A new approach to flood education (booklet)

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A NEW APPROACH TO FLOOD EDUCATION

By Neil Dufty, Principal, Molino Stewart Pty Ltd

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Recovery: the process of returning to “normality” after an emergency occurred. The post-disaster phase that is also used to increase safety and preparedness.

Resilience: describes the capacity of systems to maintain their integrity and the relationships and balance between elements in the presence of significant disturbances by drawing upon internal resources and competencies to manage the demands, challenges and changes encountered.

Risk perception: the level of perceived threat or risk posed by a hazard.

Self-efficacy: people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. It influences people’s receptivity to information and the likelihood of their adopting risk reduction behaviours.

Sustainability: means that decisions made by the present generation will not reduce the options of future generations, but will pass on to them a natural, economic and social environment that will provide a high quality of life.

Vulnerability: refers to the inability of people, organizations, and societies to withstand adverse impacts from multiple stressors to which they are exposed. These impacts are due in part to characteristics inherent in social interactions, institutions, and systems of cultural values.

INTRODUCTION

3 August 1990 – I’ll never forget that date. My family, including our two young children, was living at Pitt Town on the outskirts of Sydney, in a flood-prone area close to the Hawkesbury River. We were relatively new residents of four years - you had to be there at least 30 years to be called a ‘local’. Nevertheless, we had experienced a few small floods in our ‘short’ stay that came close to, but did not inundate, our house.

About five kilometres away from where we lived was my ‘business’ – I was teacher-in-charge of Longneck Lagoon Field Studies Centre, a special school that taught environmental education to over 6,000 visiting students per year.

The Centre’s main building had been built well below the 1-in-100 level (who allowed that to happen?) and had already been flooded to a depth of over 1.5 metres in the 1978 Hawkesbury River Flood, well prior to my employment there. So, although I hadn’t experienced a flood at the Centre, I knew it could flood.

And so on the third of August, after several days of torrential rain, we knew this could be a ‘big flood’. It was. Our home was inundated with about 30cm of water and the Centre building to a depth of about one metre.

In hindsight, we were reasonably well prepared at home, having listened to ‘local knowledge’ about vertically-raising items (we had a two storey house) and using rugs as floor coverings that could be lifted. Neighbours and the SES provided great support and advice during the flood. Recovery was relatively easy with only a ‘wash out’ of debris required and then a ‘dry out’ which took about a week.

On the other hand, our preparedness for the level of inundation at the Centre was poor. Based on flood warnings, as the River started to rise we did evacuate staff early to allow them to return to their homes safely. But we had no real plan to minimise damage to office and other equipment and, as a result, there was extensive damage. It took well over a month to recover. Fortunately, the damage cost was covered by State Government insurance – if the Centre had been a private business it may never have opened its doors again!

I learnt from these floods that preparedness planning is critical both for the home and business. However, it is only part of the ‘resilience equation’ - a community’s capabilities, networks, leadership, re-
sources etc all could contribute to how well it will respond and re-
cover, and improve ready for the next flood.

This flood experience has motivated me to help communities build
their resilience to floods and other natural hazards. Based on my
long history of involvement in community education, especially envi-
ronmental education, I believe there is great value in community
flood education to help build this resilience.

Fortunately, over the past four years through my employment at Mo-
lino Stewart Pty Ltd, I have been able to conduct extensive research
into aspects of flood resilience and related community education.
This research has mainly been carried out for the NSW State Emer-
gency Service (NSW SES) and the Victoria State Emergency Ser-
vice (VICSES) and I acknowledge the help of the following staff:

- David Webber, Phil Campbell, Steve Delaney, Catherine
  Moyle, Andrew Gissing and Steve Opper (NSW SES)
- James Haley, Fiona Dunk and Mary Barry (VICSES)

I would also like to acknowledge the work of Amanda Hyde (Hunter-
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nated the development and implementation of the Maitland Flood
Education Strategy described in the ‘Planning’ section of this booklet.
Steven Molino, our Molino Stewart flood ‘expert’, has provided me
with a great insight into floodplain management and commented on
the education approach outlined in this booklet.

The aim of this booklet is to especially provide those involved in
floodplain and emergency management with an understanding of a
new approach to flood education that is starting to be used by or-
ganisations such as NSW SES and VICSES.

The approach outlined in this booklet has been developed from sev-
eral sources including:

- Evaluations of community flood education programs from
  around the world
- Psychological research into individual and community haz-
  ard preparedness
- Social research into flood preparedness and response
- Studies of community resilience
- Evaluation of approaches in other community education
  (e.g. sustainability education, health education) that aim to
  achieve behavioural and systemic change.

GLOSSARY

Adaptive capability: the systems and competencies required
by people and communities to coordinate and utilise
behaviours and resources to confront and adapt or
adjust to the hazard event.

Community: includes all spheres of government, business
and industry and the general public.

Critical Awareness: extent to which people think and talk
about hazards.

Empowerment: multi-dimensional social process that helps
people gain control over their own lives. It is a pro-
cess that fosters power (that is, the capacity to imple-
ment) in people, for use in their own lives, their com-
munities, and in their society, by acting on issues
that they define as important.

Evaluation: an objective and considered assessment of the
efficiency, effectiveness and appropriateness of a
project or program.

Flood education: is any learning process or activity that
builds community resilience to flooding.

Hazardscape: the landscape of many hazards. The interac-
tion among nature, society, and technology at a vari-
ety of spatial scales creates a mosaic of risks that
affect places and the people who live there. The
term is normally used in reference to a specific place
or region.

Outcome expectancy: the perception of whether personal
action will effectively mitigate or reduce a problem or
threat.

Participation: the active and constructive engagement of
people. It is a bottom-up process within which peo-
ple enter (and often help create) spaces for interac-
tion and influencing of decision-making mechanisms.

Preparedness: the process by which behaviours and re-
sources (e.g. emergency plans) that facilitate coping
with the hazard event are developed and main-
tained.

Problem-focused coping: involves confronting the hazard
problem and represents a mechanism for facilitating
resilience.
The booklet firstly explains the significance of ‘resilience’ and outlines the new approach in this context. It then provides details of the new approach and examples of practical education activities related to it.

I trust that this booklet will provide you with the background and tools to commence or improve your flood education program.

Neil Dufly
RESILIENCE

Before describing the new approach to flood education, it is important to understand the meaning of ‘resilience’, particularly in its strategic context.

According to Paton (2006a), resilience ‘is a measure of how well people and societies can adapt to a changed reality and capitalise on new possibilities offered’. In terms of flooding, resilience involves the ability of a community to not only resist and recover from a flood but also to adapt to the changed realities that the flood may cause. It therefore includes the ability of a community to learn from the flood experiences and to improve its systems and capabilities for the next event.

The antonym of resilience is generally viewed to be ‘vulnerability’. Whilst resilience refers to the ability to resist and adapt to a disaster, vulnerability refers to the tendency of something to be damaged in a disaster (SOPAC, 2004). Vulnerable communities can be defined with respect to demographic (e.g. age, ethnic minority status, educational level) and socio-economic (e.g. family dynamics, economic resource limitations, limited social network access) characteristics.

However, according to Paton (2006b) and other researchers, this opposite relationship between resilience and vulnerability cannot be assumed. In fact, vulnerability factors may co-exist with factors that facilitate a capacity to adapt to adverse circumstances i.e. assist resilience (Caddell et. al, 2003). Paton (2006b) cites the example of some groups that would be seen as ‘vulnerable’ (e.g. ethnic minority status, age and poor educational status) but have demonstrated better than anticipated levels of community participation and empowerment.

Apart from its immediate economic and social benefit, resilience has a critical role to play in two connected global issues – climate change and sustainability.

It will be crucial for communities to build their resilience to adapt to the impacts of ‘accelerated’ climate change. Tompkins and Adger (2004) stress the importance of community resilience-building in addressing the uncertain, yet inevitable, impacts of climate change. ‘Communities need to enhance their capacity to adapt to the impacts of future climate change, particularly when such impacts could lie outside their experienced coping range.’

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MOLINO STEWART SERVICES

Molino Stewart is an environmental and hazard management consultancy firm based in Parramatta, NSW. The firm was founded by Company Principals Peter Stewart and Steven Molino in 1995. It employs specialists in the fields of hazard management, education, ecology, planning, GIS, community consultation and engineering.

Molino Stewart has particular expertise in aspects of floodplain management including evacuation planning, flood education, evaluation of warning systems and flood-related urban planning. The firm produces Floodplain Manager, a periodical that is distributed throughout Australia.

Molino Stewart can assist communities and agencies with a range of flood education projects related to the approach in this booklet. These projects could include:

- Facilitation to assist community committees develop their local flood education plans
- Expert guidance in the development of flood education plans, programs and activities
- Evaluation of flood education programs and plans
- Social research including post-flood reviews e.g. of warning systems, community preparedness and response, impact of flood education programs and plans
- Development and delivery of training programs
- Development of school education programs (e.g. lessons, learning activities) based on relevant curriculums
- Preparation of community engagement tools e.g. personal and business flood planning guides

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In terms of flooding, most climate change models predict increases in the intensity of rain events and floods exceeding the 1-in-100 year flood in parts of Australia in the next 50 years. With the limitations of structural works to protect communities already acknowledged, in a future of increased flooding risks communities will be even more exposed. The need for resilient communities becomes paramount in this climate change context.

‘Sustainability’, although being a goal of many societies throughout history, was only placed formally on political agendas in 1987 and accepted as a widespread international policy in 1992 at the Rio Summit. At a national scale, Australia was an early leader in translating sustainability into policy and law, and state/territory regional and local bodies have also pursued it actively.

The importance of resilience in relation to sustainability has been well documented. Critical to sustainability, both social and environmental, is the ability for systems to be ongoing and resilience helps to ensure this. According to Folke (2002), ‘more resilient social-economic systems are able to absorb larger shocks without changing in fundamental ways’. He adds that ‘management that builds resilience can sustain social-economic systems in the face of surprise, unpredictability and complexity. Resilience-building management is flexible and open to learning’.

Governments are now starting to actively support this linkage between resilience-building and the broader goal of sustainability. For example, the US Federal Emergency Management Agency in 2000 produced ‘Planning for a Sustainable Future’, linking hazard mitigation and disaster management with resilience-building to achieve sustainable communities. Dovers (2004) notes that ‘sustainability and disaster management are closely connected in terms of substantive issues and of underlying research on policy challenges’.
A NEW APPROACH

‘Flood education’ is defined in this booklet as ‘any learning process or activity that builds community resilience to flooding’. The term ‘community’ includes all spheres of government, business, industry and the general public.

A strategic relationship between flood education and sustainability is shown below.

It should be acknowledged that flood education is only one mechanism to build community resilience and resilience-building is only one part of the pathway towards sustainability. The terms ‘preparedness’ and ‘adaptive capability’ are discussed later in this booklet.

Through the above linkages, there are opportunities for flood education and education for other natural hazards (e.g. bushfire, earthquake, tsunami) to become part of ‘education for sustainability’ initiatives.

SUMMARY

The main points to note in the new approach to flood education outlined in this booklet are:

- Flood education is ‘any learning process or activity that builds community resilience to flooding’.
- Flood education will become increasingly important to help communities adapt to the impacts of flooding related to ‘accelerated climate change’.
- Flood education also has a role, as part of ‘education for sustainability’, in helping communities move towards sustainability.
- Flood education should be delivered in a way that communities are empowered to research, plan, implement and evaluate their own learning activities.
- Emergency management agencies should act as ‘consultants’ to communities in flood education (e.g. as facilitators, resource providers, change agents, coordinators) rather than directing the change process in a ‘top-down’ manner.
- There are four functions of community flood education related to the ‘flood cycle’ – preparedness conversion, learning mitigation behaviours, learning how to build adaptive capabilities and learning from flood events.
- Flood education should be delivered in communities on a regular basis and not as a one-off ‘campaign’.
- A ‘local community flood education plan’ is an effective way to deliver flood education to communities and parts of communities.
- Local flood education plans should be based on the four functions of flood education and developed by community representatives with authorities.
- Flood education programs and plans should be evaluated as they proceed to ensure continual improvement.
- Social research should be used as an important tool in the planning, implementation and evaluation of flood education programs and plans.
- Opportunities for the integration of flood education in cross-hazard (and cross-agency) programs and plans should be identified and implemented where possible.
- Flood education planning should be part of floodplain and emergency planning processes.
Where possible, the evaluation of community education plans and programs should involve the community or its representatives. Participatory evaluation involves local stakeholders in problem identification, evaluation design, data collection, analysis and use of results. Stakeholders include those who affect or are affected by the policies, decisions and actions of a program. Participatory evaluation has already shown to be effective in several fields including sustainable development, health and agriculture (McDuff, 2002).

Before embarking on a description of the new approach to flood education, it is important to dispel some myths about flood education.

**MYTH 1 ‘AWARENESS-RAISING IS CRITICAL’**

Most flood education programs and their learning activities are based on the premise that raising individual awareness will lead to appropriate preparedness and response behaviours. According to Paton et al. (2003), ‘It is frequently assumed that providing the public with information on hazards and their mitigation will encourage preparation. This assumption is unfounded.’ Several researchers, such as Boura (1998), have demonstrated that there is not a strong and causal link between being aware of a hazard and acting appropriately for that hazard.

Also, some organisations, apparently lacking an understanding of community education processes, have titled their programs as ‘education and awareness’. This is a tautology as ‘awareness-raising’ is an educative process and it should not be the primary focus of a community flood education program as argued above.

The role of awareness in preparing communities for flooding is discussed in the ‘Preparedness Conversion’ chapter.

**MYTH 2 ‘THE FOCUS SHOULD BE ON SCHOOL EDUCATION’**

People often perceive the word ‘education’ as meaning ‘formal education’ e.g. in schools, universities. Education in this booklet means learning across all sections of a community such as its residents, businesses, government organisations as well as its schools and other education institutions. Moreover, education is here viewed as a life-long process in all settings.

Several organisations have designed school programs (e.g. lessons, teaching resources) as their main flood education activity. This is possibly due to the misunderstanding about ‘education’ noted above or the premise that ‘educating school students will educate their parents and the broader community’. This premise is unfounded — research shows that in a ‘crowded school curriculum’ and with the communication constraints between students and adults (including parents) related to modern western lifestyles, there can be little effective transference of practical messages such those related to flood preparedness.
Moreover, school-aged people do not have the major responsibility for actions related to flood preparedness, response and recovery. Adults own property that can be damaged and have ‘duty of care’ responsibilities for the safety of their children and, it could be argued, other children that can be seen to be at risk during a flood.

Flood education should therefore be primarily directed at adults. Education of school students is still important, especially in relationship to them learning safety actions such as ‘not playing, walking or riding in floodwaters’ and helping adults with their preparedness, response and recovery actions. Also it should prepare them for future responsibility as adults in flood events.

**MYTH 3 ‘OUR WEBSITE WILL DO’**

Many organisations use the Internet as their main means of educating people about flood risks and preparedness behaviours. This information-based process of education is questioned in subsequent discussion.

Although there is an acknowledged increasing use of the Internet, several social research studies of flood-affected communities have shown that people generally use other means to learn about flooding. Depending on the type of community (e.g. urban, rural, non-English speaking, indigenous), people learn about flooding mainly through word-of-mouth, events (e.g. field days), the media and through their groups and networks (e.g. newsletters). The exception to this trend is the relatively high number of hits on the Australian Bureau of Meteorology website where people are seeking weather forecasts, including flood warnings as an event unfolds.

It also should be noted that the use of the Internet for flood information may be limited during floods due to electricity failures and inundation.

The Internet should therefore be viewed as a useful repository of flood information and a reference but should not be used as a primary education tool, particularly to engage communities.

There is also research that shows that a cross-hazard approach to community resilience education has merit, not only in economies of scale and avoiding duplication of community effort, but also using standard preparedness messages and education activities (e.g. preparing personal or business hazard emergency plans instead of just flood preparedness plans). Furthermore, where possible, local flood education plans could be part of local hazard education plans (e.g. in communities at risk from both bushfires and flooding) developed by a local hazard education committee or, especially in smaller communities, a progress association or other community representative group.

A major deficiency of many flood education programs is a lack of evaluation to gauge their appropriateness and effectiveness. Evaluation should be part of the planning and implementation of these programs and inform improvements for future programs and education activities.

There are two categories of program evaluation;

1. **Summative evaluation** which measures the program’s success or failure by comparing outcomes with original goals
2. **Formative evaluation** which measures program progress against ongoing benchmarks and allows the manager to make course corrections.

An evaluation process should also be built into local flood education plans to determine the success of education programs and activities included in the plan. Evaluation in the plans should be both formative and summative.

Evaluation should strive to gauge the appropriateness and effectiveness of the plans and their education activities by measuring success in the following:

- Delivery of the plan actions and education activities
- Levels of community preparedness
- Competencies and systems in place to adapt to a flood event
- Response including use of appropriate mitigation behaviours to a flood event
- Recovery after a flood event
- Learnings and improvements to preparedness, competencies and systems after a flood event.
Local flood education planning should consider the four roles of community flood education described in this booklet i.e. preparedness conversion, mitigation behaviours, adaptive capability and post-flood learnings. It should also relate appropriate learning activities to different community groups or sectors (e.g. ethnic groups, businesses, rural landholders, residents).

Local flood education plans should strongly promote and support individual, home and business flood preparedness plans. They also should build community capacity where appropriate (e.g. networks for learning, training of volunteers) and engage the community in the planning, implementation and evaluation phases.

To date, flood education plans have or are being developed in four communities in NSW. Although the impacts of these plans have not yet been evaluated, the main benefits of these flood education plans at this stage appear to be:

- More community ownership in flood education
- Greater recognition and support of flood education by floodplain management and emergency management authorities
- Flood education activities planned for local needs
- Information and resources are better distributed in areas of need
- Feedback and engagement processes are at a wider and more complex level
- Flood education activities to be rolled out systematically over time
- Improvements to be made to local flood education through planned evaluation
- State-wide and regional education initiatives to be utilised where appropriate to the local situation.

A good example of a local flood education plan is that developed for the Maitland area in the Hunter Valley of NSW. The flood education plan was developed by representatives of local rural landholders, businesses, town residents, Maitland City Council, NSW SES and the Hunter-Central Rivers Catchment Management Authority. A copy of the plan can be obtained from the Hunter-Central Rivers CMA.

THE PARTICIPATORY APPROACH

The ‘traditional approach’ to flood education, still in widespread use, informed the community about floods and their risks through the dissemination of prepared material. It sometimes emphasised actions people could undertake to protect themselves and their property. According to O’Neill (2004), this approach ‘was often one-off and one-way, and assumed that the audience was an undistinguishable group of individuals who had the same needs and values’.

The traditional approach is based on the premise that raising individual awareness will lead to preparedness which, as discussed above, is tenuous at best. Moreover, based on several evaluations, the traditional approach to flood education has been shown to be relatively ineffective in initiating appropriate preparedness and response behaviours.

A more participatory approach to community flood and other hazard education is now promoted. According to Paton (2006b), ‘Participation in identifying shared problems and collaborating with others to develop and implement solutions to resolve them engenders the development of competencies that enhance community resilience to adversity’.

In this participatory approach, emergency management agencies act more as facilitators to communities rather than directing change in a ‘top-down’ manner. They also can help the community build its capabilities (e.g. networks, leadership, competencies) for preparedness, response and recovery.

The participatory approach enables communities to develop, implement and evaluate their own education programs with the input of expert education guidance as required. More details about community flood education planning and evaluation can be found in the ‘Planning’ chapter.

The participatory approach, although relatively new to flood education, has been well acknowledged and used in other forms of community education. For example, in education for sustainability, according to Tilbury and Wortman (2004), ‘genuine participation is essential to building people’s abilities and empowering learners to take action for change toward sustainability’.
THE FUNCTIONS OF FLOOD EDUCATION

Using the participatory approach, the aim of flood education is to help build flood resilient communities. Resilience not only refers to how well a community can anticipate, prepare for, respond to and recover quickly from floods but also its ability to learn from and improve after flood events.

The figure below shows theoretically the difference between a flood resilient community and a less resilient community. Note that the y-axis is ‘community functioning’ – how well individuals and organisations are performing their normal functions.

![Diagram showing community functioning over time]

(after Adger, 2000)

As shown in the figure, the ‘resilient community’ will often experience less flood impacts to its normal functioning, while the ‘less resilient community’ will experience greater impacts to the same level of flooding. It is also clear that the less resilient community will take longer to recover to come back to normal functioning. Furthermore, the resilient community will most likely improve its functioning through learning from the flood event.

EDUCATION PLANNING

A major problem with flood education is that it has been treated as low priority by many floodplain management organisations. As such it has been, at best, an add-on to structural and other non-structural activities. In many cases, it hasn’t been part of flood planning.

Furthermore, where it has been supported by these organisations, flood education has generally been carried out as a one-off, short term ‘campaign’ of less than six months. This has been mainly due to funding limitations and lack of recognition of the value of flood education in floodplain management and emergency management planning. Most of these campaigns are conducted in a ‘top-down’ authoritative way with little community participation in the formation, delivery and evaluation of the education program.

There is some new evidence to show the value of longer term community flood education programs in comparison to these education ‘campaigns’. For example, research by NSW SES has shown that communities that received longer term (over one year) education programs have shown significantly higher preparedness levels and a greater willingness to evacuate.

Using the participatory approach, a relatively new way to formalise longer term flood education activities is through ‘local flood education plans’. These plans are developed, implemented and evaluated by local committees usually consisting of resident (urban and rural) and business representatives, local council and State government agency staff.

In some communities, local flood education committees need to be formed to manage the development of the local flood education plans. In other communities, the management of a flood education plan can be subsumed into the function of an existing floodplain management or emergency management committee. In every case, there needs to be local commitment and drive to ensure the success of the plans.

It cannot be assumed that the local committee has specific education expertise, especially related to the flood education functions identified above. Education practitioners, such as those from the NSW SES and VICSES, can provide expert education guidance for these committees as required.
POST-FLOOD LEARNINGS

As stated above, resilience not only includes a community’s ability to resist and recover from a flood but also to learn and improve from it. According to Maguire and Hagan (2007), ‘An optimal recovery involves not just returning to an initial equilibrium point. Rather, by adapting to new circumstances and learning from the disaster experience, higher levels of functioning (and thereby resilience) can be attained.’

As noted previously, the community learnings from a flood event should feedback to improve future flood preparations including flood education. Learnings should help inform flood education programs that help people ‘convert’ to preparedness, learn appropriate preparation, response and recover behaviours and build the community’s competencies and systems to better adapt to future flooding. As such, the post-flood learnings are a critical part of the evaluation of local flood education plans promoted in the next chapter on ‘Planning’.

Some examples of education activities to help communities and emergency agencies learn together from a flood event include:

- Social research (e.g. surveys, focus groups) to find out how effectiveness of warning systems, evacuation, recovery support, flood education etc. and how they can be improved
- Community de-brief meetings to identify problems in preparation, response and recovery and possible improvements

Note that, using the participatory approach, these learning activities are best designed by emergency management agencies with community representatives.

Flood education is one way to help to facilitate change in communities from being less resilient to being more resilient to flooding and to maintain this resilience.

In this new approach, there are four functions of flood education in building flood resilient communities.

1. **Preparedness conversion** - Helping people, organisations and communities commence and maintain preparations for flooding.
2. **Mitigation behaviours** - Learning what to do before, during and after a flood.
3. **Adaptive capabilities** - Learning how to change and maintain social systems and build community competencies to minimise the impacts of flooding.
4. **Post-flood learnings** - Learning how to improve preparedness levels, mitigation behaviours and adaptive capabilities after a flood event.

These functions are related as education interventions to the ‘flood cycle’ in the figure below.

As shown in the figure, pre-flood or ‘preparedness’ education should aim to help people, organisations (e.g. businesses) and their communities commence and maintain preparations for flooding and to build competencies and systems to adapt to flood events.
‘Preparedness conversion’ is a prerequisite, especially in communities where preparedness levels are low, for individuals, organisations and communities to commence preparedness planning and then to learn appropriate mitigation behaviours and how to improve their competencies and systems (‘adaptive capability’) to resist and recover from flooding.

After a flood, education has another important role in helping individuals, organisations and communities learn from their flood experiences (e.g. the effectiveness of mitigation behaviours and adaptive capability) and use these learnings for improvements in future flood events.

Another phase of education then commences as long-term recovery becomes the pre-flood part of the new cycle.

Most attempts at flood education to date only focus on ‘preparedness conversion’ and improving ‘mitigation behaviours’, with little done on building ‘adaptive capability’ and community learning after floods. The new approach promoted in this booklet calls for effort related to all four functions, using community participation.

Education activities related to the four functions are detailed in subsequent chapters.

Flood education can also help communities learn about systemic change required to build their resilience. These social systems could include flood warning systems, institutional systems related to flooding (e.g. local flood plans), evacuation and recovery systems. Learning activities related to improving these systems could include public meetings, planning forums, research (e.g. into best practices), SWOT sessions and After Action Reviews (AARs) or post-disaster de-briefing sessions.
ADAPTIVE CAPABILITY

Community resilience to flooding is more than preparedness and the ability to carry out appropriate behaviours in response to a flood event. According to Paton (2006a), the resilience, or ‘adaptive capacity’, of a community also includes the systems and competencies required by people and communities to coordinate and utilise these behaviours and resources to confront and adapt or adjust to the hazard event. These adaptive social systems and competencies are here termed the ‘adaptive capability’ of a community.

The development of a community’s adaptive capability in relation to flooding should be an ongoing process and could form part of broader community development or strengthening initiatives.

As noted previously, the multi-faceted nature of communities should again be acknowledged in flood education related to adaptive capability. Some community ‘groups’ may be especially vulnerable and need special assistance in building their capabilities to adapt to flooding.

There is an important role for flood education in helping communities, or parts of communities, build their capabilities to adapt to flooding. They can do this through learning associated with:

1. Improving competencies
2. Systemic change

The ways that a community can learn to build its competencies to resist and recover from flooding include:

- Training of key community people (e.g. leaders, SES volunteers, media) in aspects of response and recovery
- Problem-solving sessions with community groups to explore how community can work with emergency authorities to resist and recover from different local flood scenarios
- Oral histories about previous floods and how the community adapted to them
- Information sharing (e.g. through community groups, discussion ‘salons’) about how community can adapt to flooding
- Forums to develop community-based solutions to flooding problems

PREPAREDNESS CONVERSION

A first challenge for flood education can be the lack of motivation in the community or parts of the community to prepare for flooding. Through an understanding of psychological models and barriers relating to preparedness, educators with communities can develop effective ways to motivate people to prepare for flooding.

An important initial step in gauging preparedness levels and possible barriers to preparedness is to use social research e.g. surveys, focus groups. This research can provide an insight into what sectors of the community are poorly prepared and education activities can be designed to encourage them to prepare. The research can also provide baseline data to help evaluate the impact of education and other interventions on preparedness levels.

One limitation of social research is that it usually gauges self-reported preparedness levels and may not validate actual preparedness actions or knowledge e.g. development of an emergency kit, understanding of evacuation routes.

Researchers have developed theoretical models to help understand how people take up preparedness behaviours. For example, Paton et al. (2003) developed and tested a psychological model of preparedness to assist both research and the formulation of practical risk communication strategies.

As shown in the diagram below, Paton’s model consists of three stages:

STAGE 1 - Precursors. The motivation to prepare for a hazard is determined by ‘critical awareness’ (the extent to which people see the hazard issues as important to think about and discuss on a regular basis), ‘risk perception’ (the level of perceived threat or risk posed by a hazard) and ‘anxiety’ related to the potential hazard.

STAGE 2 - Intention formation. Outcome expectancy, self-efficacy and problem-focused coping are all predictors of the intention to prepare. (terms are defined in the Glossary)

STAGE 3 - Conversion to preparedness. Prominent moderators for the conversion of intention to actions include the ‘time frame’ within which people estimate or assume that the next hazard will occur and their levels of trust in the sources of information.
Note in Paton’s model that ‘awareness’ is only one of several factors that lead to preparedness.

Paton’s model has been validated through extensive research and should guide the design of education activities aimed at helping people to prepare for flooding.

Recent research by VICSES has also shown the possible merit of using a community facilitator or educator to help communities to respond with appropriate mitigation behaviours just prior to and during a flood event. Flood education activities in this context could include doorknocks, community meetings, delivery of printed information and general advice during the flood event. Note that this initiative is only useful in riverine scenarios where there is a lag between the onset of heavy rain and possible inundation – it is therefore not appropriate to flash flooding situations.

Paton’s socio-cognitive model of preparedness (Paton et al. 2003)

Through social research, the barriers that may impede the processes in models such as Paton’s should also be investigated. Several researchers have used social research and other studies to identify barriers to the uptake of preparedness behaviours.
‘flash flooding’ version of the flip chart. VICSES has broadened the scope of the action plan to include other hazards such as fire.

NSW SES has also developed a toolkit to help businesses identify appropriate actions to reduce flood damages and ensure staff safety and to develop a flood action plan as part of business continuity planning.

Although these generic guides appear useful in helping people and organisations plan for and carry out appropriate mitigation behaviours, they need to be supplemented with local flood guidance for each community. This local guidance should explain the specific flood scenarios for that community and any mitigation behaviours related to these scenarios. If possible, using the participative approach outlined above, this local guidance should be developed with local communities.

An example of this local guidance is the FloodSafe Guides, produced by NSW SES. These Guides provide background information and mitigation actions for specific communities and even sections of a community e.g. Kempsey Businesses. The Guides can help people and organisations in these communities with ‘local knowledge’ input into their flood action plans.

Evaluations of the impact of these and similar education tools have shown that ongoing community discussion about flooding is critical for the uptake and maintenance of flood action plans. Communities should decide on the best ways to continue this discourse. Some possible ways include:

- Educative stalls and displays at events such as field days, agricultural shows highlighting mitigation behaviours and flood action planning
- Media releases related to mitigation behaviours and need for flood action plans
- Use of SES volunteers and other community representatives in informal chats about mitigation behaviours
- Use of SES volunteers and community leaders in helping people and organisations to complete and update their flood action plans
- Problem solving meetings related to flooding scenarios with community groups e.g. retirement villages, chambers of commerce, progress associations, schools

Through a comprehensive literature review, Finnis (2004) identified the following barriers to the uptake of these behaviours:

- **Risk perception** - where people do not internalise the risk of a hazard (‘That event is never going to happen’)
- **Unrealistic optimism** – the illusion of personal invulnerability that can cause a denial of risk (‘It’s never going to happen to me’)
- **Response efficacy** – (‘I don’t have the time/money/skill to prepare’, ‘There are more important things to think about’, ‘I can’t be bothered’)
- **Outcome expectancy** – the perception of whether personal action will effectively mitigate or reduce a problem or threat (‘No amount of preparedness will help’)
- **Normalisation bias** – viewing a hazard as a common event that will not vary in impact (‘Our town has floods all the time, and I survived those’)
- **External locus of control** – people believe that forces outside of their control are the ruling forces (‘Disasters are an Act of God’, ‘If it is meant to happen…..’)
- **Transfer of responsibility** – believing that others are responsible for preparedness and response (‘The SES will be there to help me’)

Gissing et al. (2005) identified four barriers to the uptake of a toolkit that helps businesses plan for flood preparedness and response. There barriers were:

1. **Skepticism.** Many businesses surveyed felt there was a low risk of flooding and that losses would not be great if a flood eventuated.
2. **Trust.** There was a high level of trust in the emergency combat agency (NSW SES) in a community (Wagga Wagga) that had not experienced a significant flood for a relatively long period of time.
3. **Self-confidence.** Some businesses believed they knew what to do to prepare and respond to a flood (and therefore did not require guidance). Other businesses had a fatalistic view, demonstrating a lack of confidence in being able to do any thing to mitigate flood impacts.
4. **Priority.** Lack of time was cited as a reason for not carrying out flood planning.
Again, any barriers to preparedness should be identified in the community and education activities designed to help break them down.

Another challenge for flood education is the complex nature of communities. Some communities are isolated – some part of a metropolis. As Maguire and Hagan (2007) note, ‘Even relatively straightforward communities contain multiple social groups, and these groups differ in significant ways. Groups may differ in terms of their socio-economic status, their degree of geographic isolation, or vulnerability to psychological trauma’. Educators therefore need to understand and work with these community sectors or ‘groups’ in the design, delivery and evaluation of all flood education activities including those that encourage people to prepare for flooding.

Some examples of education processes that could be used to help ‘convert’ people to preparedness and maintain this preparedness include:

- **Risk perception** - Helping people understand flood risks to them.
- **Critical awareness** - Encouraging discussion about flooding and its importance
- **Barriers to Preparedness** - Identifying people’s barriers to preparedness and helping them overcome barriers
- **Outcome expectancy** - Showing impacts of flooding and importance of preparedness
- **Personal competencies** - Building skills in confronting problems related to flooding
- **Trust in information** - Demonstrating trust in flood information and advice
- **Timing of next hazard event** - Showing that flooding is inevitable in a floodplain.

### MITIGATION BEHAVIOURS

The challenge for hazard education is to be effective in promoting appropriate preparedness, response and recovery behaviours in an environment characterised by infrequent hazard activity, and to maintain this state of readiness over time (Paton et al., 2003). This challenge is exacerbated for flooding which several communities view as being of comparatively low risk in their complex hazardscape (Molino Stewart 2003, Molino Stewart 2005a, Molino Stewart 2005b).

The challenge for flood and other hazard education is arguably much more difficult than for many other community education programs designed to change and maintain behaviours. For example, waste education and stormwater education encourage people to carry out regular activities (e.g. recycling, not littering, minimising phosphorus use) as part of everyday lifestyle. On the other hand, flood education has to help people learn to act appropriately before, during and after events that are irregular, that may be very infrequent and not part of everyday thinking and living.

Furthermore, flood education needs to help people carry out behaviours to mitigate the impacts of flooding that may be different for certain flooding scenarios. For example, in a ‘riverine’ flood, with plenty of notice, an appropriate behaviour could be to wait for an evacuation order or to evacuate triggered by a flood warning or river height. On the other hand, due to lack of evacuation time and danger with fast rising floodwaters, the appropriate behaviour in a ‘flash flooding’ scenario may be not to evacuate (‘shelter in place’) or to vertically evacuate where possible.

With this challenge in mind, it is recommended that individuals, homes and organisations (e.g. businesses, local councils, government agencies) develop and maintain their own flood action plans that list appropriate actions before, just prior to, during and just after a flood.

There are a plethora of generic education guides that help people to develop these flood action plans. Many of these are located on websites such as the Emergency Management Australia site.

Both NSW SES and VICSES have produced ‘toolkits’ for people to help people identify appropriate mitigation behaviours and develop their own flood action plans. These toolkits include flood action plan flip charts that can be affixed to fridges or cupboards and be easily accessed in the home. NSW SES has produced a ‘riverine’ and a