
Improving dam safety and levee bank management and other priorities for flood management

Consultation Report 2019



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1 Introduction

This report summarises the process of engagement and the responses received on consultation relating to improving dam safety and levee bank management and other priorities for flood management in South Australia.

The engagement process involved publication of three draft papers:

- a draft dam management framework;
- a draft levee bank management framework; and
- priorities for improved flood management in South Australia

These papers were made available on the Department for Environment and Water (DEW) website

<https://www.environment.sa.gov.au/topics/water/hazard-management> and YourSAy

<https://yoursay.sa.gov.au/decisions/flood-management/about>. Feedback was received via a survey, the YourSAy discussion board, as well as targeted presentations and workshops to key stakeholders. Engagement commenced in February 2019. YourSAy engagement closed on 15 April 2019 and further written responses were received later in April and May 2019, where an organisation had requested an extension.

Section 2 provides a short background to the engagement, section 3 outlines the target audience and stakeholder engagement methods. Section 4 outlines the stakeholders reached and number of responses received. Section 5 provides an analysis of the responses for dam safety management. Section 6 does the same for levee bank management policies and section 7 considers feedback on priorities for improving flood management in South Australia.

The draft position papers will be updated to include consideration of responses received, resulting in changes to some elements of the proposed frameworks and inclusion of recommended actions. Following endorsement by State government, the position papers will be published on the DEW website. DEW will coordinate implementation of the proposed dam safety and levee bank management frameworks and include other priorities for improved flood management in the development of the new Flood Hazard Plan.

2 Background

Flooding is the most costly natural disaster in South Australia and can have impacts on people's safety and wellbeing, the economy, the environment, communities and on public services. The floods linked to the extreme weather event in September and October 2016, caused an estimated \$51 million of damage to agriculture and greater than \$20 million damage to Local government infrastructure. A changing climate and increased development on floodplains present ever increasing challenges to manage these risks.

An independent review of the extreme weather event in 2016 recommended improvements in dam and levee bank management because the failure of dams and levees can greatly increase the costs of flooding to the economy, communities and the environment.

2.1 Dam safety management

During the 2016 floods, many dams failed or threatened to fail, endangering human life and downstream property or damaging the operation of the dam. According to a report by the University of South Australia, dam failure flood risks are significant. Evidence shows that dam design and maintenance is often not adequate: many spillways (if they exist) have inadequate flood capability and there are often structural issues with dam walls. Better regulation of dam design, construction and maintenance combined with better education, linked to an understanding of the risk rating of a dam could help to reduce the potential impact of floods.

2.2 Levee bank management

For some communities, levee banks are an important part of flood protection, however it is often unknown who should look after their maintenance and whether they can provide the protection against flood risk, for which they were originally constructed. Levee bank failure along the Gawler River in 2016 contributed to the significant economic costs of the floods in the Virginia horticultural area.

Impacts of floods resulting from levee bank failure are inevitably high because communities are often not prepared for flood in those areas as they assume the levee bank will protect them.

2.3 Dam and Levee Bank Management frameworks.

Draft position papers were developed, to provide a framework for improved levee bank and dam management in South Australia for discussion and feedback. The frameworks were developed considering ideas from researchers, approaches interstate and feedback from Commonwealth, State and Local government staff involved in flood management.

The dam safety management and levee bank management frameworks aim to reduce the impacts of floods on the economy, communities and the environment by ensuring that:

- roles and responsibilities for dam and levee bank management are clearly articulated, agreed and understood and can be implemented;
- dam management risks for both existing and new dams can be managed by landholders and do not significantly increase the potential impacts of floods in South Australia; and

- there is clarity on how levee banks can be factored into flood risks and flood response as there is confidence in their location, function and performance.

2.4 Priorities for improved flood management in South Australia

Flood management is a shared responsibility between Commonwealth, State and Local government and the wider community.

There are opportunities for a more strategic and coordinated approach to flood management, going beyond dam and levee bank management, addressing issues such as sharing flood risk information, managing flood warning infrastructure and the interaction with stormwater management and land use planning.

The draft discussion paper on priorities for improved flood management in South Australia sought ideas on other priority flood management issues to be addressed and how best to address these issues.

3 Consultation methodology

The draft position papers were developed with input from Commonwealth, State and Local government agencies and Natural Resources Management (NRM) Boards and considered lessons learnt interstate. The draft policy positions were endorsed by the State Emergency Management Committee (SEMC) as a sound basis for targeted stakeholder engagement in July 2018.

An engagement plan was developed with the following objectives:

- Gain feedback on discussion papers outlining proposed elements of a dam management policy and levee bank management policy framework from interested and affected community and industry;
- Gather ideas on other issues that need to be addressed to improve flood management in South Australia and the process for addressing these from interested and affected community and industry;
- Understand community needs and expectations regarding dam safety management and levee bank management to ensure they are considered in developing the final policies; and
- Understand issues and ideas that interested and affected communities and industry feel are priorities for improving flood management across South Australia.

The target audience identified included

- Individual local councils/Local Government Association/regional Local Government Association /Local Government Functional Support Group
- Zone Emergency Management Committees
- Gawler River Floodplain Management Authority/ Brownhill Keswick Creek Stormwater Board
- Stormwater Management Authority
- Other State government agencies
- NRM Boards
- Coast Protection Board
- Dam owners
- Flood prone communities
- Landholders with levee banks or adjacent to levee banks
- Dam contractors
- Engineers/consultants
- Water Industry Association/Australian Water Association
- Hydrological society/stormwater liaison group (research and consultant community)
- Primary Producers SA and associated producer groups
- Conservation Council of South Australia
- Aboriginal Nations and communities

Targeted stakeholder engagement commenced in February 2019 and concluded by 15 April 2019, although some later submissions were received where extensions were requested.

The engagement involved:

- A YourSAy page with background and links to the three discussion papers and an online survey.
- Publication of discussion papers on the DEW website
- Message on DEW's LinkedIn page and River Murray Facebook page and a number of NRM Board pages
- Promotion of the YourSAy page through YourSAy social media channels
- An information session organised by the Local Government Association (LGA) for Local government representatives
- Letters to NRM Boards and presentation to South Australian Murray-Darling Basin NRM Board
- Letter and presentation to the South Eastern Water Conservation and Drainage Board
- Distribution of information via the State Mitigation Advisory Group to other State government agencies
- Meeting with Department for Planning Transport and Infrastructure staff
- Article in the Australian Water Association newsletter
- Presentation to Stormwater SA
- Meeting with Conservation Council of SA staff
- Presentation to Coast Protection Board
- Email with links to YourSAy and survey to staff in the Department for Environment and Water and Primary Industries and Resources involved in securing low flows, Flows for the Future, the Northern Adelaide Plains Agribusiness Initiative, River Murray Operations, Aboriginal Engagement network, coastal management and urban water management, requesting distribution through their networks.
- Email with links to YourSAy and survey to Bureau of Meteorology, Stormwater Management Authority and South Australian University contacts.

4 Consultation reach and submissions received

The engagement was promoted on social media across 10 posts, achieving a cumulative reach of 139,668 on Facebook and Twitter during the open consultation period. It generated 1164 visits to the website to learn more. The three discussion papers received over a hundred clicks each.

A total of 30 responses were received from individuals and organisations. Table 1 outlines the organisations (or representatives of organisations) who provided a response to the draft papers.

Table 1: Organisations (or representatives of organisations) who provided a response

Organisation
Adelaide and Mount Lofty Ranges NRM Board
City of Holdfast Bay
City of Playford
City of Salisbury
City of Tea Tree Gully
Country Fire Service (CFS)
CSIRO
Department for Planning, Transport and Infrastructure (DPTI)
Gawler River Floodplain Management Authority (GRFMA)
Inside Infrastructure
Livestock SA
Local Government Association of South Australia (LGA)
One World Environmental Solutions
Red Cross Society
SA Murray Darling Basin NRM Board
South East NRM Board
South Eastern Water Conservation and Drainage (SEWCD) Board
The Barossa Council
Tonkin Consulting

In terms of the target audience, Local government and NRM Boards were well represented. Feedback from primary industry bodies and individual landholders was more limited and Aboriginal interest groups were not reached effectively or the issues were of limited interest. There was a reasonable response from the water industry and emergency management sector.

Overall, the breadth of issues raised in the feedback was very valuable and will help improve the draft policies outlined in the position papers, and also assist in setting priorities for improving flood management in South Australia.

However broader stakeholder engagement will be required before some of the proposed elements are progressed. The suggestion was provided to undertake a trial of certain policy elements in a pilot area.

5 Responses for dam safety management

Education and awareness about dam safety and maintenance is broadly supported. In response to the question how broader coverage of dams by **emergency action plans** can be achieved, suggestions included legislating the requirement for emergency action plans. However, it was acknowledged that ensuring compliance will be difficult. An education campaign was considered beneficial. Making development of emergency action plans a condition of approvals was an option suggested for any new dams. For existing dams, making it part of a registration process for development of a dam register was suggested.

The responses to the proposal to introduce **an enforceable duty to maintain a dam** were mostly supportive. It would reduce the need for emergency response call outs and reduce risks to communities. It was considered important to have a mechanism to ensure compliance with conditions that may have been imposed through development approvals or permits. Issues raised to be considered included:

- Contingent liability for inspections/failures;
- Data and record keeping procedures/systems
- Ongoing collection of fees for inspections and compliance; and
- Compliance management of non-conforming sites
- Additional financial, work load and water resource management burdens on landholders and farm businesses.

Most responses considered the proposed Landscape South Australia legislation as the logical place for such a duty, but the option of expanding powers under the *Fire and Emergency Services Act 2005* (FES Act) or the *Planning, Development and Infrastructure Act 2016* (PDI Act) were also raised. It was noted that further consultation and thought about resourcing and tools would be required. It was suggested that publicly owned dams and details of their lifecycle management should be identified within the relevant Asset Management Plan of the entity responsible for dam operation and maintenance. Clarification was sought on the nature of the regulation of SA Water reservoirs, as voluntary compliance was not considered appropriate if all other owners of dams would have an enforceable duty to maintain their dams.

Feedback on development of **a dam register** was broadly supportive, and there was extensive feedback on the type of information it should hold and who should have access. Most responses considered that State and Local government, including emergency services and NRM Boards, should have full access, while landholders and the wider community should have more limited access. Others suggested that all information should be publically available, in particular anything relating to flood risk. The option of making information available on any title search or property search for current and prospective landowners was raised. Access for designers of dams was raised.

Other information suggested to be stored on a farm dam register included a spatial depiction of the dam failure impact area, (estimated) age of dam, maintenance records and information relevant to the CFS to access water for firefighting. The observation was made that the information can have implications for land sale values and insurance premiums, which in turn may create incentives for good dam design, construction and maintenance. The opportunity to link the dam register requirements for water resource management and flood management was recognised, but it was acknowledged that this may require different levels of access to information. It was pointed out that the cost of developing and maintaining such a register requires some further thought.

In terms of **competencies for the design, construction and maintenance of dams** there was support for a scale of competencies to be developed, depending on the size and nature of the dam, where smaller dams just need to meet guidelines, medium sized dams may require an engineer to evaluate and larger dams would need a full assessment. The suggested qualifications included requiring a number of years of experience in dam construction and/or engineering qualifications.

There were different views about the requirements for competencies (experience or qualifications) and whether this should be in the form of guidelines or regulation. Competencies required could be included in the Accredited Professionals scheme in the PDI Act or in the proposed Landscape South Australia legislation, because of the close linkage between design and siting of dams and the impacts on water resource management and water allocations. There was also discussion about competencies for the contractors versus competencies for the approval authority.

There was support for **guidelines relating to the siting, design, construction, modification and maintenance of dams** but similar to the response on guidelines or regulation for competencies, there were different views about the level of prescription and the legislation (proposed Landscape SA or PDI Act) to be used if regulation would be required. A suggestion was made to include access for emergency services vehicles to dams as part of guidelines for design and construction of dams. This could be both for sourcing water for firefighting as well as emergency actions to prevent/reduce impact of failure.

There were limited responses to the proposal to develop a **dam failure risk rating method**, but all responses were supportive. The need to consider the impact of dam failure on downstream dams, creating a cascading impact was raised. A mechanism to review a dam's risk/impact assessment may be required to account for any change to land use/intensification of development downstream of a dam which may alter the likely impact should a dam fail. The opportunity to align risk assessment for dams with programs such as Flows for the Future and Securing Low Flows was identified. A self-assessment method similar to the Victorian approach was supported by some respondents, but questions were asked about the implications when the assessment reveals risks that need to be addressed but may be beyond the financial capacity of a landholder. Some concerns were raised about the feasibility of developing a risk rating for all dams and that a focus may need to be on priority dams and locations in the first instance.

Extensive responses were received on the question of **the inclusion of dam construction requirements within the new Planning and Design Code or exploring consolidation of all aspects of regulation of in scope dams under the proposed Landscape South Australia legislation**.

Stakeholder consultation revealed a broad acknowledgement that current arrangements are confusing and lead to a risk of gaps in the assessment of approvals for dams and conflicting advice to landholders. There was a preference to see dams assessed and approved by a single authority and single piece of legislation. Inclusion in proposed Landscape South Australia legislation for simplicity was suggested by some respondents. Observations were made about a number of powers and requirements in the proposed Landscape South Australia legislation that would be relevant in this situation, such as the ability to require additional structural works. Others argued that inclusion in proposed Landscape South Australia legislation would not be in line with a "back to basics" approach for the Boards, as emergency management and public safety is not within their current line of responsibility and would require investment in capacity and expertise.

The inclusion of design standards in the Planning and Design Code was proposed as an alternative to regulation under the proposed Landscape SA legislation. The opportunity to further refine dam regulation in the P&D code was recognised by a number of respondents, including DPTI. Local government or DEW/South Australian State Emergency Service (SASES) were suggested as alternatives for the authorities to ensure dam safety aspects are managed.

It was acknowledged that it is unlikely that there will be significant construction of new larger or smaller dams and the focus will be on modification of existing dams, small numbers of new dams and maintenance of existing dams.

There was a general observation that the discussion paper focused on the structural and safety side of dams not the water management aspects of dams. Changing the language from dam management to dam safety management would provide greater clarity about the proposed scope.

6 Responses for levee bank management

The ***proposed planning process to identify priority levee banks and resolve management arrangements*** was generally supported but further suggestions and some alternatives were provided.

For any future levee banks the planning process suggested by some respondents was a consistent development approval process (across Local government boundaries) to undertake construction and maintenance. In the planning approach, the funding responsibility and a consistent cost apportionment mechanism would need to be established. The planning process should take note of the control hierarchy so that any new development only needs protecting as a last, not first, resort. The planning process should consider whether a levee bank is an effective and suitable flood mitigation measure, especially existing structures constructed without formal approval.

A coordinated approach through State government for the planning process was also suggested to ensure consistency and leadership, as well as alignment with capabilities.

It was suggested that the PDI Act or the proposed Landscape SA legislation could include legislative requirements for the planning process, including criteria to identify priority levee banks and non-priority levee banks.

The end point of the planning process could be that priority levee banks are incorporated into local councils' asset management plans and their capital works programs, or priority levee banks could become a State government responsibility. The planning process would need to ensure ongoing financial, expertise and experience for maintaining and managing levee banks.

The feasibility of identifying and assessing all levee banks to determine their priority was questioned and it was considered that a more targeted or strategic approach would be needed. Trialing a planning process for some existing levee banks to help develop and refine the process was supported.

The need to consider all flood mitigation infrastructure in a catchment was highlighted, as the building of a flood mitigation dam upstream, can have implications for the performance of levee banks downstream, for example along the Gawler River.

It was considered important that landholders are involved in the planning process as they may be beneficiaries or potentially negatively impacted.

Rail lines and roads frequently act as levee banks and store large volumes of floodwater acting as detention basins and protecting downstream properties. The planning process for these structures may be different as they may never have been designed to act as levee banks. Including existing coastal levee banks in the proposed arrangements was noted and supported by a number of respondents.

Suggested ***potential contributors to the construction, remediation, upgrade, operation and maintenance of levee banks*** in addition to those outlined in the draft position paper included individual landholders and owners of private levees and the South East Conservation and Drainage Board. The role of NRM Boards was mostly considered to be the administration of permits and as a referral body for development approvals. NRM Boards taking on any role in levee bank management could be considered contrary to the "back to basics" approach advocated in Landscape SA reform.

The use of **the beneficiary pays principle** for ongoing operation and maintenance of levee banks received mixed responses. It may be applicable where the benefits are largely private. Significant public benefit may justify publicly funded arrangements. The problem of identifying the beneficiaries was highlighted, for example avoiding interruption to or loss of a transport route affects a broad community and should be paid for by a broad community. The community panel discussions with regard to funding mechanisms for the drainage works in the South East were referenced and the conclusion from the panel was that the cost should be covered by public funds. The beneficiary pays principle could be an option for new levee banks protecting new developments, but was considered unsuitable for existing ones by most respondents. Alternatives suggested were that priority levee banks should be state-wide priorities and funded by state/commonwealth funding. Another suggested option was a combination of state appropriation and council rates.

A key matter for consideration raised was the payment mechanism to be utilised. For example, if maintenance and management of priority levee banks is undertaken by NRM Boards, then Local government should not be required to contribute as the community already pays through the NRM levy and would not want to see their contribution duplicated with council rates. Another respondent noted that landholders who pay council rates will assume that this covers the operation and maintenance of levee banks and other flood protection infrastructure, such as flood detention basins or stormwater infrastructure.

In terms of **a levee bank database or register** stakeholder consultation highlighted broad support for the development of such a database, but the process of gathering information for the database or register needs careful consideration, as it can be resource intensive and further consultation with stakeholders to determine an effective approach to information gathering would be needed.

In terms of access arrangements for the database, it was suggested that location and flood mitigation standard should be available to the public, land ownership should be linked to the approach by Land Services SA and maintenance status and governance arrangements should be accessible to local councils, DEW and the SASES. The South East Water Conservation and Drainage Board as a stakeholder was mentioned for a levee bank database.

Suggestions for information to be stored included: asset details, maintenance and upgrade responsibility, and asset management plan, design criteria (design event, area it protects, type, materials etc.), does it have temporary sections, access points, failure mechanisms (for controlled failure) extent of potential inundation if rupture occurs (including maps) and Population at Risk, survey of the existing levees.

Access arrangements in the form of purchase of land or acquisition of easements to ensure one entity could take on responsibility for ongoing operation and maintenance of levee banks was put forward for discussion and alternatives were sought. Generally there was agreement that there are no clear viable alternative options. One option was to legislate for access to a levee bank for ongoing operation and maintenance. Another suggested that land management agreements may be part of the solution.

For levee banks with strategic flood mitigation importance for the community or state infrastructure, it was suggested that State Government may need to consider sharing management responsibilities by establishing easements, in other cases Local government may be more appropriate. Relying on individual landholders to undertake maintenance of their section of a levee banks was considered unlikely to be effective by most respondents.

The issue of **damage or unauthorised changes to levee banks by landholders** and how to address this, raised a number of responses. It was noted that this requires an inspection/auditing regime by the managing body, which would need to be given the legal power to compel repair by the landholder to bring the levee into compliance with a standard or if no repair

is undertaken by the landowner, provide powers for repair by the maintaining authority and recovery of costs. It was suggested to investigate arrangements for damage to other infrastructure such as stormwater infrastructure, power lines etc.

Ensuring landholders take responsibility for risk management, both in terms of maintaining levee banks or dams, could consider approaches used under the Fire and Emergency Services Act, which places responsibilities on landholders, with associated penalties, to take reasonable steps to prevent or inhibit fire outbreak or spread on their land. It sets up authorised persons who can issue notices of compliance and provide advice and information and can enter private land to ensure compliance occurs, or proceed with necessary works to ensure compliance.

With regard to ***guidelines relating to the siting, design, construction, modification and maintenance of levee banks***, it was suggested that the guidelines would need to cover issues such as design criteria (i.e. to protect existing developments and assets, not as a first resort to enable development in areas exposed to flood hazard), responsibilities, process for approval, consideration of existing levees that do not meet existing standards, assessment of impact on other landholders and clarification of liability for third party impact.

It was suggested that guidelines may not be sufficient and that a performance standard may need to be included in the Planning and Design Code. Levee bank management under the PDI Act could cover design standards, levee bank capacity and mitigation standards for future planning. The legislation should also enable levee banks to be reassessed and action to be taken if the structure no longer meets standards. The levee construction requirements developed in Victoria were considered a good starting point.

A suggestion was made that levee bank design standards should be provided under the Building Code of Australia and that a national unified design standard would be the best approach.

Issues were raised about the current ***approval processes for levee banks***. Consultation feedback confirmed that current approval processes for levee banks, are confusing and in need of further work to provide a consistent and transparent process which the public can understand. The NRM Boards manage approval processes via Best Practice Operating Procedures (BPOP) or Current Recommended Practices (CRP) for levee bank construction. Councils manage applications via Development Approval processes. One recurring suggestion was that all levee banks are assessed under the PDI Act with the NRM board as a referral agency. The opportunity to further refine levee bank regulation in the Planning and Design Code was recognised by a number of respondents, including DPTI.

In terms of ***management of non-priority levee banks***, issues raised included: re-assessment of flood maps to determine impact of failure for levee banks that are not maintained. There may be an opportunity for non-priority levee banks to be maintained by individual landholders in consultation with other landholders and supported by formal agreements. Others suggested that management arrangements for non-priority levee banks could include cost sharing arrangements for the removal of levees.

7 Responses for priorities for improving flood management

The draft position paper sought feedback on the three outcomes to be achieved by an improved state-wide approach to flood management and the three priority issues to be addressed. The responses tended to blend outcomes and priority issues. The outcomes suggested by respondents are outlined in Table 2 below.

Table 2: Suggested outcomes by respondents

Outcome	Priority
Clear roles and responsibilities for all parties involved	High
Better controls on development and building in flood prone areas (i.e. preventing development if required, setting clearly defined levels of service)	High
Reduced life loss, property damage and environment impacts of flooding.	High
Current and future predictive flood maps and models to be referenced to plan and prepare for major floods	Medium
Flood risk assessments: transparency about risk and acceptable risk	Medium
Flood mitigation infrastructure (levees, flood detention basins)	Medium
Management of stormwater and urban flooding (including urban watercourses) including recognition of alignment between watercourses in good condition and flood resilience	Medium
Set a clear state-wide framework that enables everyone to effectively contribute to flood management	Medium
Clarify the intersection with water resource management, emergency management, stormwater management and land use planning.	Medium

The suggested priority issues to be addressed and number of responses are outlined in table 3 below.

Table 3: Suggested priority issues by respondents

Priority issue	Priority
Flood mitigation infrastructure (levees, flood detention basins)	High
Evaluation of flood risks through flood studies/flood risk assessments	High
Avoiding or minimizing risks through planning and building	High
Collecting and maintaining flood information including flood data, flood maps and flood intelligence and sharing of this information	Medium
Impact of climate change	Medium
Flood emergency management	Medium
Process of evaluating mitigation options applying nationally agreed approaches	Medium

During consultation a wide range of parties were identified that would need to be involved in developing an improved South Australia-wide approach to flood management, including: DEW, SASES, DPTI, Primary Industries and Regions SA (PIRSA), Local government, industry representatives, SMA, Insurance Council of Australia, Urban Development Institute of Australia, universities and research centres, land owners, peak business bodies, Department for Premier and Cabinet, LGA, and the LGA's Mutual Liability Scheme (LGAMLS), SAicorp, Bureau of Meteorology, Emergency Management Australia, SA Police.

There was no clear preference for the approach of developing a strategic framework for improving flood management in South Australia. Alignment with stormwater, land use planning, infrastructure management, broader water resource management and floodplain restoration and management were raised in the responses provided.

In terms of other suggestions and priorities to improve flood management, a wide range of issues were raised.

- Legislative cohesion for flood management which will enable State government to successfully coordinate across all appropriate bodies.
- Ongoing financial commitment and funding to support an appropriate level of expertise and experience when considering siting, maintaining and regulation structures taking a whole of waterway and whole of catchment approach.
- A statewide flood mapping project similar to the one currently undertaken in Tasmania that delivers user friendly maps and a mechanism to update from time to time.
- Reference was made to the final advice provided by the South East drainage community panel and that these recommendations should be considered.
- Improvement of stormwater infrastructure to reduce risk of stormwater on the Adelaide floodplain.
- There needs to be a central State department responsible for understanding flood characteristics, maintaining flood studies and having clear, risk based programs for flood mitigation.
- All flood management assets should be identified within the relevant Asset Management Plan of the entity responsible for flood management asset operation and maintenance.
- More explicitly include consideration of the River Murray in the flood management
- Streamlined approached to flood management that provides greater clarity around roles and responsibilities in this space.
- Prioritising environmental restoration as a cost effective and self-sustaining method of flood management. A substantial area of intact environment can perform a large part of flood mitigation and decontamination of flood waters.
- Floodplain infrastructure must consider other important parts of water management, security, water quality, design.
- There is a need to change the mindset that all flooding is damaging and negative and needs to be 'managed'. In reality there can be benefits from some floods such as replacing nutrients on farm land and environmental benefits.