



Environment Food and Rural Affairs Committee

Written Evidence on Winter Floods

March 2014

Background to CIWEM

1. The Chartered Institution of Water and Environmental Management (CIWEM) is the leading professional and qualifying body for those who are responsible for the management of environmental assets. The Institution provides independent comment on a wide range of issues related to water and environmental management, environmental resilience and sustainable development.
2. CIWEM has produced a report entitled "Floods and Dredging - a reality check" in response to the winter floods which provides further background to this written evidence. The report is available from <http://www.ciwem.org/flooding>.
3. CIWEM has recently updated its Policy Position Statement: Flood and Coastal Erosion Risk Management with the assistance of our Rivers and Coastal Group. This is available from <http://www.ciwem.org/fcerm>.
4. CIWEM welcomes the opportunity to submit this written evidence to the Environment Food and Rural Affairs Committee (EFRA) on the winter floods. In formulating this evidence, CIWEM has utilised the expertise of CIWEM's Rivers and Coastal Group Committee which represents over a thousand members working in flood and coastal risk management. The group is broad in its scope and includes representatives from Lead Local Flood Authorities, the Environment Agency and Internal Drainage Boards.

Summary

5. Flooding is sometimes inevitable. It is related to extreme weather patterns, which are likely to become more frequent if the climate changes according to current projections.
6. Flooding is obviously distressing to individuals and communities and CIWEM shares the dismay and concern for those affected.
7. There is no prospect of preventing flooding entirely; floodplains are designed by nature to flood. The Committee might emphasise that local authorities should be resourced to manage the expectation of what can be achieved and Public figures should not undermine this.
8. The damage caused by flooding is extremely costly, although episodic. Measures to prevent flooding are less costly, but are recurring.
9. Because of these costs, much of the debate about flooding is about money. Whether this is described as funding, spending or investment is immaterial; someone has to find the money. The costs of prevention versus cleaning up fall on different parties, and on different budgets, which can further distort priorities.

10. There is emerging consensus that current rules are short-sighted in favouring capital expenditure (on new projects) over maintenance activities.
11. CIWEM is concerned that absolute levels of funding for maintenance are at a bare minimum, and that this represent inadequate planning for the future, but recognises that public funding is constrained.
12. Equally important is that what money is spent should bring maximum efficiency, effectiveness and benefit. CIWEM supports the call from the EFRA Committee for new maintenance funding to "be spent effectively". Transparency about who is responsible for what (i.e who sets the budgets for flood prevention, who plans the measures, and who carries out the work) is essential to maintain public confidence.
13. For consistency, CIWEM believes responsibility for the planning and managing of maintenance should sit with the Environment Agency as part of a strategic overview or as a partnership of the existing organisations. In this way maintenance can be considered as part of the catchment based approach and linked to capital works.
14. There is no rationale for a widespread programme of dredging (as a sole measure) to prevent flooding. There is broad agreement that dredging can and will be part of the solution. But dredging will not always be cost-effective. If carried out in the wrong way and in the wrong place, dredging can result in significant environmental damage, increased flooding and erosion downstream.
15. A whole catchment approach is inherently superior, more versatile and more durable approach. It allows a range of measures to be tailored to local circumstances, resulting in greater benefits, with fewer risks - and can include dredging.
16. We have seen no evidence to support the claims that too much attention has been paid to environmental schemes. Flood prevention is already geared towards protecting people and property. To deliver this aim schemes which work closely with natural processes should work in concert with engineering solutions.
17. Every catchment is different; the Somerset Levels (in particular) are not representative. Dredging should be considered on a case by case basis and should be used within the context of a range of tools and the origins of different sources of flood water. It comes with significant risks that must be understood at a local and catchment scale.

Detailed comments

What lessons are we learning from the winter floods in relation to the approach to maintenance work?

18. CIWEM believes funding for new flood and coastal erosion defences should not be to the detriment of funding to support communities protected by existing assets. This spending is divided between capital (for new and improved defences, major refurbishment and other expenditure on defences, assets, plant and equipment) and revenue (including routine maintenance of defences, emergency planning and response, community resilience, forecasting and warning services, risk mapping, modelling and assessment and other running costs).

19. The Payment for Outcomes framework¹ requires targets or 'outcome measures' to be agreed between Government and the Environment Agency, such as the number of homes to be protected by installing new flood defences or for environmental improvements. The target for the number of houses protected (OM2) is set by Defra for each Comprehensive Spending Review period. For example in the current period the Defra target is 145,000 houses, although the Environment Agency plans to target 175,000. As these targets must be met, the economic case favours this capital expenditure, allowing less to be available for the maintenance of existing schemes.
20. Capital schemes are funded through payment for outcomes, utilising the partnership funding calculator with the benefit-cost ratio from the HM Treasury's guidance. Due to the way the partnership funding calculator works, the benefit cost ratio for a capital scheme in reality only needs to be robustly above one. The Environment Agency's maintenance budget is set nationally and is then shared for maintenance work based largely on the benefit cost ratio to the 'asset system' (each system is effectively a sub-catchment). The 'minimum needs' (the legal requirement) for maintenance are defined for each asset system. CIWEM understands that the cost benefit ratio required for the Environment Agency to undertake maintenance above the minimum needs is far greater than for a capital scheme.
21. This therefore means that a capital scheme might gain funding in an asset system with a low benefit cost ratio for maintenance. The construction of a capital scheme could in fact raise the necessary maintenance costs for the asset system and therefore reduce the benefit cost ratio for maintenance in the asset system. Whilst maintenance is included in the business case, there is no guarantee that funding will be forthcoming to pay for it.
22. River maintenance is a visible and emotive topic. Recent media reaction has shown that members of the public in areas that have had maintenance withdrawn are unhappy with this approach and that they place great value on rural land, although there may be little immediate financial benefit. There is a need to engage with the public about the availability of funding and what can and cannot be realistically achieved. With specific regard to the maintenance of rivers utilising dredging, there is a need for consultation on the realistic benefits and disadvantages of its practice for managing flood risk.

What changes to the approach should be made before next winter?

23. A review of this winter's floods would be valuable, for example to review the funding mechanisms and prioritisation used, and to address the longer term coordination of flood defence works and resilience around the country.
24. Measures are needed to provide greater resilience to events exceeding the capacity of existing flood risk management measures. A review of critical infrastructure resilience is necessary, for example roads, railways, hospitals, water treatment works and electricity substations. One of the greatest problems in Somerset has been the isolation of people and how they gain access and egress and simply to be able to 'live with floods'. Every defence, however robust, can be defeated.
25. Another aspect is emergency planning and response. Flood warnings have proved successful with far fewer fatalities than the 2007 floods. However there have been a

¹ Environment Agency, 2011. Flood and coastal risk management outcome measures
<http://www.environment-agency.gov.uk/research/planning/122070.aspx>

number of examples in Somerset and the Thames Valley where evacuation has proven difficult and some people still do not know where to receive help.

26. Many people believe that flooding can be prevented and coastal erosion can be stopped, however this is not the case and there is an urgent need to manage expectations and to educate people in what can be achieved. Involving local people and businesses in managing flood risk management spending could be one solution to this.
27. The longer term resilience of the country must be addressed by ensuring that the 'risk based approach' is followed and applied on a catchment wide basis. A catchment approach emphasising more sustainable solutions such as upstream storage, upland woodland and an emphasis on sustainable drainage are needed to reduce flood risk. These methods can bring a long term and low annual cost solution that balances the needs of the environment and people.
28. There may be a need to review the changes to Higher Level Stewardship payments under the Common Agricultural Policy for farmers to identify if there will be any detrimental impact of these policies on flood risk.
29. It should be recognised that whilst several thousand homes have been flooded there are over one million that have been protected.

How is funding allocated by the Government and the Environment Agency to maintenance work and how can this process be more transparent and effective?

30. Recent flooding of low lying areas drained by natural and manmade channels has led to claims that these policies have neglected farmland, especially in relation to a lack of river dredging. The dredging work that many members of the public have called for in the Somerset Levels would not qualify for significant central Government funding under current HM Treasury rules. This is due to the (relatively) low benefits obtained compared to carrying out flood management schemes in urban areas elsewhere in the country. The Environment Agency was only able to put £400,000 towards dredging and under funding rules could not provide more; the total costs would have been more than four times this sum, and there was no other forthcoming contributor.
31. The process is already transparent with the Environment Agency publishing its entire river maintenance programme and also its assessment of the level of risk for each river. However with most Environment Agency asset systems only receiving the legal minimum funding, CIWEM believes this should be reviewed.
32. The use of upstream measures for storing water would inevitably involve land that must be managed to accommodate occasional flooding and for this to be balanced with its use during non-flood periods, for example grazing, although it may be that some land is 'sterilised' from other uses. The Government should consider how to compensate landowners where their land is contributing to an overall reduction of flood risk (payments for ecosystem services) or, in some cases, purchase of this land so it can be set aside for flood storage. This system is already being applied to managed realignment schemes for creating inter-tidal habitat.

Is the responsibility for maintenance work currently allocated in the best way? How can this approach be improved? What maintenance role should IDBs, local authorities and landowners take?

33. The legislative framework sets out adequately the jurisdictions of the relevant authorities (Environment Agency, Lead Local Flood Authorities and Internal Drainage Boards). However as the powers are permissive they will always compete with other priorities. Catchment co-ordination and education as to which organisations have permissive powers and who has ultimate responsibility as a riparian owner are critical.
34. For consistency, CIWEM believes the responsibility for planning and managing the work should sit with the Environment Agency as part of a strategic overview or as a partnership of the existing organisations. In this way maintenance can be considered as part of the catchment based approach and linked to capital works. Delivery programmes should be informed by up to date catchment strategy documents including River Basin Management Plans and Catchment Flood Management Plans.
35. Responsibility for maintenance could be devolved to landowners and local bodies where feasible. This broadly fits with the Flood and Water Management Act. However this raises questions in terms of funding. There will need to be an agreed plan as to how they will be allocated financial support, particularly when that maintenance brings about benefits to others. Ecosystem services and payment for outcomes could assist with this. Under Government procurement rules it may be difficult to pay landowners to do work on their own land as competitive tender may be necessary. Landowners may also need to submit consents to the Environment Agency to ensure protected wildlife and habitats are not damaged.
36. CIWEM considers landowners and riparian owners should not be funded to undertake what is essentially their responsibility to keep watercourses flowing. Farmers can reduce soil erosion and the sedimentation of watercourses, through good management techniques, thereby reducing the need to dredge watercourses. There may be an opportunity to support the establishment of new Internal Drainage Boards to undertake maintenance in catchments, funded by rate payers within the area. The provisions of the Flood and Water Management Act are improving circumstances and the ability to designate features will be beneficial, but changing behaviours may take time.

In what circumstances is dredging effective in reducing flood risk? When is dredging not effective?

37. CIWEM recently published a review of floods and dredging in response to the 2013/14 winter floods. This concluded that dredging can play a role in flood risk management in some cases, but is not a stand-alone solution. It should be considered in the context of a range of tools and the origins of different sources of flood water, and comes with significant risks that must be understood at a local and catchment scale.
38. Historical perspective is important. Dredging has never been a tool primarily for flood risk benefit; it is a land drainage tool that helps to lower water levels on land that is otherwise unproductive. Typically it has been used since the post-war period to increase the nation's food production capacity. There may be a small flood risk benefit from sustained dredging but it is not sufficient in itself to provide a high standard of flood protection. For example research on the River Thames has shown that even dredging an extra 1.5m depth in the river would only bring a small reduction in flood risk and would make next to no difference in a large scale flood like the 2014 event. It is a technique

that is very visible for the public, but not one that is effective in terms of engineering or sustainability.

39. Dredging a length of channel results in an increase in the cross sectional area (and hence its volume), as well as a reduction in the roughness of the channel. Where dredging is used to straighten and canalise the river, the effect is to reduce its length and so increase channel gradient. These effects can increase the efficiency of the channel in moving water (increasing conveyance). Dredging should therefore lead to a reduction in upstream water levels and hence a reduction in fluvial flood frequency in the immediate area.
40. However the river bed level may not be the dominant factor that controls water levels in a particular reach. Other factors, for instance channel slope, channel roughness, engineered structures (weirs, bridges, culverts) or backwater effects from tide, downstream main river or tributary may be more dominant factors in determining the level that a certain flow reaches in a channel reach. When the flow rate is impeded by channel constriction or high downstream water levels (e.g. from tide locking, backwater ponding above confluences and in-channel structures, or pumping restrictions), dredging may provide no benefit during extreme events.
41. During an extreme flood, the peak river flow may be many times the bankfull discharge. During large events the storage provided by the river channel is typically insignificant when compared to that held in the floodplain as seen, for example, in the flooding of the River Thames in January and February 2014. It is simply not practical to contemplate dredging of the channel (let alone the floodplain) to the extent that would be required to confine such large and rare flood flows from the wider floodplain, since the storage and conveyance capacity of the channel is a small fraction of that of the wider floodplain.
42. Dredging is rarely a one-off activity. Rivers carry runoff and silt from the catchment to estuaries, so as soon as dredging is complete, material will begin to re-accumulate. Moreover, the river will seek to re-adjust itself to a more natural form in terms of cross-sectional area, gradient and meanders, with potentially serious unintended consequences including bank failure and erosion. As a result, dredged channels require long-term maintenance.
43. There needs to be a clear understanding of the difference between sediment management in smaller streams and the scale of dredging that may be carried out in heavily modified watercourses which exist in areas of land reclamation. Flood risk management, as required by the Floods Directive, should be planned and risk based. Knee-jerk reactions to the most recent, extreme weather patterns should not be taken at the expense of areas at higher risk of more frequent flooding.
44. In Somerset, the Environment Agency has undertaken feasibility studies into potential dredging of the tidal sections of the River Parrett and Tone catchments. It examined a number of potential dredging scenarios for these tidal sections, including assessments of the impacts of dredging different stretches of the rivers, different amounts of sediment removal and comparison of the impacts of agitation dredging versus complete removal of the sediment. The hydraulic models based on the 2012 event demonstrated that dredging would not have lowered peak flood levels significantly for winter storms and a significant drop in the flood levels would not have been experienced. However the models do demonstrate that dredging tidal sections of the two rivers would lead to a significant reduction in the duration of the flood event.

45. The modelling studies also demonstrated an increase in tidal flood risk to the Levels from dredging, although flooding associated with these types of events is usually much shorter-lived. Estimates are not yet available for the 2014 event, but it can be concluded that the storm surge component of the weather events may reduce the benefits shown, as a result of a greater incidence of tidelocking which reduces the ability of rivers to discharge.
46. Targeted dredging can only ever have the potential to reduce flood risk when there is a sufficient understanding of how flood water peaks move through the system. Without an understanding of this very complex picture there is significant potential to worsen flooding.
47. Repeat dredging may be required as often as every five years and can have significant direct and indirect negative consequences for ecosystems. For example, it can lead to loss and degradation of natural habitats and features such as pools and riffles. The removal of vegetation from within channels and along channel banks during dredging operations can increase water temperature by reducing shade. Warmer water temperatures result in lower oxygen concentrations, making fish and invertebrates in dredged channels more vulnerable to stress during hot weather. Dredging can reduce the diversity and density of invertebrate species, which is likely to have incidental impacts on fish and subsequently on top predators.