Centre for Disaster Studies

James Cook University

Townsville Thuringowa Floods

January 1998

Business and Infrastructure

Post Disaster Survey

Report Prepared for Department of Emergency Services
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1.1. Background to the Study

This study accompanies the household survey of Townsville and Thuringowa which was carried out immediately after the inundation of 10th to 12th January 1998. As this infrastructure report may be read in isolation from the household survey the same background to the event is included here.

Townsville and Thuringowa experienced record breaking rain on and immediately following 10th January 1998. In 24 hours on 10th and 11th January, 549 mms fell at Townsville airport. On the rest of the 11th and 12th through to the morning of 13th, a further 245 mms fell, giving a 3 day record of 794 mms. The Bureau of Meteorology in Townsville reported unofficial rainfall readings from 6 am on the 10th to 6 am on the 11th, from regular reliable sources, of 735 mms in the suburb of Vincent, 742 mms in Railway Estate and the highest total of 774 mms on Magnetic Island. The radar showed the heaviest concentration of the rain (a remnant depression from Cyclone Syd that had crossed from the Gulf of Carpentaria) to have been immediately to the north of Townsville. Consequently creeks draining from the range to Halifax Bay north of the city became raging torrents. In particular Bluewater Creek and Black River caused enormous damage in flash flooding. The concentration of the heaviest rain north of the city appears to have spared the Bohle from the same type of flash flooding. This factor is of some significance as a far greater number of houses and structures are close to the Bohle, than in the vicinity of the less developed northerly creeks. Thuringowa may have been very lucky.

Insurance implications have made people very wary of the word flood. In the mythology of the event we will undoubtedly refer to the floods of January 1998, because it is a more easily recognisable word than alternatives like inundation etc. Certainly conventional river floods that are not usually covered by household insurance, did occur within the region and were responsible for the more spectacular damage. The main event, though, was excessive

rainfall that was not able to get away. Most of the heavy rain of the 10/11th fell between the hours of 5 pm and 6 am. As this downpour developed it coincided with one of the small number of King high tides that occur every year. About five of these tides each year will bring sea water into the streets and backyards of the lowest lying areas of town adjacent to the sea. As this tide occurred at about 8 pm the excessive quantity of rain water was simply not able to drain fast enough. The surface flooding throughout Townsville and Thuringowa was therefore primarily rainwater that backed up and entered properties and houses, floated cars away and brought the city to a standstill. At the same time as the heavy rain occurred there had also been gale force winds gusting all day, so that considerable quantities of vegetation added to blockages. However, because it occurred on a Saturday night, the deluge probably carried a lower risk than if it had occurred in the middle of a working day, and the inconvenience and disruption were also lessened.

The Centre for Disaster Studies carried out a post disaster survey in an attempt to gauge the overall impact of the storm on the residential community. Shortly after commencing this survey we were contracted to carry out a survey of infrastructure and damage on Magnetic Island, and a general survey of infrastructure and businesses in the whole of the city. The aim of post disaster studies is to gather an immediate picture of the extent of the impact in order to discern any patterns or lessons that may be applied to future events and to both emergency service and council planning and mitigation.

1.2. Methodology and Survey Issues

The survey of businesses, infrastructure and services covered a selection of key organisations, services and facilities that would be expected to play a significant role in the aftermath of a disaster. The aim was to assess the impact of the flood upon these places/services in order to ascertain the extent to which they may be effective in recovery and a return to normalcy. The immediacy of the post event survey placed constraints on the number of organisations that could be approached, and the detail of questioning that could be carried out.

Initial emphasis was on the designated evacuation centres, many of which are schools, and on basic support services and urban infrastructure, then on a selection of businesses. Places and organisations were selected through a snowballing technique in liaison with staff at the two councils. Data were collected by direct visit, telephone calls, and follow ups by visit, fax and telephone. The process was much slower than that of conducting household surveys. A survey instrument in the form of a short questionnaire was used to structure and facilitate responses. Despite the shortness of the instrument many people claimed not to have the time to fill it in. Thus although the survey was brief and very general, anything longer would probably not have been responded to.

The survey of businesses, infrastructure and services was commenced a week after the inundation event. Most data collection was done in the two weeks that followed, although follow up calls and visits continued over a further two week period, after which the main report was produced. Therefore for most organisations and individuals, relatively normal operations had been restored by the time they were approached to take part in the survey.

Despite this there was an initial significant reluctance on the part of many people to cooperate with the survey. This unwillingness was much higher than that encountered in all household surveys. We believe it derived from the chain of command of the organisation, pressure of work, fear of speaking out and insurance problems and issues. The slowness of the survey process followed from the need to locate, or gain approval from the appropriate manager etc. This is always going to be an issue with this kind of survey. However, once the appropriate spokesperson had been located most were very cooperative and helpful.

The flood occurred on a Saturday night in the school holidays. Thus for many businesses and organisations little was happening, and many premises were closed on the Saturday evening and were not required to be open on the Sunday. This timing of the event minimised the impact. If it had occurred mid week during the day with schools in session, the chaos would have been severe.

A constraint of the survey instrument was its limitations in dealing with a wide range and complexity of premises and structures. The instrument was therefore used as a basis rather than as a precise set of questions. Each organisation has been listed separately in the main report, with extensive notes referring to specific issues and observations. The advantage of the survey instrument then lay in having a broad set of comparable answers that could be aggregated for all of the surveyed premises. These form the basis of the summary report which follows. The summary tables exclude the questions on heights and floor heights etc., firstly because they were extremely variable in a non comparable way, and secondly because most flood heights were not known with any accuracy as many premises were closed at the time. Also virtually nobody answered question 17 which asked for precautions that could have been taken to avoid damage and problems that were experienced. Again this is most likely a consequence of the unwillingness of employees and managers to stick their necks out and acknowledge that they could have done something about it.

The survey prompted self reporting, but as responses were of a purely factual nature we had no need to doubt their veracity. There was, however, one glaring exception on the part of a Telstra employee who stated, eventually, that there had been no loss of services etc. on the part of their organisation. Numerous answers to question 8 of the survey listed loss of the telephone service as one of the disruptions that they faced during and after the flood.

1.3. Summary Data

Tables 1 to 8 summarise responses to the questionnaire survey for each main group of types of organisations. The question numbers from the questionnaire survey have been included in the table for convenience, but the question has been turned around into a statement for which numbers of premises are summarised as a yes or no answer. For example question 4 asked at what times between Saturday evening and Monday, the place was inaccessible. Answers varied considerably, and are given in full in the main report for each place. This has been summarised in the tables to a general level of inaccessibility during all or part of that period. Thus in table 1 for example, 6 ambulance, police or fire stations, out of the 8 covered, were inaccessible during some of that period, mostly during the crisis period on Saturday night.

In all of the following tables disruption refers to the business and activities of the organisations that were surveyed. Thus some places were inaccessible but were able to continue functioning as staff were inside, or because the place was simply closed at the time that it was inaccessible. Other places remained accessible, but their operations were disrupted by flood waters, staff being unable to reach the places because of floods elsewhere, or because other services such as power, water and telephones were not available or were to some extent disrupted. These other answers were also used in assessing the extent to which the response to question 16, the restoration of normal services, was delayed. Some places stated that their operations returned to normal more promptly than was likely. This was especially the case with schools, where the answer has been modified to deal with the likely scenario of returning to normal if it had been the school year. Most would not have been able to because of a combination of, at the very least, a loss of water supply, power, damage to some classrooms, and stated damage to the grounds. The fact that most were back to normal by the start of the school year at the end of the month is not an indication of a prompt return to normal.

Table 1. Ambulance, Police and Fire Stations

Question Number	Statement of Inundation Impact	Yes - Number	No - Number	Number Not Applicable
4	Inaccessible all or part Saturday to Monday	6	2	
5	Operations were disrupted	7	1	
6	Disruption from water inside building	3	4	1
7	Disruption from water around buildings	5	2	1
8	Disruption from dependency on other disrupted facilities	5	3	
9	Staff unable to reach premises or leave	4	4	
10	Customers/users unable to reach or leave premises or service	7	1	
11	Loss of stock, equipment and plant	2	6	
12	Damage and loss to storage capacity	1	6	1
16	Restoration of normal operations delayed	5	2	1
	Not contacted or no response	4		

Table 1 suggests that the emergency services were somewhat inhibited in their response capacity during the floods. The places that did not respond to the survey were primarily part time and rural operations.

The main body of the report lists those schools, and other buildings that were designated evacuation centres prior to the event. It is quite clear that many of them would have had difficulties in fulfilling their role as gathering or evacuation centres. James Cook University was also an evacuation centre but is not included in the group in table 2, as it had completed its own, extensive inventory of flood damage. The full report on the university is included as a separate part of this report, but the analysis did not lend itself to direct comparison with the other places and organisations that were surveyed.

Table 2. Evacuation Centres Other than Schools

Question Number	Statement of Inundation Impact	Yes Number	No Number	Number Not Applicable
4	Inaccessible all or part Saturday to Monday	2	3	
5	Operations were disrupted	2	2	1
6	Disruption from water inside building	2	3	
7	Disruption from water around buildings	2	3	
8	Disruption from dependency on other disrupted facilities	2	2	
9	Staff unable to reach premises or leave	2	0	2
10	Customers/users unable to reach premises or to leave	2	1	2
11	Loss of stock, equipment and plant	3	1	1
12	Damage and loss to storage capacity	0	3	2
16	Restoration of normal operations delayed	2	0	2
	Not contacted or no response	12		

Table 3. Schools (Including Designated Evacuation Centres - See List)

Question Number	Statement of Inundation Impact	Yes Number	No Number	Number Not Applicable
4	Inaccessible all or part Saturday to Monday	27	34	1
6	Disruption from water inside building	42	20	
7	Disruption from water around buildings	34	28	
8	Disruption from dependency on other disrupted facilities	23	26	13
11	Loss of stock, equipment and plant	52	10	
16	Restoration of normal operations would have been delayed if in school year	30	6	26
	Not contacted or no response	4		

Because the schools were closed, and in some cases were not visited until some days after the event, the direct comparison questions have been reduced. While most experienced loss and damage, the main report shows that in many cases this was relatively superficial. However, there were some schools that suffered severely, and in all cases where damage had occurred it would probably have added to the hazard of entering the grounds and premises, especially for children. The response rate from schools was very good, but it should be borne in mind that they constitute the bulk of community evacuation centres, and that 44% were probably inaccessible during the storm.

Table 4. Infrastructure, Government, Council and Transport

Question Number	Statement of Inundation Impact	Yes Number	No Number	Number Not Applicable
4	Inoperable or inaccessible all or part	11	12	

	Saturday to Monday			
5	Operations were disrupted	12	11	
6	Disruption from water inside building	9	13	1
7	Disruption from water around buildings	5	15	3
8	Disruption from dependency on other disrupted facilities	10	11	2
9	Staff unable to reach premises	13	7	3
10	Customers/users unable to reach or use service or premises or leave	4	4	15
11	Loss of stock, equipment and plant	9	14	
12	Damage and loss to storage capacity	5	16	2
16	Restoration of normal operations delayed	12	11	
	Not contacted or no response	3		

Table 5. Medical Facilities.

Question Number	Statement of Inundation Impact	Yes Number	No Number	Number Not Applicable
4	Inaccessible all or part Saturday to Monday	3	3	
5	Operations were disrupted	3	3	
6	Disruption from water inside building	1	5	
7	Disruption from water around buildings	3	3	
8	Disruption from dependency on other disrupted facilities	3	3	
9	Staff unable to reach premises or leave	4	2	
10	Customers/users unable to reach premises or leave	4	2	
11	Loss of stock, equipment and plant	2	4	
12	Damage and loss to storage capacity	2	4	
16	Restoration of normal operations delayed	4	2	
	Not contacted or no response	3		

The services covered in tables 4 and 5 are those critical operations that must be fully functional during an emergency or disaster situation. We know that the city muddled through remarkably effectively, but it is clear from these tables that there was significant disruption to the services provided and the capacity of these organisations to respond fully.

Table 6. Chemicals, Bulk Fuel Stores and Service Stations

Question Number	Statement of Inundation Impact	Yes Number	No Number	Number Not Applicable
4	Inaccessible all or part Saturday to Monday	4	2	
5	Operations were disrupted	3	2	1
6	Disruption from water inside building	0	5	1
7	Disruption from water around buildings	3	2	1

8	Disruption from dependency on other disrupted facilities	3	3	
9	Staff unable to reach premises	1	4	1
10	Customers/users unable to reach premises or leave	3	2	1
11	Loss of stock, equipment and plant	4	2	
12	Damage and loss to storage capacity	1	5	
16	Restoration of normal operations delayed	4	2	
	Not contacted or no response	2		

The main report specifies damage to the bund walls of the bulk fuel stores. This incident, along with the overspill from the tailings ponds at Yabulu, raises some important issues concerning associated disasters, that need addressing by the councils before a similar event or cyclone wreaks greater havoc than occurred this time.

Table 7. Shopping Centres

Question Number	Statement of Inundation Impact	Yes Number	No Number	Number Not Applicable
4	Inaccessible all or part Saturday to Monday	4	1	
5	Operations were disrupted	1	4	
6	Disruption from water inside building	1	4	
7	Disruption from water around buildings	4	1	
8	Disruption from dependency on other disrupted facilities	4	1	
9	Staff unable to reach premises	2	2	1
10	Customers/users unable to reach premises or leave	1	3	1
11	Loss of stock, equipment and plant	2	2	1
12	Damage and loss to storage capacity	2	2	1
16	Restoration of normal operations delayed	2	3	
	Not contacted or no response	4		

Shopping centres could be safe evacuation centres if security issues are sorted out. Of those who responded, business resumed very quickly, but not without damage and disruption. Although Stockland did not respond, we know that there was significant inundation of its storage areas and great loss of stock. Although we did not deal at all with car dealers their losses were even greater. Many small businesses and corner stores suffered inundation and damage to stock and premises. However, despite these problems and over 100 mms of further rain, with extensive surface flooding on the Monday, the city had largely gone back to business. In fact the cover picture of this report is part of the factory estate on the Ingham Road late on the Monday afternoon, almost 48 hours after the main deluge of Saturday 10th.

Table 8. All Surveyed Facilities, Businesses and Premises

Questio	Statement of Inundation Impact	Yes	No	Not	Total

n Number						Applicable		
		No	%	No	%	No	%	No
4	Inaccessible all or part Saturday to Monday	57	50	57	50	1	1	115
5	Operations were disrupted	28	52	23	43	3	6	54
6	Disruption from water inside building	58	50	54	47	3	3	115
7	Disruption from water around buildings	56	49	54	47	5	4	115
8	Disruption from dependency on other disrupted facilities	50	43	50	43	15	13	115
9	Staff unable to reach premises	26	50	19	37	7	13	52
10	Customers/users unable to reach premises or leave	21	40	13	25	18	35	52
11	Loss of stock, equipment and plant	74	65	39	34	1	1	114
12	Damage and loss to storage capacity	11	22	36	71	4	8	51
16	Restoration of normal operations delayed	59	52	26	23	29	25	114
	Not contacted or no response	28						

All surveyed premises, organisations and services are summarised in table 8, showing percentages in each category of impact. Thus 50% of all places were inaccessible during part or all of the inundation period, operations were disrupted for 52%, water came inside buildings for 50%, although much of this was roof, guttering and window leaks, 43% were disrupted by dependency on other services, and 50% had staff unable to reach their place of work. Not only were staff unable to reach work, but neither were customers or users (it was fortunate the death toll was so low, as the mortuary was also inaccessible), and in many places customers were unable to leave. Those in pubs were probably quite cheerful, but one elderly couple had felt other than satisfied in having to spend the whole night watching movies. Damage of some kind affected 65% of respondents and 52% of places/services were delayed in returning to normal operations. Given the extent of these problems, the speed of the recovery and return to normality were quite remarkable. Thus although the survey indicates a significant impact on infrastructure, services and business, the city was able to function remarkably well.

A final observation is a comparison with work on vulnerability that the centre has recently completed for Cairns. For Cairns, a 3 metre cyclone storm surge scenario (above Australian Height Datum, which is a mid tidal range) would put similar depths of water (albeit saline and therefore more damaging) into the low lying areas of the city. Our estimates there, based on census data and the Emergency Services Cairns City Council database, suggested an impact of between 68% of service facilities to 81% of business and industry inundated, while only 20% of residential housing would experience inundation. The results of these two surveys of Townsville and Thuringowa and strong indications of similar levels of impact. Alongside impacts on more than 50% of services, infrastructure and business, the household survey indicated that 15% of residential buildings experienced inundation. A point for consideration, not only in Townsville/Thuringowa and Cairns, is that education and awareness for hazard preparation and planning probably needs to target the decision makers and leaders of the community as a far greater priority than the general public. Our residential dwellings are far better placed to deal with flood hazards, than our services, infrastructure and businesses.

2. Main Report

3. James Cook University Reports

4. Survey Questionnaire