

## FLOODING ISSUES ADVISORY COMMITTEE

### AVOIDANCE SUB-COMMITTEE

#### SUSTAINABLE FLOOD MANAGEMENT & RURAL LAND USE

##### **Purpose**

1. This paper is intended to inform and stimulate discussion by exploring the potential roles of rural land use in sustainable flood management (SFM) in Scotland. Although it concentrates on river flooding, some of the issues considered are also relevant to debates about the role of ‘managed retreat’ in coastal flood defence and the management of coastal erosion.

##### **Introduction**

2. Across the world, published predictions of climate change, and the uncertainties associated with its effects (some possibly appearing already) have increased interest in flood management. Attention and resources are shifting from dealing with the effects of floods towards managing their causes. The role and function of natural drainage processes and rural land use in managing river flood risk to communities and properties, often much further downstream, has come under increasing scrutiny. Several projects in the UK, and beyond, are examining these processes, and their possible role in flood management.

3. This approach to flood management relies on two basic arguments. First, in catchments where flood flows are initiated in rural areas, particularly in the headwaters, a number (probably a relatively large number) of changes in rural land use and/or of river processes could help to reduce the size of a flood peak by influencing the rate of passage of the flood downstream. Second, action could be taken to maximise natural floodplain retention or to enhance it artificially. This would allow for elements of storage to occur during a flood event and subsequent slow return of flood waters to the channel from the floodplain as the river drops. These arguments stem from the principle that flood management responses and techniques are best applied where catchment flooding processes are well understood.

4. Possible land and channel management measures include:

- (a) reduction of grazing pressure to allow for an increase in general ground ‘roughness’ and to re-establish native tree cover in headwaters – both in flatter terrain and gullies, to intercept precipitation and slow down rapid runoff from compacted soils/low vegetation which generates flood flows;
- (b) reversing upland drainage (by blocking surface drains & ditches) in improved pasture and forest plantations, again to use the natural capacity of the ground to slow the downstream release of flood waters;
- (c) connecting field drains to wetlands rather than directly to watercourses, to slow the rate of run off into the river.
- (d) controlling surface soil erosion and soil compaction through targeted cultivation and re-vegetation practices, to reduce overland flow and sediment loadings;
- (e) managing woody debris dams in gullies above floodplains, to impede sediment and debris movement which might otherwise choke lower-gradient channels downstream;

- (f) re-establishing meanders or creating ‘two-stage channels’ to maximise the volume of in-channel storage during flood events, reduce channel slopes and increase friction.
- (g) restoring and protecting watercourses that have been deepened and straightened, to slow the flow down the channel and increase the buffering of flows provided by vegetation;
- (h) maximising/re-establishing the natural storage and attenuation capacity of floodplains, through removing, lowering or ‘setting back’ flood banks;
- (i) increasing ‘floodplain roughness’ (for example, by re-establishing floodplain tree cover) to slow the downstream movement of water; and
- (j) enhancing floodplain storage beyond natural capacity (e.g. excavate retention basins, install control structures or diversion channels), or set-back floodbanks, if necessary with control structures).

4. It is also worth adding a general point regarding other benefits associated with land use changes and sustainable flood management. The biodiversity value of sites is likely to increase. Wetlands offer high amenity value and can have a positive effect on water quality and carbon sequestration. Flows are not only attenuated in high water conditions. In low water periods, water is still released from wetlands for a longer duration than if they had been drained or reduced.

5. Doubts surround the effect some of these measures may have in controlling more extreme flood events. They could be promoted in higher return period events as methods of mitigating design uncertainty and ecological impacts. Freeboard is currently used by engineers to mitigate uncertainty. These measures could also contribute to managing uncertainty. However, there is more agreement on their potential role in managing small- to medium-sized events with shorter return periods. Flood management benefits include: a longer, flatter flood hydrograph for a given sized flood (and hence more time for flood warnings and emergency procedures); less associated damage, through greater flood resilience and ‘living with the flood’; and lower flood management infrastructure and maintenance costs. In addition, there are much wider, additional benefits for biodiversity, landscape and amenity value. Such measures, in their close attention to the detail of land cover, land management, and channel management, should, through creating greater structural and biological diversity in river ecosystems, also help to ‘defend’ the water environment from diffuse pollution.

6. In England, the Government’s strategy for managing the risks of flooding and coastal erosion, Making Space for Water, supports such measures as part of the “wider portfolio of responses” for managing flood risk. Through further R&D, pilot projects in a number of catchments, and Common Agricultural Policy reform, the Government in England is seeking to promote rural land use solutions as part of its strategy for flood risk management.

7. This paper argues the case for a similar formal position in Scotland, initially through stimulating wider debate via FIAC. The paper summarises the current position, proposes a long-term vision, identifies some key challenges, and highlights a range of short/medium-term opportunities for progress. For the purposes of this paper, short-medium term opportunities are considered to be within the period 2005-2010, with the medium/longer-term spanning 2010-2030.

## Current position

8. Rural land use can be severely disrupted by flooding (both through inundation and subsequent damage), as well as offering a range of potential measures for managing flood risk. However, at present, flood management legislation in Scotland makes little provision for the management of flooding of agricultural land. Here, responsibilities tend to rest with the owner of the land. Earlier legislation from the 1930s-1950s created land drainage schemes which protected drained farmland from flooding; statutory maintenance of these schemes ceased in the 1990s. In addition, as late as the 1980s, agricultural grant was available for maintaining flood banks and river channels for flood prevention purposes.

9. The Flood Prevention (Scotland) Act 1961 makes it clear that Local Authority powers and responsibilities are specifically restricted to assessing and managing the risk of flooding of non-agricultural land. Access to funds for SFM via the '61 Act is unclear yet there is a clear duty for SFM in the WEWS Act. This position requires to be clarified, since it could release substantial funds quickly for SFM.. However, some flood prevention schemes considered or promoted recently have included flood storage or attenuation on agricultural land. Local authorities report difficulties (they are eligible but grants are not normally provided when there is a statutory requirement) in accessing existing rural land use budgets (e.g. Scottish Forestry Grant Scheme (SFGS); Rural Stewardship Scheme (RSS)) for statutory flood management purposes. However, informal and exploratory approaches to managing agricultural and forested land for flood attenuation (i.e. not involving statutory schemes) can be found in areas such as Clackmannanshire and Aberdeenshire.

10. Agricultural payments available through the EU Common Agricultural Policy are increasingly moving away from simply subsidising food production towards supporting a broader range of social, economic and environmental benefits. Recent payment schemes for farmers and crofters offer a range of prescriptions which could help to reduce the risk of flooding, or of flood damage. Current payments/measures which could contribute to SFM are available as follows:

- Set-aside near watercourses (land taken out of cultivation);
- Numerous management options and capital payments under the Rural Stewardship Scheme (e.g. ponds, riparian woodlands, wetlands, floodplains, moorlands, wet pasture);
- Tier 1 Single Farm Payment for, inter alia, minimising soil erosion;
- Several options in the 2005 Land Management Contracts (LMC) Tier 2 'Menu Scheme', e.g.
- Buffer areas (Option 6);
- Management of ditches (Option 7);
- Management of moorland grazing (Option 8);
- Management of rush pasture (Option 9);
- Retention of winter stubbles (Option 11); and
- Farm woodland management (option 17).

11. By 2007, it is intended that in Scotland these are delivered through LMCs via 3 'tiers' of payment. First, through 'Tier 1', the Single Farm Payment will use 'cross-compliance' to make existing subsidy payments conditional on achieving basic standards of animal welfare, food safety and environmental quality – the latter including measures relevant to the

behaviour of flood waters in soils. Second, ‘Tier 2’ offers payments on a non-competitive basis to all farmers and crofters in Scotland for a range of measures, some of which could contribute to SFM. Finally, ‘Tier 3’ measures (yet to be made available) will target specific areas of Scotland where rural land management could bring specific benefits. Some elements of the LMC scheme’s basic standards (e.g. the UK Forestry Standard; Standard of Good Farming Practice; General Agricultural and Environmental Conditions) could also help in managing flood risk.

12. However, flood management benefits are not generally promoted as an aim of many options which, if correctly targeted and incentivised, could deliver greater benefit for SFM. To do would require a new approach, where there was a stronger focus on the design and implementation of particular land use options for SFM, with a focus on assessing merits and securing implementation at the essential catchment scale. This implies a clearer understanding of catchment flood processes, a better guarantee of SFM options being taken up, and the need for options which involve payments which are attractive in the long-term. New arrangements and relationships are required to secure the long-term/permanent commitment required to safeguard communities and properties downstream from flood damage. All of these are significant challenges.

13. The Scottish Forestry Strategy, first published in 2000 and with the second edition out for consultation, includes objectives to increase the amount of floodplain and riparian woodland, through the SFGS. As well as helping with SFM, this would increase ‘woodland connectivity’ through river corridors linking existing woodland fragments. However, evidence gathered during the strategy review suggests that there has been little interest in these objectives – a disappointing observation, given the potential SFM benefits. The current strategy review provides an opportunity to examine the reasons for this lack of interest, to address that where possible through amending the SFGS, and to introduce support for some of the other measures proposed above at para. 4. Whilst of less obvious relevance, moorland management (especially in sporting estates supporting deerstalking and grouse-shooting) may also need attention where vegetation management could deliver SFM benefits.

14. In summary, there remains an artificial divide between statutory provisions for protecting non-agricultural land from flood damage and private/proprietary responsibilities for protecting agricultural land. Whilst there are some funds and measures available which could improve SFM in rural Scotland, it is not easy to coordinate these at a catchment scale, or to combine them with downstream ‘harder defences’. More frequent flood flows are predicted, but not enough is known about which catchments could best benefit from rural measures as part of a wider SFM package.

### **Long-term vision (2010-2020) – and associated challenges**

15. This vision, expressed in the ‘future present’ tense, sets out what is considered to be necessary (and achievable) outcomes for governing sustainable flood management in rural Scotland during the period 2010-2020.

(a) A Scottish strategy for sustainable flood management, which highlights the role of rural land use in delivering a reduction in flood risk to communities and properties downstream. This could be achieved through the identification of objectives, targets, milestones, responsibilities, delivery mechanisms and funding sources;

- (b)** Local Flood Management Plans developed by broader-based Flood Liaison and Advisory Groups, operating under new flood management legislation, linked to river basin management plans/Area Advisory Groups (AAGs) established via the WEWS Act.
- (c)** These plans are supported by an improved, shared and published understanding of how floods typically arise in different parts of Scotland, the communities and assets vulnerable to flood damage, the measures proposed to minimise such damage, and the locations in each catchment where such measures will be carried out;
- (d)** Local Flood Management Plans are linked strongly to (and informed by) key rural land use and water use policies, with objectives, procedures and funding streams much better aligned with those for agriculture, forestry, sporting estates, natural heritage, fisheries, other water uses (through WFD river basin planning) and more 'urban' land uses (through town and country planning). Better coordination of delivery of public funds for flood management.
- (e)** Measures are available, or in place, to maximise the contribution which rural Scotland can make to SFM, to complement – but perhaps in some cases, avoid – the need for 'harder' engineering solutions. Rural land managers receive long-term 'SFM premium' payments where they manage land/channels in accordance with wider CFMP measures, to deliver a flood management service with wider catchment benefits.
- (f)** Flood management in rural Scotland delivers multiple benefits, helping to deliver a range of objectives in Scotland's Sustainable Development Strategy, including: a reduction in damage and disruption created by flooding; better understanding & awareness of flooding; lower flood defence capital costs; lower maintenance & repair costs for defences after low-medium return-period events; and benefits for biodiversity, landscape & amenity, fisheries, and control of diffuse-source pollution.

16. However, if this vision is to be achieved, the approaches advocated above will need to overcome a number of challenges:

- (a)** Significant culture changes, of various types, but mainly professional and social – challenging 200 years of land use policy and practice, 50-75 years of civil engineering flood defence practice, and public perceptions of what flood management is.
- (b)** Mathematical uncertainties for the SFM benefits which might arise for small-medium flood events: how much effect, and where is effort best targeted (upper catchment, floodplain, channel management);
- (c)** Gaps in the expertise needed to assess land use options, conduct a 'flood risk management audit' and advise on options, design and delivery: hitherto not a service easily provided by (e.g.) FWAG, SAC, FC, SNH or SEPA;
- (d)** No obvious current route for systematic, proactive, pursuit of some of the channel management options (e.g. re-meandering, debris dams);
- (e)** Difficulties in accessing rural land use budgets for SFM purposes at an organised catchment scale, or for the length of time required to deliver some of the longer-term SFM benefits;
- (f)** Longer time periods needed to mature some land management options before they deliver their full SFM potential – thus the likely need for a combined approach with (temporary?) hard defences downstream, and for larger floods;
- (g)** Potential conflicts with other land management objectives (agriculture, grouse & deer, biodiversity, landscape) if greater tree cover is proposed for higher-grade agricultural land, sporting estates, or protected areas;
- (h)** Liability issues if landowners' actions create/exacerbate flood risk or other risks elsewhere: damage to rural infrastructure (tracks, footpaths); more woody debris blocking

bridges/culverts, triggering channel change, hence the need for expert advice issued within the context of a wider strategy;

### **Short-medium term opportunities (2005-2010)**

17. Whilst the precise facts and figures are open to debate, there is a growing body of support for the view that catchment processes (land cover, land management, channel management) in rural Scotland can contribute to flood risk, but could also help in managing the risk of flood damage. However, previous rural land use and river channel management decisions have rarely been taken with a view to managing flooding throughout a catchment. This, with the heavy statutory focus on preventing flooding of non-agricultural land, has resulted in a 'policy drift', with uncertain consequences for SFM.

18. The principal issue for FIAC to consider is whether or not reducing the risk of flood damage should be an objective of rural policy in Scotland. The authors of this paper contend that this should be the case and the FIAC Avoidance Sub-Committee is invited to endorse this view.

19. If such an objective is to be delivered, clear actions can be identified in the short-medium term which will help to deliver the vision proposed above. These actions are summarised below.

(a) Issue high-level Scottish Executive policy statements on the role of rural landowners & managers (agriculture, forestry, sporting estates) in helping to deliver SFM.

(b) Issue WEWS Act SFM guidance, and detailed procedural guidance for LAs, pushing existing legislation as far as it can to highlight opportunities for rural measures. Broader membership & remit for FLAGs, linked to the work of SEPA AAGs, to explore the possibility of publishing catchment-based assessments of flood risk and the possible SFM solutions least likely to damage the water environment under the Controlled Activities Regulations.

(c) A Scottish Rural Development Plan with an SFM objective, with stronger incentives, via SFGS and for collaborative LMC applications, and a broader range of measures/prescriptions, to deliver SFM. Payments available for collaborative catchment flood risk assessments, to identify areas most likely to deliver SFM benefit. Public service aspects of providing land for SFM measures acknowledged through payments.

(d) R&D and a network of pilot projects to improve the knowledge/evidence base – e.g. build on the recent JBA report on natural floodplain capacity in extreme flood events, with R&D for less extreme events. Build on work by WWF in Clackmannanshire and the LA in Aberdeenshire. Improve the understanding of key processes and rural catchment locations which generate flooding, locations most frequently flooded, feasibility & potential contribution of various measures, including human, geographical and hydrological practicalities. This offers a real opportunity to link into the research and funding agenda of SNIFFER and other bodies. A major unknown is the economics of sustainable flood management. Although, experience has revealed this as likely to be a fraction of traditional schemes and requiring virtually no maintenance. This clearly another opportunity for study.

(e) Improve understanding and involvement of views of those in rural communities who own, manage or access rural land affected by flooding, or with a potential role in managing flooding.

(f) Promote debate within & between professional communities (land managers, water managers, engineers, planners, utilities, environmental interests) and with local communities.

- (g) Build professional capacity towards establishing new advisory and operational expertise. Explore the funding of a post-graduate course in Sustainable Flood Management.
- (h) Trial catchment-wide flood risk assessments to identify these areas where rural measures are best applied, i.e. areas of catchments which contribute to flooding or are flooded. Work towards maps showing catchments in Scotland at particular risk of flood damage; locations where payments are available for the application of appropriate measures; locations of properties and infrastructure at risk.
- (i) Work towards establishing new institutional arrangements, funding packages and statutory functions – new flood management legislation in the 2007-2011 Scottish Parliament.
- (j) Argue for land use & channel management solutions to be included in the UK negotiating position regarding proposed EU Floods Directive

## **Conclusion**

20. This discussion paper has reviewed the current position, proposed a long-term vision, identified challenges, and suggested short-medium term actions for discussion. During this interim period, a flexible combination of ‘bottom-up’ and ‘top-down’ actions, and new policy, funding and R&D frameworks, would allow and encourage various approaches to evolve, to test out the issues, rather than trying to force them in areas of current technical uncertainty.

21. FIAC views land use measures as part of a wide portfolio of responses to flood risk management. Calls for flood defences will not abate whilst this debate plays out. As it does, heavy reliance is likely to be placed on ‘CAR’, Ministerial guidance, and the evolving RBMP/AAG process, by promoters of schemes to identify options which help to minimise the risk of environmental damage arising from new flood management schemes.

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