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A FRAMEWORK FOR CHANGE

# Reducing flood risk

JULY 2001



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Published by:  
Environment Agency  
Rio House  
Waterside Drive  
Aztec West  
Almondsbury  
Bristol BS32 4UD

Tel: 01454 624400  
Fax: 01454 624409  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

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# Reducing flood risk

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# Reducing flood risk

“Severe flooding could become more common  
as a result of global warming”

JOHN PRESCOTT, DEPUTY PRIME MINISTER,  
NOVEMBER 2000

## 1. Why a Framework for Change?

### The Environment Agency's vision

In June 2000 the Agency consulted widely on its long-term objectives and goals. After taking into account the responses that we received, in January 2001 we published *An Environmental Vision: The Environment Agency's Contribution to Sustainable Development* (the *Vision*)<sup>1</sup>.

This sets out our long term, aspirational objectives for the environment, grouped under nine environmental themes. In preparing it, we were very conscious that it would be the process by which those objectives are met - the route by which the Agency plans, in partnership with others, to make progress towards the long term destination - that would be of particular interest. This was reinforced by the comments we received during the consultation on the *Vision*.

### Frameworks for Change

To show the route we propose to take, we have prepared a series of *Frameworks for Change*, one for each of the *Vision's* nine environmental themes. This document is one of these thematic *Frameworks* which are intended mainly for internal planning purposes though they are publicly available. They set out our proposals for the medium term to make progress towards the long-term objectives described in the *Vision*. These *Frameworks* - and the associated dialogue and business development that will flow from them - are not only intended to make progress towards the environmental outcomes in the *Vision*, but also to improve the Agency's service delivery to Government<sup>2</sup>, industry, and the public. They are also intended to improve our own internal efficiency and effectiveness. Overall, we regard them as being beneficial to both our stakeholders, and society in general. They are frameworks with a menu of possible actions, rather than final plans, because we still have to agree the final proposals. We have to balance the competing priorities within them, take into account their specific implications for others, and match them to the resources we have available. This balancing and prioritisation has to be agreed with Government, and will be done through our corporate planning process, with our firmed-up work programmes appearing in our formal Corporate Plans. The Government's current revision of its statutory guidance in respect of our sustainable development remit will also help us clarify the routes and options available to us.

We will be discussing these proposals with our stakeholders. The main vehicle for this external dialogue and discussion will be a separate series of sector based *Frameworks* starting late in 2001. These will draw from the nine themes the issues and outcomes relevant to the sector concerned.

<sup>1</sup> The Environmental Vision, and Frameworks for Change is available on the Agency's website <http://www.environment-agency.gov.uk>

<sup>2</sup> References to Government include the UK Government and, where appropriate, the National Assembly for Wales.

### **Working with partners**

We recognise that we cannot on our own deliver the outcomes and goals we have set out. We already work in close partnership with a wide range of organisations and groups, and we are keen to explore how we can strengthen existing partnerships and develop new ones. This does not just involve seeking partners for Agency led projects, but also supporting the work of others. We will need to work with a wide range of bodies with an interest in land issues, including those we regulate. Below we list areas where we will want to work in partnership with others, but have not sought fully to specify who these others might be.

## **2. Reducing flood risk**

Flood risk cannot be eliminated but it can be reduced. The Agency's flood defence strategy aims to minimise risk to life and property, while exploiting the benefits of natural flooding for biodiversity, in an integrated way that will accommodate the inevitable impacts of climate change. Our current estimate is that nearly two million properties are at risk from floods, affecting about ten per cent of the population. The projected growth in household numbers from 21 million in 1997 to 24 million by 2021 represents a 12 per cent increase in housing stock and will place flood risk areas under even greater development pressure. Recent floods have highlighted the fact that many vulnerable people, especially those in poor housing, need support to protect themselves and their homes against floods.

However, flood reduction measures can only be implemented if the potential benefits outweigh the financial costs. For this reason the Agency is unable to guarantee flood protection to all people, buildings and land within flood risk areas.

### **Safeguarding the environment**

The Agency is committed to safeguarding nature conservation sites and to minimising the potential impacts on biodiversity and the environment. The damage to natural habitats caused by past flood defence schemes and climate change is becoming increasingly evident, particularly on the coast. It will be essential to expand the use of sustainable, soft engineering techniques such as managed realignment and foreshore recharge in order to overcome problems of intertidal habitat loss through "coastal squeeze" and erosion.

### **Recent changes**

The catalysts for the recent change in the Environment Agency's flood defence strategy have been the Agriculture Select Committee report on Flood and Coastal Defence (July 1998) and the Environment Agency Response to the Independent Report on the Easter 1998 Floods (November 1998) and the report *Lessons Learned from the Autumn 2000 Floods* (March 2001). The most immediate priority for action is the call by the Ministry for Agriculture, Fisheries and Food (MAFF) for the Agency to achieve a "seamless and integrated service of flood forecasting, warning and response".

### **Flood warning**

The public response to flood warning is influenced by three socially-linked factors: the public's awareness of whether or not they are in a flood risk area; their understanding of the implication of a flood warning; and their knowledge of what actions to take in order to protect themselves and their property (both before and during flooding). Recent surveys show that the current availability and ability of residents to respond to a flood warning is satisfactory, but residents'



effectiveness in taking action is low. Furthermore, these surveys identified that 25% of residents suffered health problems, were hard of hearing, or did not have English as their first language. These groups are considered to be especially vulnerable, and their proportions may be greater in some areas.

The regional pressures on flood risk in general and the Agency's flood defence activities in particular are shown in Table 1 (page 17).

### **3. The Environment Agency's role**

England and Wales have over 36,000 km of main rivers, one of the longest coastlines in Europe, and large areas of land below sea level (see Table 2: Key Facts and Figures). The population density is high, and complex flood defences have been constructed to protect residents of flood risk areas. Historical planning decisions have permitted the expansion of built development in floodplains, drastically increasing flood risk. Furthermore, past flood defence schemes, such as those involving the re-routing of rivers and surface waters, have frequently led to increased risks elsewhere in the catchment area.

#### **Powers and duties**

The Environment Agency has a duty to undertake a general supervision of all matters related to flood defence. It has permissive powers to operate, improve and maintain flood defences to mitigate flooding from rivers and the sea. We are responsible for the dissemination of flood warnings to the public, and continually monitor weather conditions, rainfall, and tidal and river levels to forecast where flooding may occur. We have set up a National Flood Warning Centre to lead the development of our seamless and integrated service of flood forecasting, warning and response. We maintain a highly skilled emergency workforce to enable us to provide an effective response to emergencies.

The Agency has its own limited powers to regulate development that may increase flood risk. We are a statutory consultee in the land use planning process to ensure that if new development is permitted, it is safe from flooding and does not increase flood risk elsewhere. Our main input to development planning is through the provision of flood plain surveys and consistent advice on development and flood risk.

#### **Strategic approaches**

The Agency has taken on a national approach to the management, procurement and delivery of our capital investment programme. National frameworks will soon be in place for consultancy services and construction work, which will support our aims of building collaborative relationships and promoting the principles and practice of sustainable construction.

Traditionally, money was injected in a reactive way at the 'point of trouble' in response to floods. The Agency is now pursuing a more strategic approach to catchment and coastal zone management. Strategy plans are being developed which identify flood defence requirements for coastal sediment cells: this approach will be applied to river catchments in the future. The strategic approach is more compatible with the long-term concept of sustainability and the potential for working with, rather than against, nature. Applied to the Agency's role in the statutory land use planning process, this approach focuses on the importance of flood prevention as preferable to costly remedial measures after the event.

#### 4. Working in partnership

We routinely work very closely with the Department for the Environment, Food and Rural Affairs (DEFRA) and the National Assembly for Wales (NAW) in supporting the development of policy and best practice. We also maintain strong links with the Department of Transport Local Government and the Regions (DTLR) on land use planning guidance.

Although the Agency is the main operating authority for flood risk management, local authorities and Internal Drainage Boards perform similar roles for smaller rivers and drains. We have working parties with the Local Government Association at both Member and Officer levels to develop collaborative working on the achievement of DEFRA (formerly MAFF) high level targets, Planning Policy Guidance Notes, funding, and institutional arrangements. The Agency is represented on the Association of Drainage Authorities committees to help facilitate the most effective use of available resources by all operating authorities.

We have a good, strong partnership with English Nature. In the specific context of flood defence we are working with them on joint projects on the coast and on the implementation of Biodiversity Action Plans.

The Agency also has good links with the Meteorological Office, the Association of British Insurers the Royal Society for the Protection of Birds, major research institutions, the Wildlife Trusts and the WWF-UK. This collaborative work involves the development of best practice and the identification and promotion of research needs. Working in partnership on demonstration sites for sustainable management of river floodplains, the coastline and estuaries is fundamental to increasing our knowledge of the impact of climate change. We have also established international links within and beyond Europe on a range of research topics.

#### 5. The Environment Agency's objectives

In *An Environmental Vision*, our overall long-term objective with respect to reducing flood risk is that:

*Flood warnings and sustainable defences will continue to prevent deaths from flooding. Property damage and distress will be minimised. The role of wetlands in reducing flood risks will be recognised and all the environmental benefits from natural floods will be maximised.*

This *Framework* has links with those for *Improved and protected inland and coastal waters*, and *Limiting and adapting to climate change*, and the prevention of flooding and a reduction in flood risk help contribute to the overall quality of life. There are also close links to the *Enhanced environment for wildlife* theme.

The outcomes we will help achieve are:

- Flood warnings will be given in good time, acted upon and damage minimised.
- People will accept the need to avoid flood risks, take warnings seriously and act accordingly.
- Nationally consistent standards of flood defences will be in place to meet the challenges of climate change.
- Flood defences will be designed and constructed to deliver optimum environmental benefits.
- Positive aspects of natural flood events will be recognised and flood defences designed to work with nature in accommodating them.

- Flood risks arising from land use and climate change will be recognised, understood and fully taken into account in planning decisions.
- Planners and developers will understand their role in sustainable flood risk management.
- Properties at risk will be designed or modified to cope with the likely consequences of being flooded.
- Flood defences that may be required because of new development will be fully funded by developers as part of that development, and should not lead to additional flood risk.
- Innovative uses of technology will improve the ability to predict and cope with floods.
- Benefits for water resources and wildlife will be achieved from natural flood events.

We will seek to achieve these goals in the most efficient and effective manner, taking into account the costs and benefits of the options available to do so.

## 6. Goals and actions

For each outcome we have identified below a number of goals we intend to achieve in the short to medium term in order to move towards the vision for the environment. We have also outlined the activities that will help achieve these goals, together with the tests to assess progress in their delivery. In practice, activities may contribute to the achievement of more than one goal and outcome.

### Tests for progress

The Government's set of sustainable development indicators<sup>3</sup> help show, at a high level, whether we are on a sustainable track. The Agency has also developed its own set of environmental indicators<sup>4</sup> that will be used to show progress towards the Vision. In addition to these, we have included some key tests for progress towards each outcome.

### Role of the Environment Agency

To clarify the role of the Agency in achieving each of these goals, we have allocated the supporting activities very approximately to one of three categories:

Environment Agency's role is central
Environment Agency as a substantial partner
Environment Agency's involvement to build understanding

<sup>3</sup> DETR (1999) *Quality of life counts. Indicators for a strategy for sustainable development for the UK: a baseline assessment.*

<sup>4</sup> Environment Agency (July 2000) *Environmental Indicators.* A set of Environmental Indicators for Agency use (also available on the Agency's website <http://www.environment-agency.gov.uk>)



**Flood warning**

**Outcome 1 – Flood warnings will be given in good time, acted upon and damage minimised.**

**Tests for progress:**

- Coverage of flood warning service to medium and high flood risk areas.
- Number of residential and commercial properties connected to an automatic warning service.
- Number of rain and river gauges.
- Number of properties covered by flood wardens.
- Number of properties covered by public sirens (or similar).

GOAL	ACTIVITY
<p>Goal 1.1 People living in medium to high flood risk areas will receive a full flood warning service and a two hour prior warning of flooding.</p>	<p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Implement automatic warning messages to commercial properties.</li> <li>• Extend coverage of flood warning service to all medium and high flood risk areas.</li> <li>• Complete current planned improvements to the rain and river monitoring system, then review the network and undertake further improvements.</li> <li>• Develop and implement new public alert systems within residential properties.</li> </ul>

- Environment Agency's role is central
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**Response to flood warnings**

**Outcome 2 – People will accept the need to avoid flood risks, take warnings seriously and act accordingly.**

**Tests for progress:**

- Increased public awareness of Agency role in flood defence.
- Number of lives lost through flooding.
- Number of community self help groups.
- Opinion surveys to report the performance of the flood forecasting, warning and response service.
- Number of residents taking effective action.

GOAL	ACTIVITY
<p>Goal 2.1 In flood risk areas the public will be supported in taking effective action.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Act on lessons from the 2000 Public Awareness Campaign and Flood Directory booklet.</li> <li>• Conduct targeted public awareness campaigns and publish evidence of their impact.</li> <li>• Publish annually performance of residents taking effective action.</li> </ul> <p>• Establish the regional number of residents suffering from health problems and introduce better targeting of people with hearing difficulties and language problems.</p> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Explore community self-help with the public, establish Community Flood Help Groups and continue dialogue with community groups.</li> </ul>
<p>Goal 2.2 Major national flood exercises with local authorities and emergency services undertaken.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Carry out national emergency exercise.</li> </ul> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Publish findings of national major flood emergency exercise.</li> <li>• Implement lessons from national, regional and local emergency exercises.</li> </ul>

**Environment Agency's role is central**

Environment Agency as a substantial partner

Environment Agency's involvement to build understanding

**Standards of flood defences**

**Outcome 3 – Nationally consistent standards of flood defences will be in place to meet the challenges of climate change.**

**Tests for progress:**

- The condition of defences.
- Frequency of inspections (according to the degree of risk).
- National consistency of standards of defence (according to the degree of risk).

GOAL	ACTIVITY
<p>Goal 3.1 Nationally consistent standards of defences based on the degree of risk.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Develop and introduce social equality issues with regard to standards of defence.</li> <li>• Establish current standards of defences according to risk.</li> <li>• Develop and introduce broad regional climate change scenarios for evaluating impacts on standards of defences.</li> <li>• Develop and introduce a multi-criteria framework for nationally consistent standards of defences that takes into account economic, social and environmental issues, discuss with Government and stakeholders and introduce.</li> </ul>
<p>Goal 3.2 The conditions of flood defences assessed nationally.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Create a national database for all flood defences and annually assess their condition.</li> <li>• Publish a State of the Nation's Flood Defences Report annually.</li> <li>• Establish a clear policy for taking over defences from local authorities, Internal Drainage Boards and those in private and public ownership.</li> </ul>

**Environment Agency's role is central**

Environment Agency as a substantial partner

Environment Agency's involvement to build understanding



**Design of flood defences**

**Outcomes: 4 – Flood defences will be designed and constructed to deliver optimum environmental benefits; – Positive aspects of natural flood events will be recognised, and flood defences designed to work with nature in accommodating them.**

**Tests for progress:**

- The number of sites with fully implemented Water Level Management Plans (WLMPs).
- The use of recycled and secondary materials.
- Changes in habitat extent as a result of flood defence schemes.
- The number of sites in which managed realignment or foreshore recharge is recognised to be the most cost-effective and environmentally beneficial option.
- The number of river restoration sites.

GOAL	ACTIVITY
<p>Goal 4.1 New defences will have a low adverse impact on the environment and maximum environmental enhancements for the benefit of wildlife.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Introduce guidance on best practice in the use of recycled and secondary materials in the design and construction of flood defences.</li> <li>• Establish monitoring requirements for loss of habitat from construction of new defences and maintenance of existing defences.</li> <li>• Introduce methodology for assessing the whole life costs of design and construction.</li> <li>• Complete Coastal Habitat Management Plans and implement actions to protect internationally important sites.</li> </ul> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Review current experience on our procurement strategy with regard to achievement of environmental best practice.</li> <li>• Introduce guidance on environmental best practice for the design, construction and maintenance of defences.</li> <li>• With Government and the EU, review the EC Habitats Regulations.</li> </ul>
<p>Goal 4.2 Managed realignment and foreshore recharge incorporated into coastal defences at sites for which they are the most cost-effective and environmentally beneficial option.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Introduce guidance on the use of managed realignment in the design of flood defences on the coast.</li> <li>• Introduce guidance on the use of foreshore recharge in the design and maintenance of flood defences.</li> </ul>
<p>Goal 4.3 Joined-up funding available to maximise efficiency.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Explore "joined-up" funding options with DEFRA, English Nature, NAW, Countryside Council for Wales and environmental groups, consult on the options available and if required, promote appropriate legislative change.</li> </ul>
<p>Goal 4.4 Rivers and floodplains restored at the earliest opportunity.</p>	<p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Introduce guidance on river restoration into the Agency manual for the design and maintenance of defences.</li> </ul>
<p>Goal 4.5 Water Level Management Plans (WLMPs) implemented in key sites.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Complete WLMPs and implement actions to protect key sites.</li> </ul>

**Planning and flood risk**

**Outcomes: 5 – Flood risks arising from land use and climate change will be recognised, understood and fully taken into account in planning decisions; Planners will understand their role in sustainable flood risk management.**

**Tests for progress:**

- The number of planning applications permitted against Agency advice.
- The number of properties within flood risk areas.
- The coverage of Catchment Flood Management Plans.

GOAL	ACTIVITY
<p>Goal 5.1 A risk-based approach incorporated into land use planning.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Establish clear Government policy with Planning and Policy Guidance Note 25: <i>Development and Flood Risk</i>.</li> <li>• Develop and introduce criteria and tests for sustainable development.</li> <li>• Review current experience of Agency's response to planning applications and continue dialogue with Local Government Association (LGA) to introduce a more strategic approach into land use planning.</li> </ul> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Carry out further research into a risk-based approach for determining what type of development may be appropriate in different zones, consult on options, agree an approach with Government and LGA and introduce it into the land use planning process.</li> </ul>
<p>Goal 5.2 Catchment Flood Management Plans integrated into land use planning.</p>	<p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Carry out a pilot study for the development of Catchment Flood Management Plans, agree criteria with Government and LGA, and implement integrated flood risk maps into land use planning.</li> </ul>

- Environment Agency's role is central
- Environment Agency as a substantial partner
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**Coping with flooding**

<p><b>Outcome 6 – Properties at risk will be designed or modified to cope with the likely consequences of being flooded.</b></p> <p><b>Tests for progress:</b></p> <ul style="list-style-type: none"> <li>• The number of existing properties modified.</li> <li>• The number of new dwellings with flood defence measures.</li> <li>• The number of sewers constructed to new guidelines.</li> </ul>	
GOAL	ACTIVITY
<p>Goal 6.1 Properties in flood risk areas will be designed and constructed to minimise loss of life and structural damage in the event of a flood.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Promote, with Government, research into surface water management and disposal and building design for flood damage avoidance, leading to the production of design guides for surface water management and disposal and for new properties and existing single storey buildings.</li> </ul>
<p>Goal 6.2 Temporary flood defence measures and retro-fitting encouraged for existing properties in flood risk areas.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• <b>Produce a leaflet for the public on the availability and use of temporary flood defence measures.</b></li> <li>• Develop and introduce options for the public for retro-fitting of properties at risk of flood damage and in liaison with the insurance industry produce a leaflet on retro-fitting.</li> </ul> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Review take-up of temporary flood defence measures.</li> </ul>

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**Funding of defences for new development**

<p><b>Outcome 7 – Flood defences that may be required because of new development will be fully funded by developers as part of that development, and should not lead to additional flood risk.</b></p> <p><b>Tests for progress:</b></p> <ul style="list-style-type: none"> <li>• The number of defences for new developments paid for by the public purse.</li> </ul>	
GOAL	ACTIVITY
<p>Goal 7.1 New development is not a burden on the public purse.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Discuss with developers and Government options for developer contribution, and seek Government approval for the preferred policy option which is then implemented and subsequently reviewed.</li> </ul>

- Environment Agency's role is central**
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Use of new technology

**Outcome 8 – Innovative uses of technology will improve the ability to predict and cope with floods.**

Tests for progress:

- The percentage of the public at risk receiving prior warnings of floods.
- The cost effectiveness of data collection and the quality of data collected.

GOAL	ACTIVITY
<p>Goal 8.1 An improved flood forecasting and warning service.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Review best practice in fluvial forecasting modelling and adopt nationally.</li> <li>• Explore improvements of the coverage and accuracy of weather radar, carry out pilot studies and introduce improved accuracy.</li> <li>• Consider impacts of saturated catchment conditions on flood forecasting and review forecasting models in light of findings.</li> <li>• Implement best practice for flood forecasting modelling.</li> <li>• Investigate options for estimation of the speed of flooding.</li> </ul> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Identify options for real time flood forecasting modelling, carry out pilot studies and introduce preferred approach.</li> <li>• Investigate development of a system to provide earlier river level warnings and introduce selected option.</li> </ul>
<p>Goal 8.2 Improved remote sensing techniques for data collection.</p>	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Promote research for advance remote sensing techniques, and incorporate proven advanced techniques into data collection best practice.</li> </ul>

Environment Agency's role is central

Environment Agency as a substantial partner

Environment Agency's involvement to build understanding

**Benefits of natural floods**

<p><b>Outcome 9 – Benefits for water resources and wildlife will be achieved from natural flood events.</b></p> <p><b>Tests for progress:</b></p> <ul style="list-style-type: none"> <li>• The number of sites using sustainable urban drainage systems.</li> <li>• The number of sites using wetlands for flood storage.</li> </ul>	
GOAL	ACTIVITY
Goal 9.1 Better ways of using surface water run-off in place.	<p><b>Short to medium term:</b></p> <ul style="list-style-type: none"> <li>• Encourage the use of sustainable urban drainage systems for new development by promoting a manual for developers.</li> <li>• Review the effectiveness of off-site storage measures in reducing flood risk.</li> <li>• Review current practice on the recycling of surface water run-off from properties.</li> </ul> <p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Introduce whole catchment decision support systems to target the siting of strategic surface water run-off storage areas.</li> </ul>
Goal 9.2 Increased use of wetlands for flood storage.	<p><b>Medium term:</b></p> <ul style="list-style-type: none"> <li>• Develop and implement evaluation methods taking into account impacts on land use.</li> </ul>

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**7. Research and development**

DEFRA and the Environment Agency are developing a new joint R&D Programme in Flood and Coastal Defence. The impetus for this change was the June 1999 report of the joint MAFF (now DEFRA)/Agency Advisory Committee for Flood and Coastal Defence R&D, which recommended restructuring and bringing together the existing MAFF and Agency R&D programmes in order to improve cost-effectiveness and performance.

The new joint programme will have a thematic structure that will follow through from developing strategic policy to constructing and managing defences. Links between R&D and DEFRA/Agency business process will be enhanced. There will also be improvements to R&D management and uptake, including the dissemination and implementation of research outputs. This will increase the effectiveness of the research and maximise the benefits of collaboration.

In developing the new programme, DEFRA and the Agency are seeking to achieve a strong "user drive" to ensure that R&D starts and ends with real-world issues and outcomes relating to practice rather than research for its own sake. Sustainability will be emphasised. A strong link is being established with the National Capital Programme for Flood Defence to promote benchmarking and the sharing of good practice.

The Programme and management structure are being set up in 2000/01 and will be fully operational from April 2001 onwards. An independent review of the results of the joint R&D Programme will be carried out in three to four years' time.

## 8. Implications for the Environment Agency

The Agency's strategic approach to flood defence will in future place a greater emphasis on its general supervisory and enforcement roles. This need was highlighted by both the Agriculture Select Committee (1998) and the Independent Review of the Easter Floods. In November 1999, MAFF published a series of high level targets for flood and coastal defence (NAW has introduced similar targets for Wales). These targets provide the means by which the Agency's delivery of flood defence aims and objectives can be measured. The Agency's elaboration of its flood defence supervisory duty addresses the actions required to fulfil the high level targets. The Agency aims to achieve supervision by consent, in partnership with the other operating authorities and the Association of Drainage Authorities.

The Agency will continue to play the lead role in providing strategic advice on flood issues. This is one of the major conclusions of the DETR's consultation draft on the new Planning Policy Guidance Note 25: *Development and Flood Risk*, published in April 2000. The draft guidance is the result of a review of the existing guidance by DETR in close consultation with MAFF and the Agency. It emphasises the importance of flood risk as a national planning consideration.

The Agriculture Select Committee highlighted the need to simplify existing flood defence funding arrangements in order to improve the efficiency of policy implementation and service delivery. The Agency aims to cut out unnecessary bureaucracy and administration by working on arrangements for DEFRA to pay a block grant to support our capital programme. Long-term funding is a concern for the Agency and we eagerly await the outcome of the flood and coastal defence funding review instigated by the Government.

A model flood risk management structure has recently been introduced under the Changing Needs in Flood Defence Review. This clarifies the day-to-day duties and responsibilities of flood defence staff and their role in dealing with flood emergencies. A Human Resources Strategy has been introduced to support this transition, which will ensure that the skills and competencies of new and experienced staff are continuously enhanced. Our highly skilled emergency workforce will continue to benefit from on-site training and focused National Vocational Qualifications.

The Agency is able to deliver many of the goals laid out in this *Framework*. However, some are not entirely within our power, while others depend on persuading the Government to introduce legislative change and working with or influencing others. Successful delivery of the goals will require the Agency to:

### Taking action ourselves

- Train our staff in best practice methods and maintain the awareness of new methods.
  - Extend coverage of the flood warning service so that people living in medium to high flood risk areas receive a two hour prior warning of flooding.
- Introduce better targeting of people with hearing difficulties and language problems in order that they understand and receive a flood warning message.



- Introduce environmental best practice for the design, construction and maintenance of defences to ensure that they will have minimal adverse impacts on the environment.
- Introduce guidance on managed realignment and foreshore recharge to assist the selection of the most cost-effective and environmentally beneficial flood defence option.
- Introduce guidance on river restoration and a programme for the implementation of Water Level Management Plans to restore the quality of river habitats.
- Integrate Catchment Flood Management Plans into the land use planning process to maximise the impact of the Agency's advice on new development proposals.
- Improve the flood forecasting and warning service through the innovative use of technology.
- Promote sustainable urban drainage systems for new development in order to maximise the benefit for water resources.
- Introduce catchment-wide decision support systems to target the siting of strategic surface water run-off storage areas.

### **Influencing and educating others**

- Establish community self-help groups to improve the number of people taking effective action upon receipt of a flood warning.
- Carry out and publish the findings of national emergency exercises to improve the responses of the Agency, Local Authorities and emergency services to major flood emergencies.
- Establish a clear policy for taking over defences from Local Authorities, Internal Drainage Boards and those in private and public ownership.
- Review experience of Agency's response to planning applications to minimise the number of applications permitted contrary to our advice.
- Produce design guide for new properties and existing single storey buildings to minimise structural damage and loss of life in the event of a flood.
- Increase the awareness of temporary flood defence measures and retro-fitting of properties to minimise flood damage to property.
- Produce design guide for surface water management and disposal to allow for the impacts of climate change.

### **Working with Government**

- Introduce a multi-criteria framework for nationally consistent standards of defences that take account of economic, social and environmental issues.
- Introduce legislative change for "joined-up" funding of flood defences to improve the efficiency of service delivery.
- Review EC Habitat Regulations in the light of lessons learned from the production of Coastal Habitats Management Plans to encompass maximum benefits for wildlife.
- Introduce a risk-based approach for land use planning and incorporate into the land use planning process to minimise the amount of new development in flood risk areas.
- Introduce a developer contribution policy to ensure that flood defences made necessary by new development are fully funded by developers.

**TABLE 1: Regional variation in some pressures linked to flood defence**

Pressure	Anglian	Midland	North East	North West	Southern	South West	Thames	Wales
Sea level rise	H	L	M	L	H	M	H	M
Wetter winters (projected)	M	H	H	H	M	H	M	H
Demand for housing	L	M	M	M	H	L	H	L
River habitat classification	H	M	M	M	M	L	H	L

## KEY

Sources: Environment Agency (2000) *Environment 2000 and beyond*  
 Environment Agency 88pp Hulme, M and Jenkins, G J (1998) *Climate change scenarios for the UK: scientific report UKCIP technical report no 1, Climatic Research Unit, Norwich, 80pp*

**TABLE 2: Flood defence: key facts and figures**

Resources	<p>Length of main river: 36,600 km</p> <p>Length of coastline: over 4,400 km</p> <p>Length of estuary: 2,400 km</p>
Extent of risk	<p><b>Frequency of incidents:</b> Over 1550 flooding and erosion incidents since 1700, increasing in frequency up to the 1950's after which the frequency declined. The factors influencing these trends include the rapid spread of development into vulnerable locations in the 19th and 20th centuries, institutional and structural responses after the major floods of 1947 and 1953, and changes in reporting.</p> <p><b>Fluvial flood risk:</b> Around 10,000 km<sup>2</sup> (seven per cent of the total area) of England and Wales is at risk from river flooding once in 100 years (including tidal rivers and estuaries).</p> <p><b>Tidal flood risk:</b> About 30 per cent of the coastline is developed, and around 2,500 km<sup>2</sup> of the land lies below 5m which is at risk of direct flooding by the sea in the absence of defences. Some 40 per cent of all manufacturing industry is located along coastlines and estuaries, and one- third of the population live within 10 km of the coast (resident numbers may increase by as much as 50 per cent in the summer).</p> <p><b>Population at risk:</b> About 10 per cent of the population live in and 1.8 million properties are located in areas potentially at risk from flooding or coastal erosion.</p> <p><b>Land at risk:</b> About 12 per cent of agricultural land (including over 60 per cent of the Grade 1 agricultural land) is located within areas potentially at risk from flooding or coastal erosion.</p>
State of defences	<p><b>Length of coast defended:</b> Some 1,260km of sea defences and a further 1,018km of coastline protected. Tidal defences amount to 2,150km. There is a greater density of defences in the south and east of England than elsewhere.</p> <p><b>State of sea defences:</b> In 1997, more than 12 per cent of sea defences needed moderate or significant work and another 40 per cent showed signs of wear.</p>
Economic risk	<p><b>Capital value of assets at risk:</b> The value of assets at risk in England, including property and agricultural land, is about £214 billion.</p>

**TABLE 2: Flood defence: key facts and figures** *continued*

	<p><b>Potential economic damage:</b> Without existing flood defences, the average annual cost of potential damage in England is £2.8 billion.</p> <p><b>Actual damage avoided:</b> With present defences in place, the average annual cost of potential damage avoided is about £0.6 billion.</p>
<b>Costs of flood defence</b>	<p><b>Current expenditure:</b> Current capital works and revenue expenditure is about £310 million a year, of which about half is spent on capital works. MAFF research indicates that current expenditure is some £100m per annum short of that required to maintain current standards.</p> <p><b>Funding:</b> Over 80 per cent of the Agency's flood defence work is funded by levies on local authorities. A further 13 per cent comes from central government and the remainder comes from a mix of sources, including internal drainage boards.</p>
<b>Flooding and biodiversity</b>	<p><b>Coastal habitats:</b> Over 90 per cent of saltmarshes have been lost due to erosion, land claim and coastal squeeze in the past few centuries. A further 8,000 and 10,000 hectares of intertidal mud and sand flats (4% of the current total area) and 2,100 hectares of saltmarsh (6% of the total) may be lost due to "coastal squeeze" around the entire coast of England between 1992 and 2012.</p> <p><b>River habitats:</b> Some 42 per cent are extensively modified with the greatest amounts of change in the east of England and the least changes in Wales. Many of these modifications are due to past flood defence works.</p> <p><b>Managed realignment:</b> Implementation of the "best guess" coastal defence policies (including managed realignment) could lead to a net loss of around 40 km<sup>2</sup> of freshwater and brackish habitats (wet grassland, coastal lagoon and reed bed) and a net gain of around 80 km<sup>2</sup> of intertidal habitat (saltmarsh and mudflat or sandflat).</p>

Sources: Environment Agency (1999) *The state of the environment of England and Wales: coasts*.

Environment Agency (2000) *Environment 2000 and beyond*.

Ministry of Agriculture Fisheries and Food (2000) *The National Appraisal of Assets at risk from Flooding and Coastal Erosion*.







## CONTACTS:

### THE ENVIRONMENT AGENCY HEAD OFFICE

Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS32 4UD.  
Tel: 01454 624 400 Fax: 01454 624 409

[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)  
[www.environment-agency.wales.gov.uk](http://www.environment-agency.wales.gov.uk)

### ENVIRONMENT AGENCY REGIONAL OFFICES

#### ANGLIAN

Kingfisher House  
Goldhay Way  
Orton Goldhay  
Peterborough PE2 5ZR  
Tel: 01733 371 811  
Fax: 01733 231 840

#### SOUTHERN

Guildbourne House  
Chatsworth Road  
Worthing  
West Sussex BN11 1LD  
Tel: 01903 832 000  
Fax: 01903 821 832

#### MIDLANDS

Sapphire East  
550 Streetsbrook Road  
Solihull B91 1QT  
Tel: 0121 711 2324  
Fax: 0121 711 5824

#### SOUTH WEST

Manley House  
Kestrel Way  
Exeter EX2 7LQ  
Tel: 01392 444 000  
Fax: 01392 444 238

#### NORTH EAST

Rivers House  
21 Park Square South  
Leeds LS1 2QG  
Tel: 0113 244 0191  
Fax: 0113 246 1889

#### THAMES

Kings Meadow House  
Kings Meadow Road  
Reading RG1 8DQ  
Tel: 0118 953 5000  
Fax: 0118 950 0388

#### NORTH WEST

Richard Fairclough House  
Knutsford Road  
Warrington WA4 1HG  
Tel: 01925 653 999  
Fax: 01925 415 961

#### WALES

Rivers House/Plas-yr-Afon  
St Mellons Business Park  
St Mellons  
Cardiff CF3 0EY  
Tel: 029 2077 0088  
Fax: 029 2079 8555



ENVIRONMENT AGENCY  
GENERAL ENQUIRY LINE

**0845 933 3111**

ENVIRONMENT AGENCY  
FLOODLINE

**0845 988 1188**

ENVIRONMENT AGENCY  
EMERGENCY HOTLINE

**0800 80 70 60**



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