Tropical cyclone awareness and education issues for far north Queensland school students

Storm Watchers — a cyclone awareness education package for upper primary school children

by Linda Berry and David King (Director), James Cook University Centre for Disaster Studies, Cairns

Cairns is a rapidly growing far north Queensland coastal city of about 120,000 with a booming tourist industry. Community and Tourism infrastructure are concentrated on a low, narrow and relatively flat coastal plain that is skirted by tropical rainforest covered mountains and the Great Barrier Reef. Annually, between the months of November and April the north Queensland coastal region is likely to be threatened with the impact of tropical cyclones and associated storm surges. In 1996 the resident population of Cairns, specifically the Northern Beaches communities, was surveyed in an attempt to get a clear picture of the community's perception of the cyclone risk and to gain an understanding of the *vulnerability* of this community. Areas where specific action could be undertaken to reduce community vulnerability were to be identified so that the effectiveness of emergency management strategies in the event of cyclones could be enhanced. The residents attitudes towards cyclones, together with their awareness and general knowledge and understanding of the hazard were examined. Household and individual preparedness and likely response to cyclones and storm surges was determined. Additionally the perceived risk associated with this hazard and the previous cyclone experience of individuals and households were evaluated. Also considered were the particular demographic and societal features of these communities. In all, six hundred of the communities households participated in the study, completing lengthy survey questionnaires.

Results were disturbing in that it was clearly demonstrated that the communities household residents have, on the whole, very limited experience of the cyclone hazard and that the individual perception of the risk associated with such an event is often biased and based on false premises. Households are often isolated from the support of extended families and communities were shown to be mobile and fragmented. Demonstrated household preparedness and stated willingness to appropriately respond to cyclone warnings was shown to be limited and would very likely be inadequate in the event of a severe cyclone impacting on the area. Additionally it was noted that there exists within this population a perception that the surrounding mountains and reef physically protect the area from the destructive forces of cyclones and storm surges. Against this background additional studies were carried out to evaluate the awareness of, and general attitudes towards the cyclone hazard within the school age section of the Cairns community. In October 1996 questionnaire based surveys were administered to a randomly selected group of the area's Primary school Year 5 students and Secondary school Year 9 students. Knowledge and, more importantly, understanding of cyclones was examined along with where, and from whom, children have acquired their knowledge. An effort was made to determine whether the students have been influenced by biases that exist throughout the adult community. Areas where informed hazard awareness education is lacking were to be identified. It was appreciated that some 10–11 year olds (the Year 5 students) may have difficulty communicating their understanding in writing so this group was given the opportunity to express their awareness with a drawing of a 'cyclone scene'.

Two hundred and seventy-seven Year 5 students participated in the survey, attempting (and in most cases successfully completing) the questionnaires. The majority of these children also produced a drawing of a 'cyclone scene'. Two hundred and thirty-four Year 9 students participated in the survey, attempting (and in most

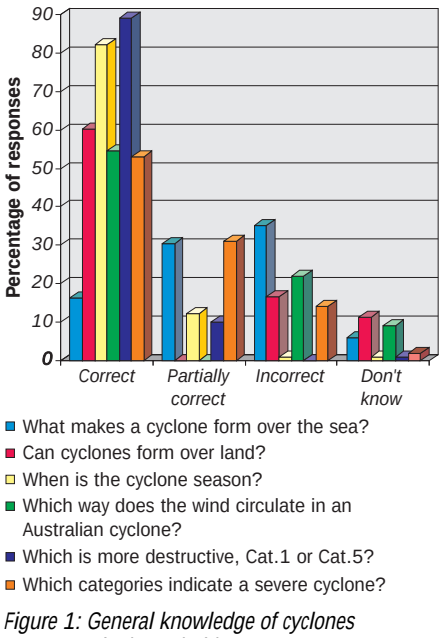


Figure 1: General knowledge of cyclones — community households

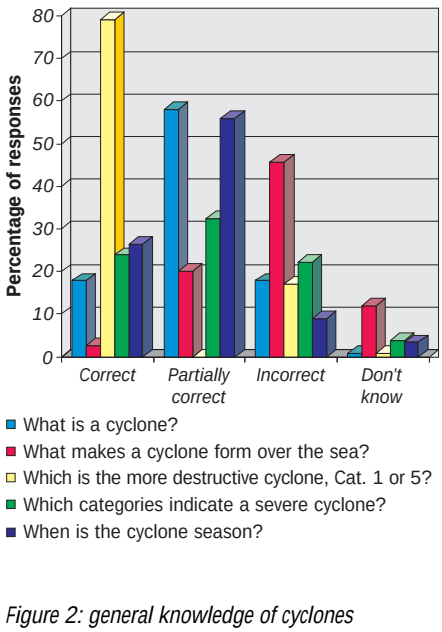


Figure 2: general knowledge of cyclones — Year 9 students

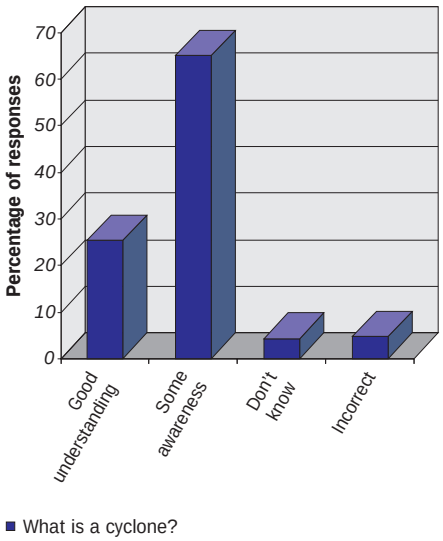


Figure 3: General knowledge and understanding of cyclones—Year 5 Students.

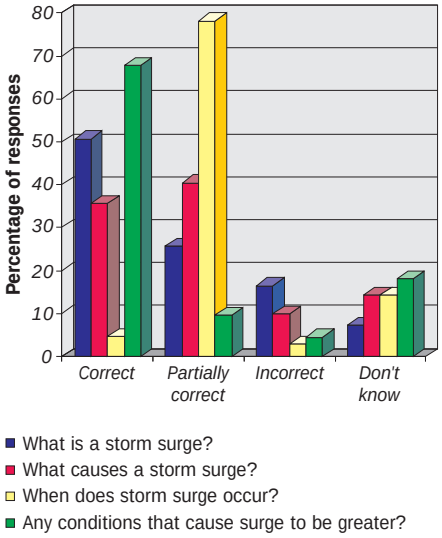


Figure 4: General knowledge of storm surge —community households.

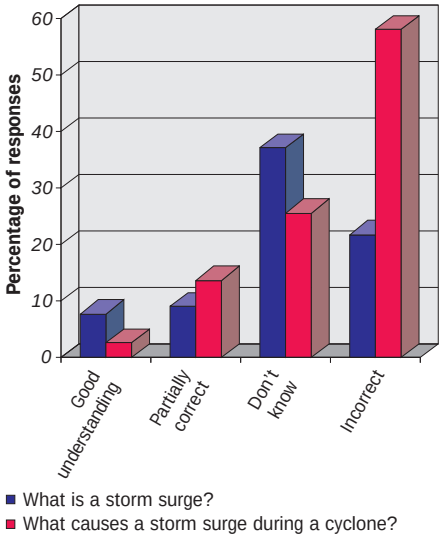


Figure 5: General knowledge of storm surge —Year 9 students

cases sensibly completing) the questionnaires.

Knowledge and understanding of cyclones and storm surge

The majority of students, in both groups were able to correctly or partially correctly answer general knowledge questions and demonstrate at least some awareness, although usually not a good understanding, of cyclone processes Storm surge is universally less well understood. This result is broadly consistent with findings from the 1996 community household study.

Year 5 students were simply asked '*what is a cyclone?*' If they described a storm and a consequence it was considered a good understanding had been demonstrated (e.g.'a big wind that can blow the roof off'), while a response such as 'lots of wind and rain' demonstrated some awareness.

To demonstrate some awareness of storm surge this younger group of students were required to include flooding with sea water in their response.

All students were asked how much they '*… think they know about cyclones*', where they got their information and how much they had learned at school. Overall responses indicate that students think they know a little, but not much, about cyclones with the majority getting their information primarily from television and their families, having learned little or nothing at school. This is despite the fact that some hazard and cyclone awareness material is included in the curriculum in all the regional schools surveyed!

Previous cyclone experience

A sound general knowledge and understanding of hazards, in combination with previous personal experience, are the key determinants that contribute to the formation and shaping of an accurate perception of the risk associated with any hazard event (Miletti & Sorrensen 1987; Smith 1996), However adequate general knowledge does not necessarily translate into a sound *understanding*, which is very much dependent on how this information is *internalised*, that is, how it is accepted and believed by the individual.

Throughout the literature it is generally accepted that cyclone experience profoundly affects the individuals perception of the risk associated with these events. (Miletti & Sorrensen 1987; Smith 1996) Most powerful is direct personal experience, followed closely by the experience of family members and then that of neighbours and close friends. Perceived risk is a powerful decider of what precautionary behaviour individuals will undertake when faced with the threat of cyclone impact and how they will respond to warnings. Community household residents in Cairns Northern Beaches communities and both groups of Cairns school students were asked if they had experienced a cyclone (*'have you ever been in a cyclone?'*) and if so to identify the storm by name or by place and approximate date. In excess of fifty percent of each group reported previous experience. Great care must be taken however when interpreting this result as the *quality* of the experience cannot be assumed. Many households identified cyclone Joy, which did not make landfall in the region and several students identified experiences that they could not possibly have had, for example Cyclone Tracy, Darwin 1975. The meaning of this result is still being investigated, however it appears likely that some children are actually constructing an experience, or a false memory, from what they have internalised from the experiences of those close to them.

Experience of regional cyclones can also be considered in terms of length of residence. The longer a resident has lived in the area the more likely it is that they have been exposed to the threat of regional cyclones. Longer-term residents have also

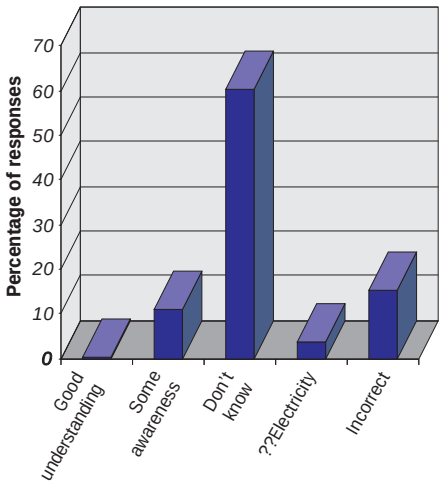


Figure 6: awareness and understanding of storm surge — Year 5 students.

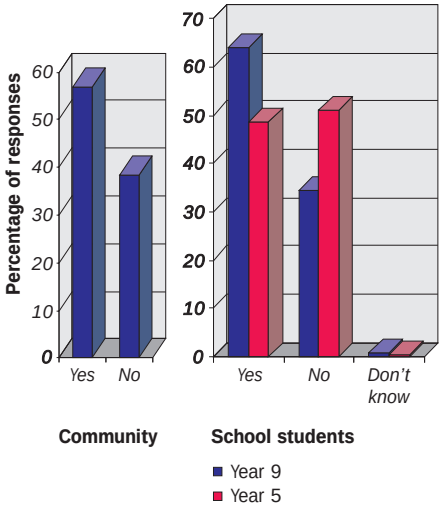


Figure 7: Previous experience of cyclones.

had more opportunity to build strong neighbourhood and community networks and have developed friendships with other residents that have had direct personal experience of cyclones impacting the region, this is likely to reduce their vulnerability and enhance their resilience in the event of a cyclone threat. On the other hand however, they have also had longer exposure to local stories and folk tales about regional hazards. In 1996 almost seventy percent of the residents living in the Cairns Northern Beaches communities, thirty five percent of Secondary school students and forty percent of the Primary aged students, had moved to the region since 1991 when Cyclone Joy (the last severe cyclone warning) threatened the area.[1]

Household isolation

The Community household study demonstrated that the areas Cairns residents were not only relatively inexperienced in relation to the regional cyclone hazard but were further disadvantaged in that a significant proportion are relatively isolated. Sixty two percent of surveyed households have no close relatives living in the Cairns region and sixty one percent have no relatives living in Far North Queensland. These residents are unlikely to enjoy readily available family support that enhances the ability to cope in times of need. Additionally fifty percent of the areas household residents are isolated within their own communities not knowing their neighbours well, if at all.

Perceived risk

Individuals and communities make decisions on how they will prepare for, and respond to, the threat of hazards based on the level of risk they perceive to be associated with these events (Granger 1993; Mileti & Sorrensen 1987; Smith 1996). Part of this perception is based on the estimated likelihood of the event occurring - and its probable frequency and intensity. An understanding of the hazard together with the level of loss an event is likely to inflict also influence one's risk perception. A decision as to what level of risk is *acceptable* is then made—either consciously or subconsciously. In 1996 Cairns Northern Beaches Community residents revealed a high level of misperception and misunderstanding of the cyclone hazard, the potential secondary risks, and the effect of the surrounding topography (Berry, 1996). Analysis of the schools surveys indicates that many of these common misperceptions are also widely accepted by the younger members of the community. When directly asked whether they were '… *concerned that any dangerous substances or fauna may not be adequately contained in the event of a severe cyclone crossing the coast near Cairns*' more than fifty percent of both the community households and Year 9 students responded in the negative.

The reality of the situation is that if a severe tropical cyclone with an associated storm surge of 2 metres above the high tide level (or 3 metres above AHD)[2] were to impact the Cairns area much of the heavily populated coastal plain would be inundated with sea water to a level above floor height. This would include sixty one percent of accommodation dwellings, eighteen percent of all private dwellings (some 28,041), eighty two percent of businesses and commercial practices, fifty three percent of community facilities, sixty two percent of emergency services buildings, eighty two percent of logistics (bulk gas, fuel, storage and transport), sixty five percent of health services, eighty eight percent of power utilities, and forty four percent of telecommunications (Centre for Disaster Studies, 1997). The likelihood of the services that are provided from these facilities being severely or totally disrupted is very high. The potential for contamination of flood waters and the coastal environment with fuel, fertiliser and other chemical pollutants is a very real possibility. Added to these threats is the location of sewage treatment facilities and crocodile farms (with more than 5,000 crocodiles in captivity) in the low lying near-coastal region, both these facilities may release hazardous product into the coastal environment. The community does not generally demonstrate an awareness of the risk of such secondary hazards.

One of the more alarming findings of the Community household study was the confirmation that the perception that the area is naturally protected from cyclone impact is widespread. Forty percent of respondent household residents stated that they believed the area to be protected, most usually by the surrounding mountains or the Great Barrier Reef. This perception has now been shown to be stronger amongst the regions secondary school students with fifty one percent registering positive responses to the question '*do you think that Cairns is protected to some degree from a direct cyclone hit?*' Many of these students provided detailed explanations as to why they believed this to be the case. It is interesting to note here that in a survey carried out immediately post Cyclone Justin, [currently in an analysis stage] there is an indication that this perception is strengthening over time and that perhaps as much as 60 per cent of the community now believes the area to be protected. This is despite the fact that all residents surveyed in the post Justin study experienced the landfall of cyclone Justin with the eye passing directly over the study area!

Stories that the area is naturally protected and that a cyclone won't hit Cairns have been part of the local folk lore for some time. These stories are believed more readily by the longer term residents who draw on past examples of 'near misses' to confirm these stories in their own minds.

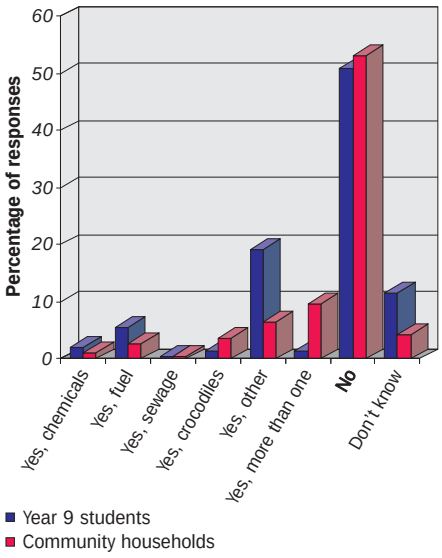


Figure 8: Other hazards perceived to be associated with cyclones

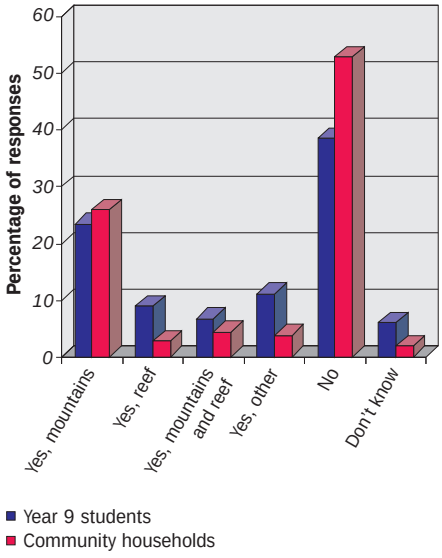


Figure 9: Perception that the area is protected

Notes:

[1] A cyclone *threat* includes the cyclone advice messages and warnings, household and individual preparation, individual and community experience, reaction and response and, if appropriate, recovery.

[2] AHD – Australian Height Datum (Mean sea level at Cairns. This is approximately 1 metre below the highest tide level such that 3 metres above AHD is only 2 metres above the high-tide level. The Highest Astronomical Tide is 1.78 metres above AHD).

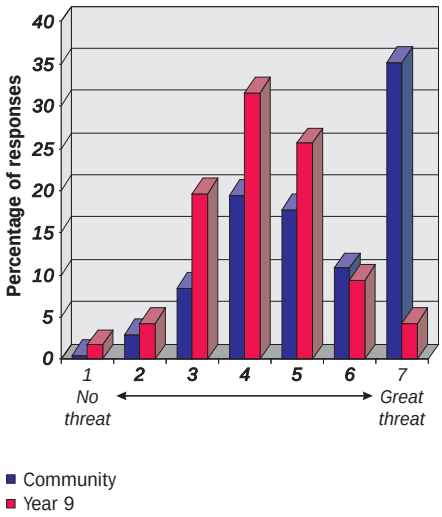


Figure 10: Perceived cyclone threat in community household residents and Year 9 students

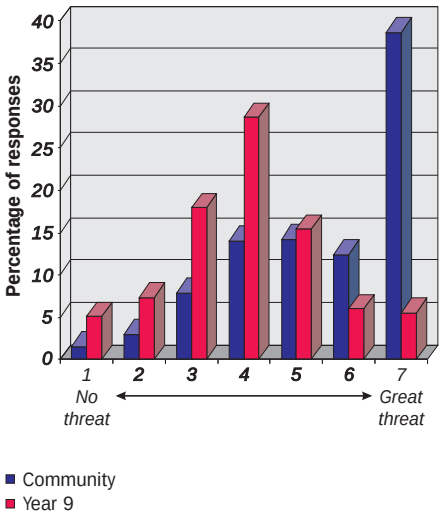


Figure 11: Perceived storm surge threat in community household residents and Year 9 students.

Shorter term residents are generally more likely to be undecided as to whether they will accept local myths or not.

Both the Community Household residents and the Year 9 students were asked to estimate what level of threat they perceived the cyclone hazard posed to them and their communities. The adult community indicated that they generally perceived the threat to be significant while the students tended to 'sit on the fence' with the majority of responses being middle range.

All students were asked how much they *worried* about cyclones and how much they thought that their *parents worried* about cyclones. Responses illustrate that, in both cases the younger students are more concerned than the older students. This result is not unexpected when the number of Year 9 students that believe the area to be protected is taken into consideration. Year 5 students were not directly asked to estimate the level of risk they perceived to be associated with cyclones and storm surges, instead they were invited to draw a 'cyclone scene'. Not all students participated in this task, however the majority did. Many of the drawings were obviously influenced by the film 'Twister', a Hollywood blockbuster about Tornados that had been only recently released and was receiving a lot of media attention. Drawings almost universally depicted environmental damage as a result of the storm, approximately half showed damage to the built environment with roof damage and broken windows being the most common destruction. Very few indicated preparatory behaviour e.g. taped windows, some even had clothes on washing lines and dogs tied to trees or parking meters. It is interesting that very few of the illustrations included people, although when they did they tended to be victims and most often children. Very few showed emergency services personnel or equipment. The few drawings that included flood water were from Yarrabah Primary School.[3]

In the drawing below the storm is seen to be passing between the house and the tree. Note that the cyclone is named 'Cyclone Tracy'.

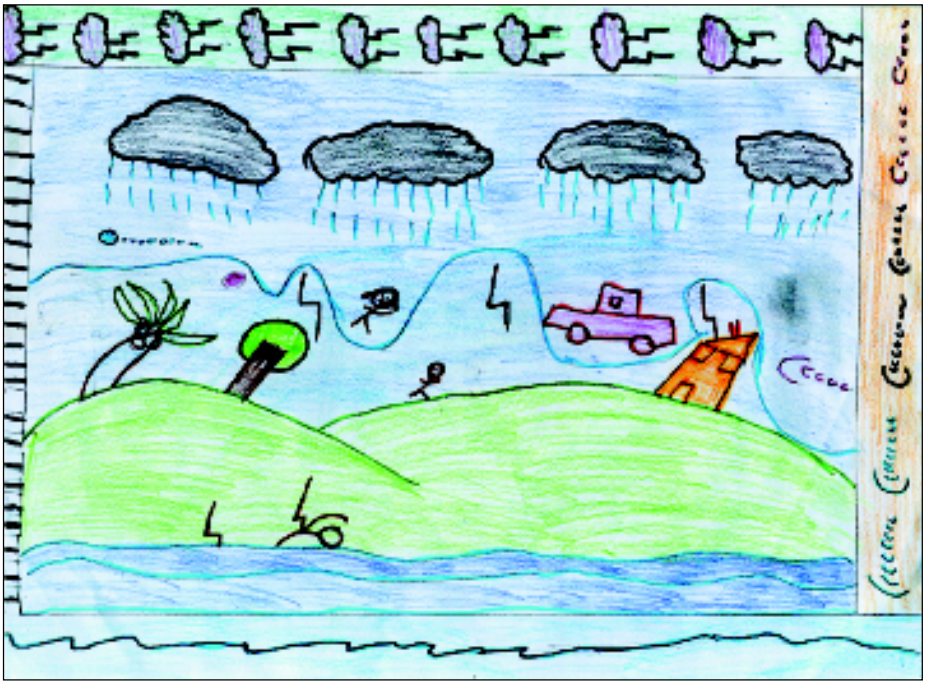
Very few of the illustrations included impact to the total environment, that is, human, natural and built.

Discussion

The students questionnaire responses in combination with the drawings demonstrate generally that they have very limited real understanding of cyclones and the storm surge risk. Most of their information is acquired from the electronic media, film and television, and from families. Direct personal experience is very limited, which is to be expected at this stage, however the families upon whom many depend for information are also relatively inexperienced and, as has been shown, very likely to be biased in their own perceptions of the cyclone risk. Consistency in responses across survey groups has confirmed that many of the prevailing attitudes towards cyclones, and risk perceptions are generalised throughout the regions residents, and that mispreceptions are not being dispelled with information and cyclone awareness material currently available

Note:

[3] Yarrabah is a predominantly aboriginal community that is located on a relatively isolated peninsula south of Cairns city and is remote from some of the services readily enjoyed by the Cairns community. Most dwellings in this settlement are on a narrow, low-lying coastal strip and are extremely vulnerable to flooding in the event of a storm surge. The community is also very 'close-knit' and information and descriptions of past experience can be 'passed on' within the community residents.



either throughout the community or in curriculum studies in schools

The studies confirm that public education campaigns, that have focussed on cyclones and cyclone processes and how to physically prepare households in the event of a cyclone warning advice being issued have been relatively successful. Residents generally demonstrate that they know what a cyclone is and what physical tasks they *should* complete to prepare their households in the event that a cyclone threatens the region. Knowledge of storm surge was not as well demonstrated.[4] However, in terms of explaining the cyclone risk so that an accurate understanding and perception of the risk prevails in the community, the cyclone awareness campaigns and school curriculum studies have apparently not been so successful. Local myths about the area being naturally protected continue to enjoy relatively wide acceptance. Household residents often described a reluctance to trust emergency managers in the event of cyclone emergency, preferring to rely on their own judgements and assessment of the situation (Berry 1996). These findings indicate that in all education campaigns a higher priority must be given to demonstrating and explaining both the reality of the cyclone risk and the roles and responsibilities of all members of the community from household residents to emergency service managers and the expectations of them in times of 'disaster'.

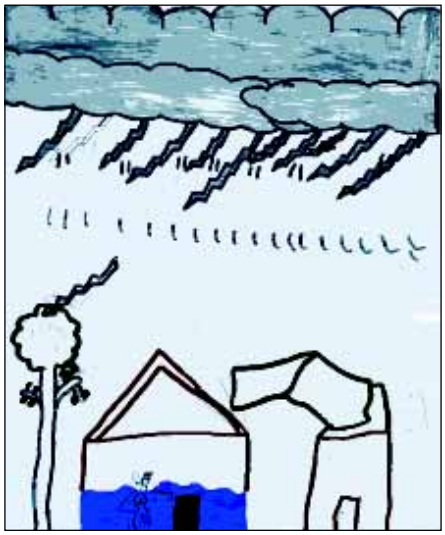
Storm watchers

A need for focused cyclone-awareness education for both groups of students has been clearly demonstrated in this study. Some hazard awareness education already exists as part of some school curriculum studies however, it is apparent that some students are able to avoid this with early subject selection or because limited resource material is available. In an effort to provide a useful resource for primary school students the James Cook University Centre for Disaster Studies in cooperation with the university's Flexible Learning Unit and with funding support from the Bureau of Meteorology Research Centre have developed and produced *Stormwatchers*, an interactive CD-Rom game.

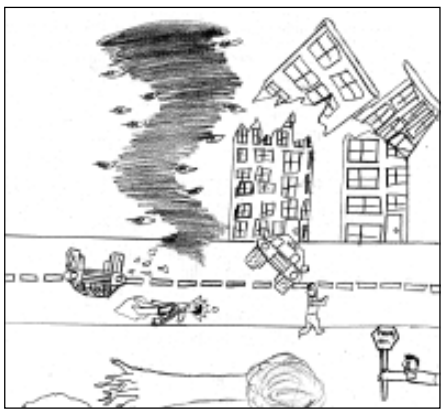
This educational package has been designed to instruct children in appropriate preparatory behaviours for the cyclone hazard and to inform them of what they can expect of a cyclone experience. Students are offered a choice of 5 different cyclone scenarios which they must work through to prepare for a cyclone. Children in the scenarios are faced with a range of experiences and social situations so most students playing the game will have something to identify with.

The five children featured in the game are:

- Liam, who lives in a house in the hills. He has to prepare house for high winds and ensure that animals are taken care of.



- Betty, who lives in a house by the beach that is threatened with storm surge. She has to prepare for evacuation to her Aunty's house.
- Sandra, who lives in a caravan, and must purchase her emergency kit items and prepare to evacuate to a shelter.
- Willy, who lives in a house by the river, and must prepare for the possibility of flooding.
- Anita, who lives in a unit in town—her mother is at work when the cyclone warnings begin so she must prepare on her own and find the safest place in the house to shelter.



Note:

[4] This has been addressed in the 1997–98 Emergency Services Division awareness raising campaign, which focuses on storm surge.

Each scenario requires the student to ensure emergency kit items are collected and offers a mini-game as a reward for collecting all the necessary items. Real video footage is included while the storm is passing to help students to understand what they can expect to experience in a cyclone. At this time a quiz is offered as a challenge to test cyclone and basic geographical knowledge. Interested students can find more detailed information, relating to the quiz in the fact book. Students are guided through the game with the help of 'Stormy' the cockatoo.

Stormwatchers has been designed to be accessible to all students in upper primary classes in Queenslands schools, irrespective of their level of computer experience and literacy skills. All these students should have access to a computer that can support the game package. Game scenarios are very easy to work through and children are rewarded and encouraged along the way. Each scenario should be able to be completed in 15–20 minutes. A small instruction sheet accompanies the game along with a suggestions for work sheets that may be of use to teachers interested in follow-up activities. This game is relevant to a range of children in a variety of circumstances and, although it has been developed based on the demonstrated needs of children in the Cairns community it is applicable to children living in any Queensland (or northern Australian) cyclone- or flood-prone community.

Additional funding has now been provided by Queenslands Emergency Services Division to produce 1500 game packages for distribution to all primary schools in Queensland. These will be available for schools to introduce into classrooms before the 1998–'99 cyclone season.

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Letter to the Editor

I was interested in your editorial in the Autumn 1998 issue of the journal which drew attention to the culture of 'anti-research' and the large gap between researchers and practitioners.

I was the co-ordinator of the Centre for Information and Research on Disasters and Natural Hazards (CIRDNH) which functioned at the Chisholm Institute of Technology (now the Caulfield Campus of Monash University) from 1979 to 1987 (Nick Carter was the Chairperson).

CIRDNH had as one of its main aims the promotion of closer liaison between researchers and practitioners, but progress towards that aim was limited, and it is disappointing that according to your editorial there has been little improvement in this regard more than a decade later. My paper '*Credibility of Disaster Research*' (CIRDNH 1987) addressed issues raised in your editorial in some detail.

Despite this lack of progress, the growth of the Macedon publication from a simple newsletter into a generally excellent journal, and the accompanying Internet, library and seminar support should provide a basis for enhancing the very necessary increased understanding between researchers and practitioners in emergency management.

I am pleased that the vision we had in the late 1970s for a national clearinghouse and a forum for discussion has eventuated at Macedon, along with centres at James Cook and Macquarie Universities.

As outlined in an article by Roger Wettenhall *(Disasters* 8:2, 1984) the lack of ongoing funding and opposition from some government sponsored bodies led to closure of the Centre at Caulfield, but a Committee operated for some time, and I maintain my personal interest in this field.

Congratulations on the journal, it fills an important need.

Yours sincerely,

Ian Murray,
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Caulfield Campus

Urban Search and Rescue Association of Australasia (USARAA) develops new web site

Following the USAR course held in Canberra (November 1995) the Urban Search and Rescue Association of Australasia (USARAA) was formed. This association consists of the majority of participants who attended the first course, and hopefully subsequent courses run in Australia, and is intended to provide a forum for the exchange of ideas and information relating to USAR.

USARAA now has a web site where the current newsletter, back issues of newsletters, photos of Australian training, and links to other Urban Search and Rescue sites can be found.

The address is:
http://www.users.bigpond.com/Pat_Kirsty_Jones

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