YOU CAN'T MOVE THE TOWN ..... SO YOU MUST MAKE IT SAFE

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1. INTRODUCTION

There was a time in the history of New South Wales when the relocation of flood liable communities was possible: during the nineteenth century Bega, Nowra, Moama and Gundagai were all moved to their present sites after having initially developed on floodplains nearby. In each of these cases, catastrophic flooding was the stimulus for the relocation. The most disastrous experience was Gundagai's; there, in 1852, 89 people of a total population of about 250 were drowned when a flood swept away the town which was then confined largely to the floodplain of the Murrumbidgee River.

In those days, of course, the volume of fixed public and private investment in floodplain settlements was small and accordingly it was possible for whole towns to be moved to new sites. More recently the scale of such investment has made such relocations unthinkable. The nearest equivalents over the past fifty years have probably been the cases of Kempsey and Maitland, where the redevelopment of individual residential streets was proscribed after large numbers of dwellings were destroyed or severely damaged during the disastrous floods of 1949 (Kempsey) and 1955 (Maitland).

It is all but certain that we will not in the future see significant instances of the `rolling back' of past development in NSW towns, except where it is market-driven, and it is virtually impossible to contemplate the relocation of whole towns. Even when large parts of towns are inundated and substantial damage is caused, as at Nyngan in 1990 and Inverell the following year, the political imperative is such that the communities respond by rebuilding on the existing sites rather than by relocating their investment. In a sense, the existing settlement pattern has been frozen into place, and large amounts of developed, built-up land in flood liable situations are the legacy.

Given that the former relocation options are no longer available, the emphasis must be on making floodplain communities safe by preventing flooding as far as possible, reducing the frequency of inundation, modifying structures *in situ* by flood-proofing them, providing improved warnings, and developing evacuation strategies. The task nowadays is to identify, on a case-by-case basis, the optimal mix of structural (flood-modifying) and non-structural (community-modifying) measures to protect life and property in areas that are or could be liable to inundation.

There are signs that the nature of this mix has itself been subject to evolution over time. Twenty or thirty years ago the construction of levees, bypass floodways, retarding basins and other structural devices made up a substantially larger portion of the flood mitigation effort than has more recently been the case. As the feasible opportunities for the creation of such structures have gradually been taken up, the emphasis has gradually shifted toward the promotion of non-structural options including flood proofing, development controls and the development of flood forecasting and warning systems. One of the consequences of this shift has been that new forms of expertise have been brought to bear in developing the elements of community flood management processes. New agencies have become involved, too, and the roles of the different players have been subjected to modification.

This paper examines the evolving role of the State Emergency Service as a contributor to the

floodplain management process. It comments on the organisation's developing involvement in the management of floodplain development and outlines its recent work in the fields of flood planning, the development of flood warning systems and the raising of flood awareness levels in flood liable communities.

2. TOWARDS LINKING FLOODPLAIN MANAGEMENT AND EMERGENCY MANAGEMENT

The State Emergency Service was created in 1955, in the aftermath of the disastrous floods on the Hunter, Macquarie and other river systems early that year. For some time the SES's role was not defined by law, and the service's activities were largely confined to response **during** the actual occurrence of floods - that is, to evacuation, rescue and resupply functions. Even the first SES Act, which was proclaimed in 1972, failed to modify significantly this relief or response bias in the organisation's activities. While some planning work was done and some attention was given to warning communities of coming floods, at-the-time response activities continued to dominate the SES interest in flood management.

One result of this response-oriented stance was that the SES remained largely outside the developing concern for floodplain management in the flood liable parts of NSW. The principles of floodplain management from the mid-fifties onwards were largely shaped by engineers and town planners in local government councils and state agencies. A high-quality floodplain management process evolved which has justifiably been the subject of much positive comment in the flood management literature.

Arguably, however, some elements of the process remained underdeveloped or, if operative, were treated as `add-ons' to the land and water management aspects of floodplain development and were not well tied in to these principal foci. Warning measures were often technically based and not clearly focussed on the needs of end-users (the flood prone communities), detailed evacuation planning was lacking even in areas where floods could be seen to be highly dangerous in terms of potential injury and loss of life, and little attention was given to the question of raising flood awareness and ensuring that the residents of flood liable communities understood and were prepared for the threat of flooding.

In essence, the engineers and planners who were responsible for the development of floodplain development strategies tried to implement all of them - but the emphasis was on visible, physical structures and on technical approaches to solutions. There was little input from the SES as an emergency management organisation, partly because the service had no legal obligation to develop any of the desired management outcomes, and not surprisingly some aspects of the process remained relatively underdeveloped. In particular, the notion that **people** had to be prepared for flooding as well as ensuring that appropriate **structures** and **systems** were developed was perhaps given inadequate attention or was treated as secondary.

Hindsight suggests that in the conceptualisation of the floodplain management problem the focus was on the tangible costs of flooding rather than the intangible ones. This, of course, is understandable given the need to justify often expensive structural mitigation options on a cost-benefit basis and given also that the incorporation of intangible damages in such equations is at best difficult and at worst almost impossible. It also suggests, however, the need for a new balance to be struck if all of the aspects of floodplain management are to be developed equally.

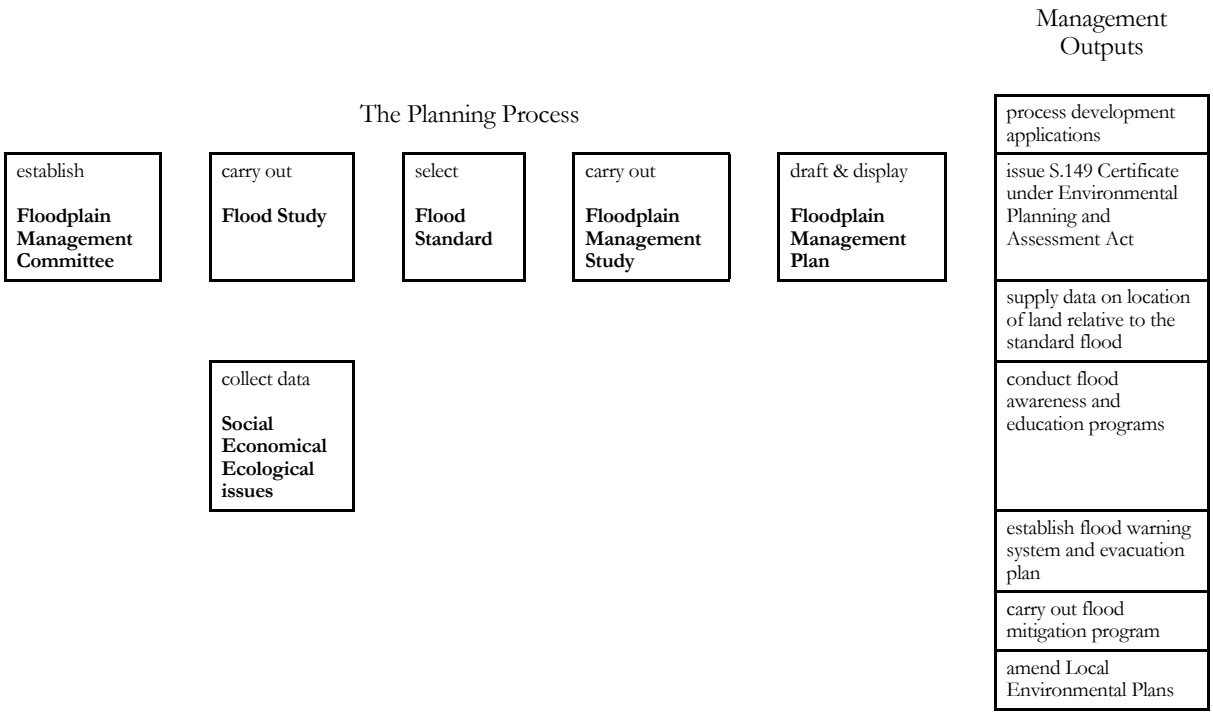
In 1989 a new SES Act was proclaimed. This Act required the SES `to act as the combat agency for

dealing with floods (including the establishment of flood warning systems) and to co-ordinate the evacuation and welfare affected communities'. The implementation of this legislation has forced the SES to bring **preparedness** activities to the fore: the result has been a major thrust towards flood planning which incorporates the development of the warning and evacuation functions and, increasingly, initiatives to raise community awareness of flooding. Now, six years after the proclamation of its Act, the SES culture has been perceptibly altered and the organisation is now well placed to develop these functions further. Indeed it must: the 1989 legislation requires it to do so.

The organisation recognises, however, that initiatives relating to the development of warning and evacuation measures and the implementation of public awareness programs must be linked to other aspects of floodplain management planning in line with the `integrated approach' to emergency management. In other words the necessary links between the various aspects of the floodplain management process need to be developed and maintained.

The diagram which follows (Figure 1) is a slightly simplified version of the one which encapsulates the Floodplain Management System as it has operated in NSW for nearly a decade (NSW Government, 1986). Depicted are the planning process and its outputs, which include the establishment of structural measures, development controls, warning systems and evacuation arrangements and the development of programs to increase flood awareness.

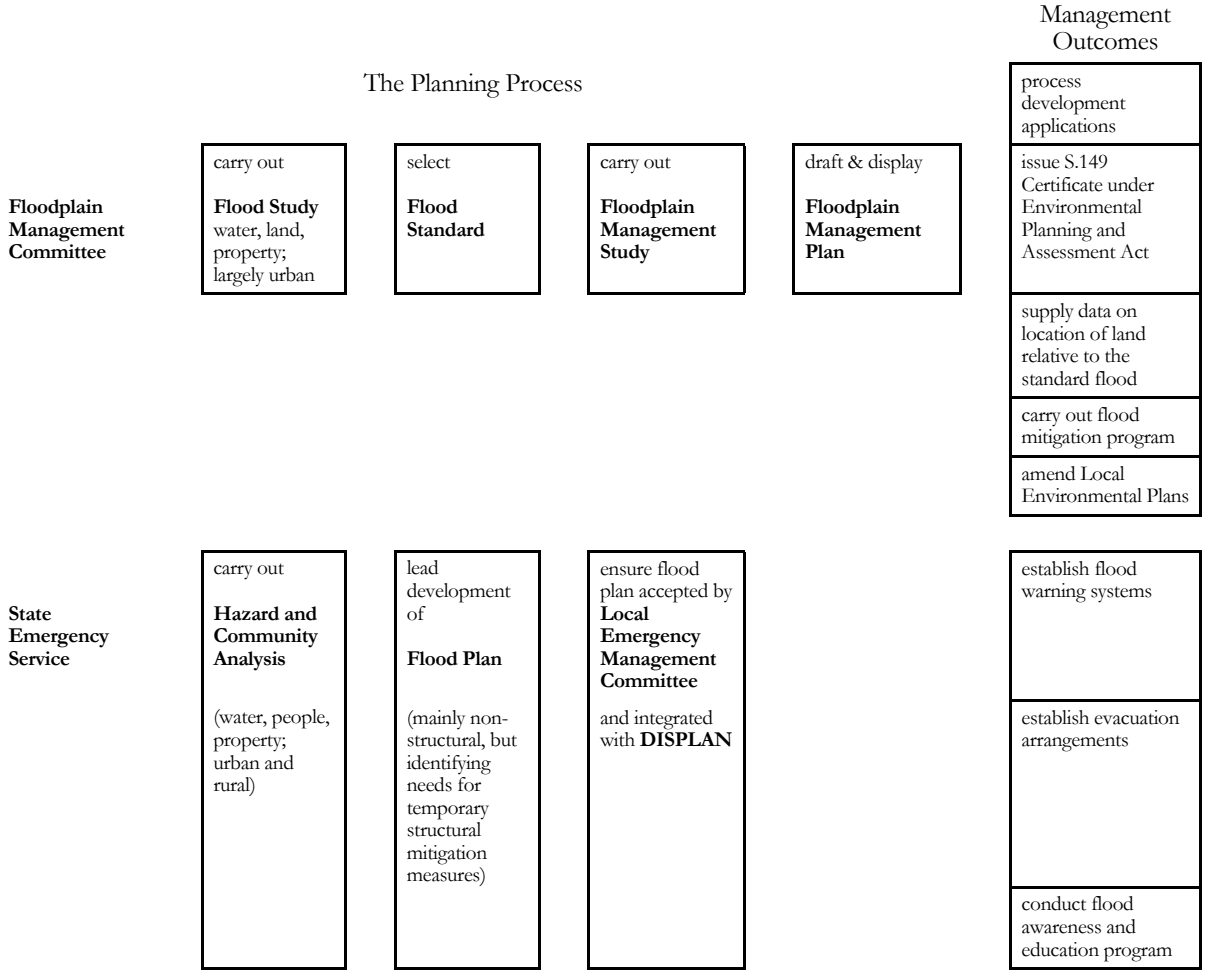
Figure 1: Abridged Version of the Current Floodplain Management System in NSW



With slight changes of emphasis, this diagram could be recast as shown in Figure 2 to provide a more accurate representation of the process as it has recently come to operate. This reformulation suggests that in reality there are two parallel processes. One of these is initiated by a concern with the interaction between land, property and water, for the most part in flood prone **towns**, and culminates in the carrying out of structural mitigation works and the application of planning (developmental and zoning) tools to guide the future evolution of the urban fabric. This strand incorporates the bulk of the floodplain management task as we have known it in NSW.

The other strand begins with an examination of the flood hazard in the context of the community (including people and their property in towns **and** in surrounding rural areas) and proceeds to the production of a flood plan which deals mainly though not exclusively with non-structural measures - especially the development of warning systems and evacuation procedures and the creation of a community which has a heightened awareness of the flood threat which it faces. This strand focuses primarily on the maintenance of public safety and on helping people to mitigate property damage during actual periods of flooding. Structural works which may need to be constructed as temporary measures when floods are rising are dealt with as part of this strand.

Figure 2: A Modified Version of the Floodplain Management System



This second conceptualisation, it is argued, adds the emergency manager's perspective on floodplain management to those of the engineer and town planner. It is driven as much by safety-based intangibles as by property-related matters of tangible damage.

It is important to note that this conceptualisation does not lead to the development of two **independent** strands. Rather, it allows for the strengthening of one of the strands in a way which leads to a stronger process overall. This strengthening comes from an **integration** of the two strands at various stages in their development, beginning with the flood study. While the first five management outcomes listed in Figure 2 will be derived largely from the first strand and the latter three mainly from the second, there will be links which will reinforce this interdependence between them. An example is the need to have a warning system (Strand 2 outcome) which will allow decisions to be made to `operate' a levee system (Strand 1 outcome) - either by closing gates at appropriate times or by determining when and to what degree a levee might require upgrading to hold out a coming flood. A further example is the need for councils and the SES to conduct flood

awareness and education programs on a co-operative basis. Other similar linkages can be imagined.

Current NSW flood policy is based on the ideal of an `integrated' approach to land planning and management. Emergency managers in Australia strive to apply `integrated' and `comprehensive' approaches to the problems of emergency management (Commonwealth of Australia, 1989). In NSW we are nearing the point at which we can actually apply these concepts in practice.

3. THE NSW FLOOD PLANNING PROJECT

In 1991 the SES embarked on a major planning project in NSW. The goal of this project was to produce a series of plans covering arrangements for the management of floods in all flood liable areas of the state. In 1991, 1992 and 1993 the SES reported on the progress of this project at the annual conference of the Flood Mitigation Authorities of NSW. Now, it can be indicated that 107 of the intended 133 Local Flood Plans have been produced and drafts of the remaining 26 should be completed by early in the 1995-96 financial year. All local government areas with a problem of riverine flooding will by then be covered by a plan designed to deal with all levels of flooding, from minor freshes in watercourses to floods more severe than have been seen since European settlement (and, where necessary, floods resulting from dam failures). Each plan specifies, among other things:

a. The nature of the flood threat.

b. The areas which could be affected by flooding.

c. The responsibilities of the various agencies with roles to play before, during and after a flood.

d. Warning arrangements.

e. Control arrangements.

f. Arrangements for passing information to flood-affected communities.

g. Evacuation arrangements.

h. Resupply arrangements.

i. Initial recovery arrangements.

As these plans are written, they are being forwarded to other agencies for their comments and to allow the negotiation of responsibilities. A formal process of consultation is necessary to ensure that a plan is understood by all the relevant agencies and that those agencies will develop ownership of and commitment to it. Once the various agencies have indicated that they will be able to carry out the roles specified for them, the plan is taken to the relevant Local Emergency Management Committee for formal endorsement and adoption as a sub-plan of the local disaster plan (DISPLAN).

As appropriate, SES Local Controllers are then being asked to brief their councils on the planning process and on the content and purpose of the plans. The process has, of necessity, been a slow one, but the SES believes this is necessary to ensure that the plans are well considered and that the commitment of the various players is achieved.

These local plans are not the only flood plans to have been produced. In addition there are 17

regional (SES Division) flood plans and a State Flood Plan which were written between 1991 and 1994. With acceptable drafts of almost all of the local flood plans how having been produced, revisions of these higher-level plans are intended to be carried out in 1995-96. The revision of the State Flood Plan will, it is hoped, be undertaken with input from people who have been involved in the Floodplain Management process in NSW.

The flood planning project has played a major part in augmenting the expertise of SES volunteers as flood managers and in ensuring that appropriate flood management arrangements are developed in NSW. It is vital, however, that the plans are kept alive so that they will remain as operationally useful documents. Regular briefings of SES personnel, and of the personnel of other participating agencies, are intended so that the plans do not gather dust on shelves. Equally, discussion and tabletop exercises are being held to ensure that key players -especially SES Controllers, Local Emergency Operations Controllers and Local Emergency Management Officers - understand their roles and the interactions between them. Last year, successful flood exercises were carried out in the Richmond-Tweed and Clarence SES Divisions in the state's north-east, and further such exercises are planned for 1995 and beyond. In August, a flood exercise will be held in the Sydney Western SES Division which contains the Hawkesbury River.

Exercises provide opportunities to reinforce the goals of a flood plan and to educate flood managers about flooding and its management. Equally, and like floods themselves, they can be used to review the contents of a plan and to initiative improvements. Each of the flood plans produced in NSW is to be reviewed after every flood event and, if no floods occur within a three-year period, after that period has expired. Such reviews will trigger a further process of consultation leading to a re-endorsement of the updated plan and further exercises. The process is continuous and never-ending: each iteration serves to improve the quality of the plan, to incorporate changes to the flood environment and the management arrangements, and to educate those with roles to play when floods occur.

4. FLOOD WARNINGS

The SES Act 1989 specifically mentions `the establishment of flood warning systems' as part of the agency's flood management role. In practice this has meant participating with other agencies in the development of flood warning policy via the state's Flood Warning Consultative Committee (FWCC), ensuring that appropriate arrangements for warning communities are written in to the various flood plans, and ensuring that SES personnel are adequately trained for the flood warning task.

The FWCC, whose member agencies apart from the SES are the Commonwealth Bureau of Meteorology, NSW Public Works, the Department of Land and Water Conservation, Sydney Water, the Department of Local Government and Co-operatives and the NSW Flood Mitigation Authorities, is responsible for overseeing the development of flood warning policy and co-ordinating the development of flood warning systems within the state. Essentially, this charter has meant upgrading gauges on the state's rivers to improve the flood prediction capability of the NSW Flood Warning Centre which is located within the regional office of the Bureau of Meteorology in Sydney, but the FWCC has also played a key role in the production of a best-practice manual for personnel involved in flood warning tasks entitled `Flood Warnings: an Australian Guide'. The contents of this guide were discussed in the SES contribution to the 1994 conference of the Flood Mitigation Authorities and a paper at the 1992 conference outlined current needs as regards flood warning practices in NSW.

This manual has been used since late 1994 to train SES personnel so that they are able more

effectively to comprehend their flood warning role and deliver high quality warnings to their communities. The training has been carried out in a series of workshops around the state which will continue into 1996. Each workshop deals with the nature of flood warning systems, the development of predictions of flood severity, means of assessing where the water will go, and the production and dissemination of warning messages. The major tool in these workshops has been `Flood Warning: an Australian Guide'. Where appropriate, personnel from other agencies with responsibilities relating to the flood warning task are being and will be invited to participate in these workshops.

The workshops will help ensure that the SES is able to warn effectively of coming floods. Warning arrangements are also being written into the flood plans and intelligence systems and are being developed so that the Bureau of Meteorology's flood predictions can be `translated' into the effects which are likely to be felt at the community level. Understanding in advance the probable consequences of a coming flood is, of course, the basis for authoritative warning messages which will help community members respond appropriately to the event - whether this means stocking up on food, avoiding certain roads on the journey to work, lifting pumps and moving stock, or raising belongings and preparing to evacuate.

In some instances, the Bureau of Meteorology is unable to provide a formal flood prediction service to flood liable communities. Where this is the case - on Mirrool and Billabong creeks in the state's southern interior, for example, and for communities between key gauges on major rivers - the SES has sought to develop an informal system of warnings based on the upstream-to-downstream passage of flood information or the provision of local flood advice derived from upstream predictions. In some instances, this function has been carried out by tapping in to long-existing community `self-help' warning practices in such a way that information can be derived and disseminated via media outlets.

The effectiveness of high-quality warning systems in helping people to mitigate the costs of coming floods is well established. New South Wales has for some time been well served by the Bureau's flood prediction service, but the predictions have not always been used to best effect in terms of providing actual warning advice to communities. The development of intelligence systems will be of benefit here, particularly when allied to improved practice in the construction of warning messages and their dissemination to the people who are threatened by flood waters.

5. FLOOD AWARENESS AND EDUCATION

It is a basic tenet of emergency management that communities which are both aware of and understand the threats they face will deal better with them when they strike because they will know what to do to stay safe and mitigate damage. Effective warnings can help here, but there is a need to promote flood awareness **outside** of flood time as well. Now that many of the flood plans have been written, a useful tool exists to educate communities about the flood threat.

The flood plans all outline the responsibility which the SES Local Controller has to promote flood awareness within flood liable communities. There is a role for councils here, too, as the list of strategies shown in Figure 3 indicates. Plans can be placed in council libraries and on rates desks, they can be advertised and discussed in local media outlets, and flood action guides and other flood information can be provided to people and premises at risk of flood inundation. The potential range of strategies is great.

Figure 3: Some Strategies for Increasing Public Awareness about Flooding

- Flood plans in Council libraries.
- Flood plans on Council rates desks.
- Flood material provided to the Mayor for radio broadcasts.
- Displays of flood material at shows, etc.
- Newspaper articles on flooding and the flood plan.
- Interviews on local radio stations.
- Commemoration of anniversaries of record or other well-remembered and significant floods.
- Public meetings.
- Drops of flood action guides.

In the valley of the Hawkesbury River in 1994, a major flood education campaign was mounted by a number of state government agencies, with council help, using several of these strategies. Early this year, which is the 40th anniversary of the catastrophic Hunter Valley flood which devastated Maitland, an effort was made to mount a commemorative event which could be used to heighten community understanding of the flood threat there. This effort, in which the Hunter Catchment Management Trust, NSW Public Works, Maitland City Council, Singleton Council, the Maitland Mercury, the Singleton Argus and the SES were partners, involved parades in the streets of Singleton and Maitland, displays of flood memorabilia, flood clips on television, inspection tours of flood mitigation works and the publicising of flood plans in newspaper articles. The evidence is that considerable public interest was aroused, and that such commemorations constitute worthwhile opportunities for raising the level of public understanding about the flood threat. At Maitland, the opportunity was taken to debunk some well known flood myths - for example, that a flood as severe as that of 1955 could not happen again, and that the mitigation system of levees, floodgates and spillways will render all future floods harmless.

The SES will seek to conduct other such commemorative events in other parts of the state in 1996 and beyond, and will attempt to involve councils and other organisations as appropriate.

6. CONCLUSION

It is unfortunately a fact of life in NSW that floods are inevitable, and some of them will be very severe. A wide range of initiatives can be employed in mitigating their effects, however, and numerous agencies have a role in this important task. In recent times the SES role in the flood management field has altered considerably, and the organisation has moved away from its previous bias towards `at the time' response by adding a strong preparedness focus to its approach. That being the case, the SES is ready to contribute to the floodplain management process to a greater extent than previously, and seeks the continued co-operation of councils and other agencies in the work it is doing in relation to flood planning, flood warning and the promotion of flood awareness at the community level. There is much that remains to be done, but significant progress is being made on all these fronts to make flood liable communities safer places in which to live.

7. REFERENCES

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