

Wollongong storm of August 1998: a survey of affected residents two years on

Introduction

Wollongong with a population of 177,000 is situated about 70km south of Sydney, NSW. It has unique geographical features that contribute not only to its beauty, but also to its vulnerability in storm events. Many small creeks traverse this narrow coastal strip. Previous floods in the Wollongong area have caused landslip, railway embankment collapse and flash flooding into homes, businesses and property.

Persistent rain fell in the Wollongong area from late July to early August 1998. Between 15 and 17 August, parts of the Wollongong catchment received up to 375 mm. On 17 August 1998, suburbs from Helensburgh in the north to Dapto in the south experienced steady rain with heavy downpours between 1500 and 1530 Eastern Standard Time (EST) and between 1700 and 2000 EST. The highest 24-hour total was 445mm at Mt Ousley. This rain saturated soils and filled drains and creeks. The most intense rainfall was around 1900 EST. This storm event resulted in one death, widespread flash flooding, road and rail disruptions and considerable property damage (Evans & Bewick 1999).

The storm had a devastating effect on residents in Wollongong. Anecdotally, many people still experience anxiety when it rains. In addition, there was community concern that lessons from the storm event were not learnt by individuals, Wollongong City Council (WCC) or government agencies. This paper investigates ongoing anxiety when it rains, community preparedness for another storm and current attitudes to the actions of WCC, government agencies and insurance companies with regard to storm/flood issues.

Method

Sample

A survey of residents affected by the Wollongong storm of 17 August 1998 was undertaken in August 2000. A self-completed anonymous questionnaire was mailed to people registered with the Wollongong Storm Water Action Group (SWAG), a community action group formed in the aftermath of the storm. Media releases were sent to the Illawarra Mercury, the Advertiser and ABC and Wave FM radio stations on 7 August 2000. The

by Anita Fletcher,
Physiotherapist,
B Sc, Grad Dip Physio, MPH, MAPA

study was approved by the University of Wollongong's Human Research Ethics Committee.

A draft survey was completed mid-July 2000 and the completed questionnaire was distributed a week before the second anniversary of the storm, 17 August 2000.

Data analysis

Statistical analysis was undertaken using

Epi Info 6 (Centres for Disease Control 2000). Descriptive statistics were used to describe the sample characteristics. Means, standard deviations (SD) and medians were calculated for years living at residence and depth of water in home and yard. Chi square test (χ^2) was used for relationships between the present level of anxiety and preparedness as well as the present level of anxiety and the perception of the likelihood of another storm. Statistical tests were considered significant if $p < 0.05$.

Results

Subjects

Two hundred and eight surveys were

Characteristic		% (number*)
Age	18-24	1.5 (3)
	25-34	8.7 (18)
	35-44	24.6 (51)
	45-54	22.7 (47)
	55-9-64	16.9 (35)
	65 and over	25.6 (53)
Sex	Male	41.9 (85)
	Female	58.1 (118)
Home building insurance	Yes	97.0 (196)
	No	3.0 (6)
Home contents insurance	Yes	89.9 (187)
	No	10.1 (21)
Home building insurance paid	Yes	67.2 (131)
	No	32.8 (64)
Home contents insurance paid	Yes	77.1 (158)
	No	22.9 (47)
Past flooding of home (prior to August 1998)	Yes	24.1 (48)
	No	75.9 (151)
Flooding of home (since August 1998)	Yes	23.4 (47)
	No	76.6 (154)

* Do not add up to n=208 as some questions unanswered

Table 1: Characteristics of sample (n=208).

Characteristic	Mean (SD)	Range, median
Number of years living at residence (at time of storm)	18.3 (13.6) years	1 - 58, 16 years
Depth of water in home (as a result of storm)	482.3 (591.2) mm	0 - 5000*, 300 mm
Depth of water in yard (as a result of storm)	982.3 (624.2) mm	0 - 5000*, 1000 mm

*5000mm depth self-reported in Fairy Meadow

Table 2: Other characteristics of sample (n=208).

	none % (n)	very little % (n)	little % (n)	some % (n)	quite a lot % (n)	a lot % (n)
Before storm						
Anxious	62.4 (121)	13.9 (27)	6.7 (13)	5.2 (10)	6.7 (13)	5.2 (10)
Angry	78.9 (142)	8.9 (16)	3.9 (7)	0.6 (1)	2.2 (4)	5.6 (10)
Unsafe	70.9 (134)	11.1 (21)	4.8 (9)	2.1 (4)	6.3 (12)	4.8 (9)
Immediately after storm						
Anxious	2.1 (4)	3.6 (7)	8.8 (17)	18.0 (35)	25.8 (50)	41.8 (81)
Angry	14.4 (25)	11.5 (20)	3.4 (6)	21.3 (37)	11.5 (20)	37.9 (66)
Unsafe	10.9 (20)	6.5 (12)	8.7 (16)	14.7 (27)	19.6 (36)	39.7 (73)
Now (2 years after storm)						
Anxious	9.2 (18)	10.7 (21)	12.8 (25)	24.0 (47)	16.8 (33)	26.5 (52)
Angry	26.9 (47)	9.7 (17)	9.7 (17)	16.6 (29)	8.6 (15)	28.6 (50)
Unsafe	19.7 (35)	12.4 (22)	12.9 (23)	18.0 (32)	12.4 (22)	24.7 (44)

* Do not add up to n=208 as some questions unanswered

Table 3: Anxiety, anger and safety before storm, immediately after storm and two years on (n=208*).

returned from 152 households representing a 51% (152/296) household response rate (296 households reached by the mail-out). Thirty-seven per cent of replying households sent back two surveys. Surveys were returned from Wombarra in the north to Dapto in the south with Figtree having the largest number of respondents (20%). Tables 1 and 2 represent demographics of the sample.

Levels of anxiety, anger and safety

Responders were asked to rate their levels of anxiety, anger and safety during storms for three periods—before 1998 storm, immediately after and now (two years on). The 'quite a lot' and 'a lot' responses for now were combined and indicated that 43% still experience high levels of anxiety, 37% anger and 37% feeling unsafe (Table 3). This can be compared with the levels before the storm and immediately after the storm. Counselling was sought by only 8%.

Effect on children

The effect on children was examined with many parents reporting children still anxious in heavy rain. Out of 152 responding households, 43 households had 92 children (less than 18 years old). Eighty-six per cent (37/43) of these households with children reported that their children experienced anxiety when it rains. Some of the reported effects at the time of the storm and soon after included anxiety and panic attacks in rain, feeling unsafe, sleep disturbances including nightmares, behavioural problems, disruption to school and other studies (Higher School Certificate) and breakdown in family relationships. Fifty-eight per cent (25/43) reported that they still have problems two years on.

Preparedness

Fifty-two per cent felt more prepared in the event of another storm. These residents described positive actions such as removing carpets, raising storage areas and instigating a safety plan. Forty-eight per cent felt that there was nothing that they could do to lessen the risks. Accordingly, 41% had made changes to their home and/or property and 59% had not made any changes. Responses were also sought for the frequency of monitoring their local creeks and the perception of the likelihood of another storm (Table 4).

Relationship between two responses

The relationship between the present level of anxiety and preparedness was significant ($\chi^2= 14.07$, $p = 0.015$). The relationship between the present level of anxiety and the perception of the likelihood of another storm was also tested but Chi square analysis was not valid, as expected values were less than 5.

Attitudes

The surveys found that 82% of respon-

dents were angry with WCC. The reasons most frequently cited were the perception of not being listened to and WCC's apparent inaction. Some of the actions that respondents felt were necessary to lessen their anger with WCC were:

- better long-term planning
- limited/careful development near watercourses, on the escarpment, and in flood-prone areas
- consideration of downstream properties in upstream development.

Nineteen per cent of respondents were still angry with insurance companies. Respondents in some areas were angry at the Roads and Traffic Authority (RTA) (5%) and the State Rail Authority (SRA) (2%) for the effect of road design and railway embankments on flooding in their area.

Five per cent of respondents were angry at the Collieries' role in their flooding and property damage (Table 5).

Factors that increase the chance of flooding were also investigated. Ninety-two per cent of respondents nominated

Statement/ response		% (number*)
Feel more prepared	Yes	52.4 (88)
	No	47.6 (80)
Changes made to home	Yes	41.4 (77)
	No	58.6 (109)
Monitor creek	Constantly	42.7 (88)
	On/off	39.8 (82)
	Never	17.5 (36)
Likelihood of another storm	Very likely	26.3 (54)
	Likely	23.9 (49)
	Not sure	33.7 (69)
	Unlikely	10.2 (21)
	Very unlikely	5.9 (12)

* Do not add up to n=208 as some questions unanswered

Table 4: Preparedness for another storm/flood (n=208*).

Party (more than one party is allowed)	% (number)
Wollongong City Council	81.7 (170)
Insurance company	18.8 (39)
Government - State/Federal	5.3 (11)
Collieries (BHP and Allied)	5.3 (11)
Roads and Traffic Authority	4.8 (10)
State Rail Authority	2.4 (5)
Developers	1.7 (3)
Environment Protection Authority	1.0 (2)
Department of Community Services	1.0 (2)
Neighbour/s	1.0 (2)
Department of Urban Affairs and Planning	0.5 (1)
Department of Land and Water Conservation	0.5 (1)
Sydney Water	0.5 (1)
State Emergency Service	0.5 (1)
Bureau of Meteorology	0.5 (1)
Media	0.5 (1)
Solicitor	0.5 (1)
Hydrologists	0.5 (1)
Others (private parties)	1.9 (4)

Table 5: Parties that you are angry at now, two years on (n=208).

the lack of creek maintenance while 73% chose urban development (Table 6).

Discussion

Anxiety

In this survey, the level of anxiety when it rains remained high two years on. Those reporting 'quite a lot' and 'a lot' of anxiety when it rains reduced from 68% immediately post storm to 43% two years later. This is not unexpected. According to past research into natural disasters, major stress and health effects diminish, but do not disappear one year after events (Clayer et al. 1985).

As the question about anxiety when it rains did not clarify intensity of rain, the reported levels may be underestimated. The number responding 'quite a lot' and 'a lot' may have been higher if the question asked about 'heavy rain'.

The relationship between anxiety and insurance status is not known. The effect of either being uninsured or having claim denied on anxiety levels was not examined. Further, the impact of flooding before and since the 1998 storm was not tested against anxiety levels. Additional analysis of available data is necessary to investigate these relationships. Furthermore, the magnitude of loss as a result of the storm was not measured and therefore its relationship with anxiety levels is also unknown.

Few residents sought formal counselling. The Department of Community Services, the University of Wollongong,

church and other organisations offered counselling shortly after the storm event. It may be that affected residents were preoccupied with the clean up as well as the struggle to get paid. Many attended community meetings and demonstrations against insurance companies. This has implications for the timing of counselling services with counselling recommended for those still experiencing problems.

Further, families, friends and neighbours were an integral part of many people's emotional recovery. The importance of informal counselling and the power of community action in helping people cope and feel some sense of control cannot be understated.

The effect on children was harder to interpret as an open question was used and that brought a variety of responses. However, based on this survey's responses, further study into the effect of severe storm events on children is recommended. Again, counselling may benefit children with ongoing problems related to the storm/flood.

Preparedness

As the level of anxiety was related to preparedness, increasing and maintaining preparedness is essential. Lustig & Maher (1997) discussed declining community preparedness as one of the barriers to sustainable floodplain management plans. Around a quarter of the respondents had been flooded before and since (Wollon-

Factors that increase the chance of flooding in your area (more than onerresponse allowed)	% (no.)
Creek maintenance (lack of)	92.3 (192)
Urban development	72.6 (151)
Main roads	40.9 (85)
Climatic change	26.9 (56)
Railway embankments	20.2 (42)

Table 6: Factors that increase the chance of flooding in your area (n=208).

gong was hit by another storm in October 1999, but on a smaller scale). Experts have stated that it will happen again. Further, there are ongoing examples of developments with significant flood risks still being highlighted in the media (Lustig & Irish 2000).

In addition, more community education on flood mitigation is needed. Almost half of the respondents felt that they could not lessen the risks of future flooding. At the time of writing this paper, the State Emergency Service (SES), NRMA and WCC released the 'FloodSafe in the Wollongong Area' brochure (SES 2001). This is a step in the right direction. However, more detailed information is needed. Lustig & Maher (1997) made several suggestions for sustaining community preparedness.

The relationship between the level of anxiety and the perception of the likelihood of another storm was not established in this survey. In reality, this is not a simple relationship. There are many complex issues in risk communication. However, discussion of the subject is beyond the scope of this paper.

Attitudes

Initially, both the insurance companies and WCC were the target of people's frustration. Two years on, the insurance company fight was all but over. The community turned their attention to prevention and saw the WCC in the central role. There was concern over inadequate creek and drain maintenance and inappropriate urban development. Both factors were nominated by a large number of respondents as increasing the chance of flooding in their area.

The question of responsibility for creek maintenance is raised. There appears to be confusion about this issue with most respondents nominating WCC as the sole body responsible for maintenance of creeks. A few respondents mentioned private landowners and the Department of Land and Water Conservation (DLWC).

The community should be clearly informed about the role of all relevant authorities in maintenance of their local creek. A coordinated approach is required but the reality is that coordination between government agencies is problematic (Lustig & Maher 1997).

Further, these government authorities should engage in more community consultation. The majority of respondents were angry with WCC as they felt that their concerns were not addressed. Lustig & Maher (1997) discussed the importance of representatives from the flood-prone community on floodplain management committees. By mid-2001 the WCC had commenced the appointment of community representatives on such committees. It is hoped that these Floodplain Management Committees operate permanently, not only when Floodplain Management plans are being drawn up (Lustig & Irish 2000).

WCC was also blamed for inappropriate development that has increased flood risks in many areas. Very few respondents mentioned other government bodies. In this concern, the role of departments such as the DLWC and the Land and Environment Court (L&E Court) is not clear to many residents. Lustig & Irish (2000) suggested that the DLWC and the L&E Court take more responsibility in opposing inappropriate developments in Wollongong.

In some areas, respondents were angry with RTA and SRA. The responsibility of these authorities in development issues that impact on flooding in any area is undisputed. Again, a coordinated approach with community consultation is essential.

Many respondents were still angry with insurance companies. It is unclear how many of these had their claim denied by their insurance company. While most insurance companies paid, with some making changes to their policies to cover some types of flooding, there is no guarantee for the future. The debate about wording of these policies will continue and puts at risk future coverage. In addition, flood insurance does not assist those in our community who are unable to afford insurance (Buckle & Fleming 2001). Most affected residents would agree that insurance or no insurance, they do not wish to repeat the experience.

A smaller proportion of respondents was angry at coalmines. This reflected the experience of residents in the suburbs of Keiraville and Bellambi who had tonnes of coalwash and sludge in their homes. The former BHP Kemira mine and Allied's

Bellambi colliery are located along the escarpment and have coal stockpiles which were lost in the heavy downpour on 17 August 1998. Discussion of the issues surrounding these coalmines and the 1998 storm is worthy of further investigation.

Limitations

The survey was only sent to people on the SWAG mailing list. Therefore the responses cannot be generalised to the wider community who was affected by the August 1998 Wollongong storm. In addition, it is not known whether responders differed from non-responders in any significant way. Further, the survey was undertaken at the second anniversary of the storm, which may have heightened people's responses in the questionnaire.

The questionnaire was considered an appropriate measurement tool for this study. However, it is important to acknowledge some of its limitations. As this questionnaire was not piloted, some of the questions may have been misunderstood. Moreover, the problem of recall and influence of wording and ordering of questions on responses necessitated careful interpretation of the findings.

Conclusion

Based on the findings of this survey, the Wollongong storm of August 1998 had a significant impact on affected residents long after the initial clean up. This is evidenced by ongoing feelings of anxiety in rain for adults and children, many still feeling unprepared for another storm and the persistent anger toward the actions of WCC and other government bodies. To address these problems, recommendations are made for counselling, community education sessions on flood mitigation, more community consultation by local and state government agencies and a coordinated approach to storm/flood management by all relevant authorities. It is essential that the storm/flood issue stays on the public agenda and that the community continues lobbying for changes to floodplain management and urban development in the Wollongong area to lessen future flood risks.

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About the author

Anita Fletcher's family home of 20 years was one of the many Wollongong homes affected by the storm of 17 August 1998. She acted as secretary for Wollongong SWAG and continues her interest in floodplain management and urban planning in the region and insurance policy changes. This study was undertaken while she was in her final year of a Master of Public Health degree at the University of Wollongong. However, the study was done in her own time and did not form part of her Masters requirement. She works as a Physiotherapist with the Illawarra Area Health Service.

All correspondence to Anita Fletcher. email: anitafletch@hotmail.com.

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