred from the Government Astronomer in Adelaide to the Commonwealth Meteorologist in Melbourne.

Reports of tropical cyclones during this decade are practically non-existent. However the next ten years, from 1910 to 1919, was a very active period. At least seven cyclones affected the Darwin region, and three severe cyclones came within 70 kilometres of the town. "

There are many accounts of cyclones.

Chapter 8 explores the evolution of a cyclone warning system. In the early 1900's there was little information that could be placed on weather maps. The use of radio during the 1920s meant that isolated communities could be linked through to the Bureau of Meteorology. Daily forecasts in Northern Australia began in 1925. The first flight between England and Australia in 1919 laid the foundations for much air travel including the development of the Royal Flying Doctor Service. This in turn generated the demand for improved weather services in the north.

More weather stations were steadily put in during the 1930s. during the second world war BoM came under the control of the RAAF, increasing their study of tropical weather systems. In 1958 the first weather radar was commissioned at Darwin Airport. In March 1963 the Northern Territory Division office was opened. In 1965 the Darwin Tropical Cyclone Warning Centre was established . The network has only grown since then.

Chapter 9 describes Cyclone Tracy in fine detail. About 70% of all homes suffered serious structural failure. In the northern suburbs all homes were destroyed. The book continues in fine detail to describe cyclone Kathy in 1984. Murphy notes that many cyclones have their genesis in the Gulf of Carpentaria.

Learning from Cyclone Tracy[1]

The following builds on the work already reported and considered above. The key issues were preparedness, effectiveness of information-sharing and warnings, effective and timely mobilisation of those likely to be threatened, and learning what has improved in the past thirty years. Now we have mobile phones, the internet, satellite and radar images accessible by 'the public'. We have high resolution predictive weather modelling. The key issues, however, remain in front of disaster managers in 2004 and beyond: 'information hoarding' by some Authorities and complacency by just about everyone remain as challenges.

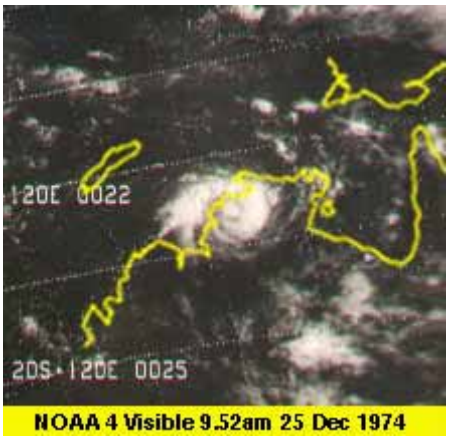
There are detailed web sites on Tracy; perhaps the most authoritative is from the Darwin library: http://www.ntlib.nt.gov.au/tracy/advanced/Cyc_Tracy.html With its iconic image of devastation:

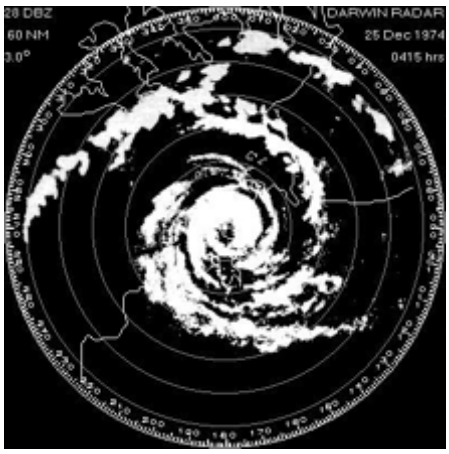
[1] **Vital Statistics of Cyclone Tracy**

Size	Gales extended to about 40 km from centre
Diameter of eye	About 12 km at Darwin
Maximum Wind Gust	217 km/h before anemometer ceased functioning
Central Pressure	950 hectopascals
Storm Surge	1.6 metres measured in harbour, 4 metres estimated at Casuarina Beach
Rainfall	255 mm in 12 hours overnight
Death Toll	65 people
Injuries	145 serious injuries, over 500 with minor injuries
Number of Houses Destroyed	About 70% of houses with serious structural failure
Total Damage Bill	Up to $800 million (1974 $s)

From: http://www.ntlib.nt.gov.au/tracy/advanced/Met/Stats.html

Figure 7.1 Darwin devastation – Cyclone Tracy





Cyclone Warning issued by the Darwin Tropical Cyclone Warning Centre at 2.30 am 25/12/74.

To understand something of the human impact of a major Cyclone, imagine being in Darwin on Christmas morning 1974:

'Galeforce winds commenced in Darwin around midnight, and increased to a peak after 3am. The last warning was issued at 2.30am before both radio stations ceased transmissions.

At 3.05am a peak wind gust of 217 kilometres per hour was recorded at Darwin Airport before the anemometer recording system failed. Between 3.50am and 4.25am the eye passed over the airport after which the wind resumed its previous intensity this time from the southwest. By 6am winds were abating in Darwin.

The last radar image before tracking ceased shows the eye overhead. The morning satellite picture shows Tracy overland near Humpty Doo.

Tropical cyclone Tracy was located by radar at 2 am CST 18 km west north west of Darwin moving east south east at 6 km/hr. The eye of the storm is expected to move over Darwin soon. Winds should become lighter to calm for

a period up to 1 and a half hr before rapidly strengthening to its previous intensity from the opposite direction'.

From - http://www.ntlib.nt.gov.au/tracy/advanced/Met/25am.html

Table 7.1 shows that the research headed by Chamberlain into the human impacts of Cyclone Tracy stratified interviews with over 400 people who were in Darwin on Christmas Eve 1974 into people who evacuated, never to return to live in Darwin, evacuees who did return, and those who stayed through the cyclone's fury. It also shows that most people only learned about the cyclone within 9 hours of landfall. The central task of this 2003/04 research is to see how to best convey warnings in a timely manner.

Given the brief nature of effective warning to most respondents, it is not surprising that about 30% of respondents made no special preparations (Table 7.2), although about the same percentage did at least some of the following: secured loose items, while about 16% attempted to improve the resilience of the building, and about 22% looked after their food and water needs. Generally, less that 10% had followed a set 'cyclone drill'. Given that 65 people died, over 700 were injured and the resultant state of much of Darwin (Figure 7.1), in this instance, the CDS model for 'threats with warnings" (Figure 7.2) would suggest that major evacuation would have been the safest action, but of course the key questions are always: evacuate how, and to where?

Table 7.3 shows what Goudie (King and Goudie 1998) and many others (ie McKenna 1993) find repeatedly in post-disaster studies: the "It will not happen to me" syndrome. In this devastating example, predictable disbelief mingled poorly with Christmas celebrations. Some survivors reporting that it was felt that no calamity could happen on Christmas day – a sacred day. It is interesting to note that the non returnees tended to have received warnings earlier and taken the most internal and structural precautions, while the returnees heard about the severity, prepared and reacted about midway of the three groups. The exception with the returnees is that they tended to be least subject to a false sense of security. Stayers tended to hear last, did the least and took least notice of the warnings. These are indicative generalisations from a fairly small sample. There are many unanswered questions about whether stayers were injured or killed more, if they were in strong houses, or in houses with more protective vegetation (see section of 'Canberra Conference' report, following, for recent research insight into cyclonic protection from trees around buildings).

From:
Chamberlain ER, Doube L, Milne G, Rolls M & Western JS. 1981. *The Experience of cyclone Tracy.* Australian Government Publishing Service Canberra.

Table 7.1:
Time at which respondents first became aware of Cyclone Tracy danger

	Percentage		
Time of Initial awareness	**Non-returned evacuees (n=219)**	**Returned evacuees (n=107)**	**Stayers (n=90)**
By noon December 24	31	27	21
Between noon and 6pm	34	37	42
Between 6pm and Midnight	18	20	12
Christmas Eve unspecified	11	6	10
Don't know for sure	6	9	14

Table 7.2
Extent and nature of precautions taken before onset of Cyclone Tracy

	Percentage		
Precautions	**Non-returned Evacuees (n=219)**	**Returned evacuees (n=107)**	**Stayers (n=90)**
No precautions taken	26	26	34
Internal precautions – loose items removed from walls, tied down	32	24	25
External precautions – loose items stored away, tied down	30	31	21
Structural precautions – Doors, windows taped, roof fixed	23	12	17
Water and food storage	24	24	20
'Cyclone Drill'	10	8	5

Table 7.3
Evaluation of reactions to warning and reasons for reactions (modified)

	Percentage		
Reaction to warnings	**Non-returned Evacuees (n=219)**	**Returned Evacuees (n=107)**	**Stayers (n=90)**
Warning taken seriously	27	22	10
Warnings not taken seriously enough because:			
Christmas Eve Celebrations	24	28	27
False sense of security – 'couldn't happen here'	22	15	24
Christmas preparations	8	9	10
Not Christmas celebrations but not certain of cause	13	18	18
Other reasons	6	4	5

"Summary and Implications for Policy"

"The most important direct contributor to stress was the disruption of a familiar valued social environment, or its complement, being separated from (often immediate) family and friends and from easy-going social and leisure activities which were such a valued part of life in Darwin before the cyclone. This pattern of results applied both to stayers and evacuees."

"The importance of family and friends in assisting affected persons to cope with disruption caused by natural hazards is well documented. [It is proposed that] the intensification of interaction amongst family members and friends occurs because people, disoriented by a natural hazard, will tenaciously seek out familiar elements in their physical and social environments, and these elements thus assume a greater importance than they had previously displayed."

"The third important group of variables which contributed to stress had to do with personal problems such as nervous complaints, children's behaviour disorders and physical injuries of both adults and children. This relationship highlights the importance of preventative training. Avoiding all physical injuries is almost impossible, but among groups and immediately afterwards, such injuries may be kept to a minimum. The extent of injuries dealt out by Cyclone Tracy was remarkably small, but nevertheless injuries were a significant predictor of stress."

"The analysis presented here did not address the problem of planning for the impact of a natural hazard. The data did not allow measurement of the stress-reducing possibilities for individuals or families of being well prepared, but it does suggest that respondents were not adequately prepared for the cyclone's impact or its consequences. Research elsewhere (e.g. Scanlon *et.al.* 1976) has suggested that preparation on an organizational level is essential for efficiently moving people from their homes, or carrying out an evacuation of an area in extreme circumstances."

"Nervous complaints and behaviour disorders are in part a product of the individual's psychological make-up, but perhaps they could be lessened if awareness of the characteristics of cyclones and their effects was increased."

"There is clear indication that training programs in cyclone-prone areas are needed to advise people of likely events, and of how to ensure the safety and emotional security of themselves and their families, both during and after a cyclone. The task of encouraging individuals and groups to take such a program seriously would be a difficult one since the belief that 'it just couldn't happen to me' is widespread."

"When Cyclone Tracy was imminent (several hours before it struck), only 69% of the sample respondents had heard any official cyclone warnings, although most others had heard of its coming by word of mouth. The cyclone struck in the early hours of Christmas morning, but by 6pm the night before at least 17% of the respondents had not heard that it was imminent. Further, nearly a

third (28%) of respondents said that they did not take any precautions once they had been alerted to the cyclone danger. Seventy-one per cent did not take the warnings seriously enough. Such findings highlight the difficulty of persuading people to treat a training program seriously when danger is not imminent."

"This Figure 7.2
Brisbane flood 1974

From
http://enc.slq.qld.gov.au/logicrouter/servlet/LogicRouter?OUTPUTXSL=object.xsl&pm_RC=PICTQLD&pm_OI=8197&api_2=GET_DESCDOC&pm_RC=PICTQLD&pm_OI=8197&api_2=RETRIEVEINFO&pm_RELAY=PICTQLD&pm_OI=8197&pm_TPX=500&pm_TPY=350&api_3=GET_OBJ&pm_RELAY=PICTQLD&api_4=GET_FILE_INFO&pm_RC=PICTQLD&pm_OI=8197&api_5=COLL_GET_PEERS&LCI=0&num_result=5&REFER=results

From: http://lookingback.slq.qld.gov.au/page.asp?ID=79
Both images © State Library of Queensland

Research suggests that planning for the post-cyclone period is at least as important as planning for the impact. As has been suggested, families and community groups should be kept together wherever possible, but if this is not possible, people need to have been prepared in advance for the effects of separation from family and friends. Maintaining contact, although difficult, should be considered of utmost importance for people who have been separated. When evacuation does not occur people need to be prepared for the social and community disruption which will occur after impact, and which was shown here to be an important contributor to stress."

Detail of the 1974 Brisbane floods[2]

From:
Chamberlain ER, Hartshorn AE, Muggleston H, Short P, Svensson H & Western JS. 1981. *Queensland flood report Australia Day 1974.* Australian Government Publishing Service, Canberra.

"The summer of 1973-74 was one of the wettest in Queensland for many years, and in some districts the January rainfalls were the highest ever recorded. Almost every river in the State had been in flood by the end of the month, and in certain areas, especially in the north-west and the Gulf country, the flooding was far more extensive and of longer duration than occurred in the south-east corner. Considerable losses and disruption to normal living resulted, and for some people in these regions the impact of the abnormal rainfall and the consequent flooding would certainly have been as devastating as was experienced when the floods struck the Moreton region in the south-east.

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[2] ***Record Flooding -*** By 26 January flooding was reported in the upper Brisbane Valley, with the nearby city of Ipswich on the Bremer River (Brisbane River tributary) experiencing major flood levels. In Brisbane, periods of intense rainfall flooded small creeks, drains and floodways. These local floods, when added to the rising Brisbane River, produced the highest flood levels to date this century, swamping one third of the city centre and 17 suburbs.

Human Toll and Damage - Tragically, 16 people died, 300 were injured and 8,000 made homeless as 56 homes were swept away and 1,600 largely submerged. In all, 13,000 buildings were affected with insurance claims totalling about $328 million (1997 values), but this figure reflected only 'rain damage' and special commercial cover as domestic flood insurance is not generally available. The total estimated damage cost was in fact $980 million, with road and bridge repairs alone costing $112 million (1997 values). At the height of the flood, even ships, including a large oil tanker, were torn from their moorings on the river and damaged. At the same time, throughout south-eastern Queensland and northern NSW where every river was in major flood, the total damage bill (including Brisbane) was a staggering $2,200 million (1997 values).

From:
http://www.ema.gov.au/ema/emaSchools.nsf/AllDocs/RWP8829DA52178627DECA256C5D000362C6?OpenDocument

However, the south-east corner is the most densely populated area in the State, and the number of people affected by the flooding in the Brisbane River system was far higher than in all other areas put together. Insofar as the magnitude of a disaster is measured by the number of people who suffer ill effects, it is therefore not surprising that attention focused far more on what was being experienced elsewhere. Some indication of the seriousness of the flooding in Brisbane may be seen in the extent to which it was reported overseas. In Britain it made headline news, and actually held one of the top places in BBC news reports for three consecutive days!

As already stated, the summer was an abnormally wet one, with extensive cyclonic depressions bringing flooding to many parts of Queensland, but it was not till late January that the Brisbane River system was affected, as a result of the activity of the tropical cyclone code-named Wanda. By Thursday 24 January, the cyclone had brought sufficient rain to the Stanley River catchment area to cause flooding in that river. This has officially been recognised as the beginning of the flood period in the Moreton region, though the actual disaster sequence evolved over the seven days which followed, i.e. Friday 25 January up to and including Thursday 31 January. The events of that week and of the immediate aftermath, in the first week of February, are outlined in ensuing paragraphs.

Friday 25 January. By Friday 25 January, there was saturation in the catchment areas of the Bremer and Upper Brisbane Rivers and in Lockyer Creek, accompanied by significant run-off in all three. On this day also the first flash flooding occurred both in Ipswich and in Brisbane. However, at this stage few people would have been aware of the likelihood of river flooding in these cities, or the extent of the potential threat to property and normal patterns of living.

Saturday 26 January. By Saturday 26 January, it was obvious that a major crisis was developing. The Bureau of Meteorology issued warnings of major flooding for the Bremer and Brisbane Rivers, and for Lockyer Creek, and a minor flood level reading was recorded on the gauge at the Brisbane Port Office, with the river height at 3.56m. (The maximum height on the Port Office gauge under normal conditions is 2m). There was further flash flooding in Ipswich and in Brisbane, with the Brisbane River seen to be rising fast. By this time, many people in the areas which were flooded during the next few days had become aware of the seriousness of the situation and thought that their own homes might be flooded. The 1974 household survey, which was conducted as part of this study, showed that, by some time on that day, over 70% of the Ipswich respondents had reached that conclusion. Many other people not directly affected by flooding or the threat of it had also begun to be aware of the serious problem which was facing the two cities, and had become involved in activities aimed at helping flood ‘victims’. Relief centres had started to function and the then Lord Mayor of Brisbane Alderman Clem Jones, announced that he was setting up a Lord Mayor’s Disaster Relief Fund.

Sunday 27 January – Thursday 29 January. The three days from 27 to 29 January cover the period in which the disaster built up to its peak. On Sunday 27 January there were further warnings from the Bureau of Meteorology of increasing rainfall, and major flood levels were recorded at the Brisbane Port Office. The Bremer River peaked at 9 a.m. on that day, but the Brisbane continued to rise rapidly to flood heights approaching those of 1893, the worst ever recorded. The peak came in Brisbane on 29 January, but on that day the Bremer started to fall noticeably. By then both cities had experienced substantial flooding. Many of their residents were in temporary accommodation, having been forced to evacuate their homes with whatever clothing and other possessions they had been able to take with them as they fled from the on-coming flood waters. It is estimated that almost 90% of flood-affected people had moved from their homes, most of them on their own initiative, with some assistance from neighbours, relatives and other people in their area.

In Brisbane at the height of the flood, inner city, near city and suburban areas were inundated and the extent of flooding in private homes and business, commercial and industrial premises was unprecedented. To add to the sense of crisis, transport and other communications such as telephone services were severely disrupted, and large areas were without electricity. There was also some anxiety about the likelihood of food shortages, due partly to the flooding of warehouses and other wholesale distributing points (such as the markets), and fresh pasteurised milk was in short supply.

Wednesday 30 – Thursday 31 January. By Wednesday 30 January the peak of the crisis had passed. Flood levels fell appreciably in both the Bremer and Brisbane Rivers, and inundated areas slowly emerged from the receding waters. The task of cleaning up property and assessing the extent of the damage now began. This was in itself a disagreeable and distressing process; but for many people the distress, which came from re-entering their homes and seeing the trail of havoc left by dirty water and debris of various kinds, was immeasurably heightened by the realization that their household insurance policies did not cover damage by flooding. This meant that they would face heavy costs for restoration and replacements, except insofar as they might be eligible for some kind of government assistance. As a result, considerable interest and attention was focused on government grants – their extent and availability, and which of the flood-affected persons might be eligible to receive them.

There was a good deal of bitterness directed at certain sections of the community who were held in some way to blame for the disaster, or for the severity of its impact on individuals. Among the scapegoats the insurance companies ranked high, as did land developers, who had sold much property in the flood prone areas in recent years.

The general functioning of the city on 30 January was still seriously disrupted. There was concern about the threat to public health and fears that there might be looting of flood-affected property. By Thursday 31 January a week had passed since the first effects of the flood had been felt, and it was clear that

the worst was now over. For the first time in days the river height at the Brisbane Port Office was below 3m, and the threat of further flooding had apparently gone. Attention was now beginning to turn away from the event itself and to focus on its consequences, particularly on the financial costs of recovery and on efforts to alleviate the problems of the people affected.

Government departments, both at Federal and State level, were mobilizing their resources, and a great deal of effort was being put into the running of the relief centres and the collection and distribution of money and goods needed for relief purposes.

CHAPTER 5: PERCEPTION, PREPAREDNESS AND WARNING

In a society such as Australian society at present, where technical knowledge is typically vested in the hands of small groups of specialists, adaptation to environmental hazards has two dimensions. To begin with, the technical experts will have a certain level of knowledge both of the hazard itself and also of the nature of technical adjustments available to deal with it.

When one begins the search for information on the flood problem in Brisbane and other areas in the Moreton region, it is obvious that there is a good deal of well-documented knowledge available, but this technical knowledge is often recorded only in confidential files in government departments. At best, though information may in theory be publicly available, it seems that it reaches only other technical experts who are able to understand and assess it. By and large, it has not filtered through to affected people who may not be experts and therefore neither possess nor have ready access to knowledge of the nature and extent of the hazards in their environment.

Perception of the Hazard

The survey finding on the level of knowledge of the flood hazard among people affected in 1974 indicated that it was very low indeed. In reply to the question ‘Did you know that flooding was likely to be a problem when you decided to move here?’ as few as 27 respondents out of a total of 530 in Brisbane and Ipswich (i.e. less than 6% of the sample) replied ‘Yes’.

Some 111 respondents (21% of the sample) reported having made a check on the possibility of flooding when they moved to the area. Only 23 (4.3%) stated clearly that they had been made aware as a result of this check that flooding might occur in the area. Eighty-one (15.3%) had been advised that their properties were safe from the threat of flood.

It appears that despite a significant flood risk, even in cases where severe flooding is a possibility, the level of knowledge of the problem among householders in the flood plain is low, which contrasts with what is known to be the case with technical specialists. It is evident also that the level of perception of flooding as a hazard is as low even among flood plain dwellers. When asked if they had ever thought of the possibility of being flooded, 77.5% categorically said ‘No’.

A further 8% said ‘No’ and gave reasons or qualified their response with remarks such as ‘We were told we were out of the flood area’. Twelve per cent said ‘Yes’, but many of these had dismissed the possibility as unlikely or unbelievable.

Pre-Threat Preparedness

Few flood-affected people were ‘prepared’ for the onset of flooding. This lack of preparedness was one of the most obvious factors about the January 1974 floods in Brisbane and Ipswich. The overwhelming consideration is infrequency of major floods. Even where flooding is relatively frequent, the extent of flooding in January 1974 was a very rare occurrence.

‘Preparedness’ should be considered in at least two ways. Firstly, one can make the distinction between psychological and material preparedness. Then, one needs to acknowledge the difference between preparations made prior to onset and those which are made immediately before impact.

In the psychological sense, flood-affected people were ill-prepared for the event and its consequences. Some 20% of respondents reported without prompting that they had feelings of ‘incredulity’ and ‘disbelief’. About 15% of the sample said they had been ‘frightened’, or, in a few cases, ‘panicky’. By contrast, many fewer (9%) said they had resigned themselves to the situation, were accepting of it, or accepted the fact that there was little that could be done after the flood had occurred. Clearly people had not expected such an abnormal event, and had little in their previous experience to assist them in dealing with it.

With little difference in knowledge among flood affected people and few variations in the perception of the flood hazard, one would expect little variation in the degree of ‘preparedness’ in a material sense prior to the flood. The data bear this out. As few as 39 respondents (7.3%) reported that they had taken some precautions to protect themselves and/or their property. In some cases, though these measures were contemplated prior to the flood in 1974, they were temporary measures which were to be taken only under immediate threat, for example, sandbagging or evacuation procedures. Very few properties were insured against flood damage and/or losses. Approximately 10% of respondents reported that their homes were insured, but the majority of these were people living in homes they were buying through the War Services Homes plan, in which case it was a requirement of the lending authority.

Post-threat Preparedness

This lack of pre-threat preparedness does not imply that people did not attempt to make suitable preparations in the post-threat period. For the majority of affected people the most significant preparation was to evacuate their homes; 88.3% of the sample reported doing this. Some took this step very early, before flood waters had even entered their property, and were able to leave their homes in their own cars, taking some possessions with them. For others, evacuating their homes was a final expedient undertaken only when safety demanded it. Some 12% of the sample reported that they had not

left until after the waters had entered the main living areas of their homes. They then left on foot or in boats.

About 67% of respondents were able to make preparations immediately before leaving home. Most commonly, apart from taking smaller portable items with them, evacuees stacked possessions above the level they expected the water to reach. Almost 22% of respondents said they made no preparations, mainly because the threat was not recognised in sufficient time.

Perception of the 1974 Threat

There was a good deal of variation amongst respondents with regard to the level of water at the time when they first thought their homes might be flooded. The fact that the physical environment was interpreted as threatening at varying water levels by different people points to the possibility that responses to the threat will also vary. If this is so, problems would surely arise for relief organisations which plan on the assumption that disaster occurs in distinct phases such as 'warning', 'threat', 'impact', 'rescue', 'repair and rehabilitation', which can be defined and recognised.

It should also be noted that the most common 'first flood indicator', mentioned by about 45% of respondents, was 'watching the water rising'. This means that, in the absence of any official warning, response to the threat depended upon a factor on which there is a great deal of variability. Furthermore, the distribution on other items shows that many were inexperienced in interpreting the 'warning' signs. Most commonly, when they sensed the threat, people stacked their belongings above the floodwater level they expected. Yet they listed amongst their major losses such things as soft furnishings, bedding, objects of sentimental value, tools, personal papers, business records – all items which would have been portable, hence able to be saved if a more accurate assessment of the threat could have been made.

Warning

The survey sought to determine whether receiving an official warning (1) made any difference to people's perception of the threat or to their post-threat preparedness.

The results show that, to begin with, only 23.8% of respondents in Brisbane and Ipswich reported receiving an official warning. About 19.4% of the total sample said that an official warning had been their first flood indicator. Most of those who received an official warning did, in the event, experience severe flooding, though they were not necessarily the most severely affected of the population.

Receiving an official warning does not; however, appear to make any difference to the likelihood of making preparations. Realizing the flood possibility and receiving an official warning appear to have occurred close together for most people. Clearly, some respondents realised that their houses would be flooded before they received an official warning, but there were also a few cases in which the respondent still thought the house would <u>not</u> be flooded despite such a warning, and a small number of cases (17),

where householders received an official warning, but floodwaters only entered the grounds and did not reach the floor of the house.

Having had previous flood experience in the same place has meant that people are more likely to have thought of taking some precautions than others who have had no previous experience or who had had flood experience only in another place, but even so, most of those who had been flooded previously had not thought of taking any precautions against flooding. Clearly, neither the known existence of a flood threat nor even personal experience of flooding is sufficient to induce people to take special precautions. Nor do the data suggest that either those who have experienced more frequent flooding in the past or the few who have experienced more severe flooding are necessarily more cautious.

Turning now to the relationships which appear to exist between these groups of factors and 'impact', two clear points emerge.

First, a late recognition of and response to the threat is in many cases associated with a greater personal displacement – longer periods in temporary accommodation, longer time off work, emotional strain and a greater likelihood of dissatisfaction with residential location afterwards. A general lack of knowledge and/or awareness of the problem is also associated with these outcomes. Secondly, in almost all cases, severe flooding (i.e. a very high water level at the peak) bears a noticeable relationship to these factors.

Conclusion

The relative infrequency of occurrence of floods of the magnitude and scope of those of January 1974 is a factor of major importance for planning. Measures for community flood protection seem to fall into the area of developing efficient forecasting and warning systems, since mitigation works to cope with floods of great magnitude are financially out of the question, especially in view of their infrequency. Virtually no one would suggest that such schemes should be undertaken.

The relatively low ratio of cost to benefit for a flood forecast and warning service makes it an ideal flood protection measure in many areas where physical means cannot be economically justified. (Heatherwick 1974)

The infrequency also means that for the threatened population, impact is an unfamiliar event, and they are unprepared both materially and psychologically. The importance of the infrequency factor was also pointed out by Irish and Falconer (1976). They wrote:

A significant difference was noted in the response of people who had experienced the 1974 flood and those who had not… (T)hose who had lived in the area in 1974 were quicker to act once they had accepted the likelihood of danger…(T)he experience of the 1974 flood and the warnings given resulted in these residents having a high degree of awareness and readiness to prepare for the consequent flooding…

The initial reaction of those residents who had not experienced the 1974 flood was to look at the height of the river or creek and suppose it could not rise sufficiently to cause flooding.

Repeated warnings by the Council, by radio and by frequent contact with friends were necessary to convince these people. Even then however they were unsure of what to do. They had no idea of what direction the water would come from or how high it could potentially rise in relation to their houses."

CHAPTER 19: RECOMMENDATIONS

"This study has not resulted in pin-pointing a simple pattern of need on the part of persons affected by disaster. Rather, flood-affected persons exhibited a variety of personal and social characteristics in the face of severe disorganisation. In view of the complexities of designing and providing appropriate and adequate post-impact relief services, it is important to stress the need for broader government responsibility for preventing or mitigating disasters. In addition, however, the fact that a high proportion of flood-affected persons found support in their normal social networks rather than through specially provided services suggests that emergency welfare planners need to find ways of providing services through such normal network channels.

The following recommendations are based on these premises,

1. Prevention

Because of the technical nature and enormous costs of schemes to prevent or mitigate natural disasters in relation to the infrequency of occurrence, it is not realistic to expect the individual householder to take major responsibility which must be seen to lie with public authorities. It is essential that relevant departments at all levels of government assume such responsibility and co-ordinate to provide the necessary funding and technical expertise.

In addition, there should be more stringent regulation and planning of land use, and consideration should be given to the introduction of compulsory, wide-ranging insurance schemes.

2. Preparation

2.1 Since precautions against very severe natural hazards would be prohibitive in cost, even if feasible, efficient forecast and warning systems should be maintained and, where possible, improved.

2.2 All information based on past experience, current knowledge and future projections relating to disaster-prone areas and conditions likely to maximize risk should be public. That is, they should be readily available to householders or intending purchasers of property in the areas concerned, and, more particularly, in the hands of relevant organisations expected to act

in response to disaster such as the Police Department, the State Emergency Services and the Natural Disasters Organisation."

This echoed, as if news, at the National Disaster Conference in Canberra in 2003. We are progressing into the realm of 'Safe, aware communities' more than indicated in 1981 of the surveys post flooded Brisbane in 1974. However, when I surveyed post flood 'victims' in Cloncurry (King D and Goudie D 1998. Breaking through the disbelief - the March 1997 floods at Cloncurry. Even the duck swam away. *Aust. J. Emergency Management.* 4:12 29-33), the most common responses were that flooded residents thought '..the flood would not get me.' Most were aware of it, watching and drinking beer on the Saturday afternoon.

Against this kind of complacency (often based on wrong information), the Tropical Cyclone Coastal Impacts Program Workshop and Safer Sustainable Communities. 2003 Australian Disaster Conference were held 30 years after the 1974 Brisbane floods.

Section 8
Third Millennium approach to hazards

The disasters workshop and conference held in Canberra in September 2003 focused on mitigating the impacts of extreme weather events. They set out to make clear how to best inform people of extreme events we can detect in advance, and how to best mobilise people to act to maximise their safety and minimise their losses. The workshop and conference demonstrated a slow but steady convergence among researchers, emergency management policy makers and practitioners to advocate minimising impacts of extreme weather events by maximising community preparedness. Australia and the Pacific have knowledge, expertise and innovation capacity to work with communities, making them more sustainable in the face of extreme weather threats.

Summary of main points

Broad issues

Cyclone tracking is improving with multiple/ensemble models developing greater resolution and predictive accuracy. Greenhouse gas effects will not necessarily bring more cyclones, but they will have greater intensity with more flooding. Debate over global warming will not cool, with retrospective analysis of 150 years of cyclone records in the US indicating cycles of more intense cyclones about every three decades rather than any recent increased intensity (Ananthaswamy 2003*).*

Jim Davidson put a 1.4m surge height (above MSL) as about a 1,000 year event at Trinity Beach, Cairns. This gives an indication of 'return times' for cyclone surge.

The power of the sea should be taken seriously, with clear evidence of massive inflows demolishing a series of sand dunes in the Port Hedland (NWA) area in cyclone surges of 1999 and 2000. Sand does not stop a seething ocean.

Building strength

Building vulnerability – beware inward openings, under secured rooves and the vacuum effect of cyclones on the upward and down-wind sides of buildings. Rain blowing under flashing into buildings can cause major repair costs from wet plaster and fittings. Exmouth WA was battered by wind gust speeds of 267 Kph during cyclone Vance in March 1999.

Connection strength is vital for cyclone resistant buildings. A building may be blown to pieces because the clips on the tiles were not bent down, or the latch on the door was too weak.

Debris and its impacts are crucial to human safety during a cyclone. Also, public shelters are a vexed issue: from the external fabric, consideration needs to be given to debris resistant openings and good management so these are not compromised. Indicative research from Darwin implies increased vegetation provided increased house protection, via increased surface 'roughness', debris adsorption and helping anchor rooves.

Warnings

Reinforced throughout this report, the workshop participants were told that weather warnings should 'provoke people into doing something', and that agencies need to know that the message is received, understood, believed and confirmed. The information should be personalised and aim to lead to a decision to action.

Remote Australian communities do use electronic media for information and appear well organised to inform other community members of impending extreme weather, then to respond in a careful way. Simplifying the weather information language is supported.

A way of conceptualising and responding to extreme events is shown in Table 8.1. Responses are: stay and 'safely weather out the threat', or head for greater safety, comfortably before the threat hits.

Table 8.1

CDS Evacuation matrix:

responses to threats with or without warnings

A. Threat with virtually no warning		
Land Slide	**Earth quake**	**Tsunami**
Stay in strong structure	Shelter in strong structure	Flee rapidly to higher ground at outflow of sea

B. Threat usually with some warning			
	Evacuation decision[1] – stay or leave[2]		
Threat > Considering V	**Major wind/ Cyclone**	**Fire**	**Flood**
Vulnerability of present environment	If in surge zone or weak shelter, must leave	Consider house material, surrounds, water available. If poor, leave early.	May be inundated, may be cut off
Vulnerability of individuals	Weakest leave earliest	Weak and young leave early	Judgements of flood height
Distance and safety to secure shelter	The further, the earlier	The further, the earlier	The further, the earlier

1 Along with physical safety, community support may alter the decision to leave or stay.

2 People evacuating need to be prepared with a strong knowledge of the escape route as it is likely to be under adverse conditions, and using transport means which are reliable and suitable to the transport task.

The 2003 Emergency Management Conference

Australia's Attorney General told us that Emergency Management of Australia is within the Attorney-General's Department, where it is believed that "foresight and teamwork" are needed for risk reduction, while using land properly and safely, leading to "safer, more sustainable communities".

There is an increased emphasis on 'self-responsibility' if people choose to live in highly vulnerable areas. This is coupled with the need for careful planning, linked with the new reality that our well developed natural disaster response mechanisms provide 'a good foundation' for response to any terrorist attack.

Salvano Briceno, Director, UN International Strategy for Disaster Reduction, told us disaster reduction fell under the heading of sustainable development, and pointed out that there was increased vulnerability with climate change and predicted more extreme events. He felt we should all consider misdirected development which may increase risk. The UN aims to make communities more resilient, shifting the culture from reacting to preventing.

There is the powerful point that if countries remain passive until impact, it shifts costs to post disaster relief from other countries. The inference seemed to be that 'aid' countries should seek mitigation works rather than response support – much the same philosophical shift well underway within Australia.

The UN is advocating that countries develop adaptation strategies for people likely to be impacted by climate change, developing "sustainable, resilient societies". Mitigation of climate change includes reduced carbon dioxide output, and that development and natural disaster risk needs to be re-linked. There is a new advocacy for partnerships, with the UN declaring 2005 – 2015 as the decade of UN "Millennium development goals". That is the kind of language we all need, with time frames to match. Ten years just to plan how we want the direction for the next few hundred to go. There are known forces at play, and predicable outcomes to certain directions. This forethought is to be supported (http://www.unisdr.org/dialogue/).

Salvano mentioned development of a board game, a bit like snakes and ladders, developed to help families with kids to work from "risk-land" to "Safeland" when faced with various possible natural disasters. This idea is incorporated into the recommendations section of this research.

An AusAid representative explained Australia's readiness to act in response to any disaster in our region, including having the RAAF on standby. Government officials spoke of partnerships, of safe, sustainable communities, with non-competitive cultures; that there was a growing realisation of the cost of disasters. We are beginning to take "whole of government approaches", adopting an "all hazard" approach, especially with planning for "large scale natural disasters and high impact terrorist incidents".

In the "Sustainability and Disaster Management" stream, similar language was used: the third millennium language of "Think risk management and the precautionary principle … all hazards approach.. integrated natural resource

management" and the need to understand volunteerism: the foundation of most large scale response. Groups ending in _'care' or _'watch' were probably composed of people predisposed to help their community. There are strong links, perhaps unacknowledged, between emergency management and natural resource management.

Generally, volunteers are getting older, with emergency response organisations possibly combining with fire and ambulance into one extended unit, reducing duplication. At the global level, disasters are now seen as part of human management, looking for a new development paradigm of care and self-help/self-reliance.

There are Socio-psychological strategies to reduce risk. For example, in the Victorian fireguard movement, people work together to enhance their own collective safety. This movement is a resident initiative of neighbours in fire-prone areas, and is supported by the Country Fire Authority. These people-oriented ways of reducing risk have a high likelihood of long term success, with other benefits of increased social cohesion.

Insurance

The Insurance Australia Group takes climate change seriously, with Australia deemed to be the most affected of all developed countries, likely to produce an erosion of insurance cover in vulnerable (coastal) areas. There will be hotter days and bush fires. The April 1999 hail storm in Sydney caused the largest insurance payout ever in Australia.

The IAG is moving to understand the implications of climate change, adapt to those changes, and to mitigate causes, both through education and behaviour of IAG employees, all working to reduce GHG emissions. There may be vehicle insurance based on km travelled, support for more energy efficient homes, reduced car fleet sizes and encouragement for more energy-efficient urban design. All very laudable directions. This indicates that 'the mainstream' is beginning to understand that impacts we each generate add up to an impact that may diminish all future lives. This is a very responsible direction for IAG to take: as responsible environmental leaders.

Insurance is seen by the Insurance industry as the ultimate community product, while withdrawing a 'friction cost'; the core purpose was to 'pay claims'. It is important to communicate to the community that climate change will bring increased sea temperature, and increased frequency and ferocity of storms. Councils need to make flood plains more transparent to developers.

IAG is setting out to "reduce our own environmental footprint" In 2003 they are reducing their paper and energy by use by 15%, and fuel by 5%.

Children educating others

Teaching disaster management to kids may be the best way to get the information out into the community – at least to households with kids. Puppets, posters and fridge magnets seem to help people to respond appropriately as a disaster looms. We are reminded that children are citizens of the present.

There are three outcomes of education for citizenship: social and moral responsibility, political literacy and community involvement. Impressive though this was, the following speaker, Neil Barker, primary school principal seconded by Emergency Management Australia (EMA) for school education was a masterful presenter. He is working with curriculum, using Victorian Education Inquiry Learning approaches: think about a topic in general, decide what you need to know, think about more information, make decisions and act on them. It is also called problem solving or discovery learning. It works on loops of: ask, investigate, create, discuss and reflect.

Disaster management education has problems – it is competing in an overcrowded curriculum scrum. Further, people see schools as the social hospitals that will fix all our ills – environmental protection, relationship repair, bike ed etc. It does fit into Studies of Society and the Environment, so there is hope for inclusion from the national down through the states. It, in turn, can at best become part of the knowledge explosion. So inquiry learning is real-world learning, and there are many resources (web) available. Disaster preparedness could be sold as a good ‘Key” into real and relevant study for individuals, with a personal development focus.

Remote Indigenous communities

In the session on working with remote and Indigenous communities, Ken Granger showed how very sophisticated computer simulations were used to inform village residents near Port Vila, Vanuatu, about how a surge may impact on their landscape. This empowered the communities to take mitigation strategies, including waste disposal and water supply. Granger’s work prompted Recommendation 4 to simulate floods across real landscape to show residents and travellers the predicted disruption of the flood.

Working on language, central to weather warnings, Indigenous residents of the Pilbara and West Kimberley Western Australia were reported as preferring the word “Danger” to “Risk”. Cyclone, floods and storms basically have the same impact, according to residents of NW WA. The remote area radio broadcast group (BRACS) is listened to and used extensively. There are now pre-season preparations for cyclones and floods. The presentation showed many slides of flooded communities. Nearly always there was dry land quite near where houses sat in water.

Marketing preparedness
People act on repeated warnings, if there is a consistent message from an authoritative source or sources, reinforced by others, and can be discussed in a family or among friends. It does NOT help if they have had previous warnings and had no hazard materialise. People are also less likely to respond 'appropriately' if there is no material evidence of a likely hazard.

Community education aims to 'make people act more safely' and 'help people help themselves'. It was stressed we needed grass roots 'conversational' involvement and a 'continuous development of knowledge' – 'Don't fear the threat, but respect it' was one of many slogans aired.

The outstanding feature of this discussion session was how many people wanted to say that getting community response or involvement was essentially a marketing exercise, usually undertaken by emergency managers with no skills in marketing. We agreed we need community champions, that the more networking the better.

Volunteerism
Conference delegates were told that there are 600,000 unpaid workers – volunteers - supporting other Australians, that we have to increase warning and response capacity while there is decreased funding for volunteers. We must develop ways the broader community may help in mass emergencies, to develop 'prepared communities', to help the community end of community participation in developing 'safe communities'.

Where to
The 'emergency reduction industry' speaks, more or less over the last 30 years, with one voice: greater community involvement. The 'how' of that has to be found locally, with incentives and personal recruiting, based on neighbourhoods of informed people. This may be a great challenge, as major threats are often rare.

Handmer (2001) suggests that a flood, for instance is actually 'owned' by the communities at risk. Individuals and organisations within these communities actively seek out information and mobilize their personal networks for action. (Handmer 2001, p24). In this way of looking at the warning process, the warning specialists act as mediators between the threat and the threatened. Local knowledge is used and the whole response process remains focused on safety and loss-minimization.