15.4.1	Ensure Local Plan policy continues to guide acceptable drainage schemes (with respect to 1) impacts on natural habitats and flow rates, and 2) quality of receiving watercourses).	**AC** / **ACC** / SEPA / SNH / DDSFB
15.5	**Introduce ponding and controlled flooding to reduce runoff rates and prevent serious flood problems.**	**AC** / **ACC** / **Land owners** / **SNH** / SW / FCS / Land managers / SEPA / **SGRPID** / MI / DDSFB / **CNPA**
15.5.1	Identify areas within the functional flood plain which, with the agreement of land owners and users, could be managed to receive and retain flood water temporarily.	**SNH** / **AC** / **ACC** / MI / Land owners / Land managers
15.5.2	Raise awareness of the issue by undertaking a publicity programme (e.g. talks to Community Councils etc, circulation of explanatory pamphlets, articles in local media).	**AC** / **ACC** / SEPA / SNH / SGRPID
15.5.3	Initiate demonstration projects.	**AC** / **ACC** / SEPA / SNH / SW / FCS / Land owners
15.5.4	Develop an incentive scheme.	**SGRPID**
15.5.5	Take a holistic approach in collaboration with other agencies and stakeholders.	**AC** / **ACC** / **CNPA** / SEPA / SNH / DDSFB / SW

Acronyms are listed in the centre of this Action Card

land management & river flows

WATER RESOURCES 15

OBJECTIVE 15. Manage the land so as to reduce the flow of water into the river in times of spate and increase the flow in times of drought (thereby reducing the severity of floods and droughts).

BACKGROUND

Land management activities, both near to and far from the river, greatly affect the rate at which rain water runs off the land and drains into the river system. For example, timber harvesting, ploughing, land drainage, peat removal and urban development can all reduce the amount of water that is absorbed into the ground. Many watercourses in the catchment have been straightened and these burns flow faster than previously as a consequence. In addition, local use of river water (for water supply and water powered machinery by means of sluices and lades) is no longer common place. Increased drainage rates exacerbate the severity of both floods and droughts: in times of spate the river rises more quickly while in times of drought the land is unable to retain stores of water.

Extremes of flow (high or low) are potentially damaging to both infrastructure and riverine habitats and species. There is a local perception that such flows are occurring more frequently than in the past and an expectation that this trend will continue under future climate change scenarios.

ISSUES

- Property is at risk from fluvial flooding: high river levels can cause flood damage to property, and leave behind deposits of flood debris to be cleared up.
- River banks, groynes, bridges and other river infrastructure are at risk from scour damage.
- Riverine habitats and species are at risk from both spate and low flows:
  - Higher rates of run-off increase the input of silt into watercourses.
  - Spate flows cause scour damage, which can disrupt salmon redds and mussel beds,
  - Low river levels affect the ecological condition of the river, reducing levels of oxygen in the water and allowing debris to accumulate. Consequently, pools can become static and can stagnate; these problems are compounded if water temperatures are unusually high at the same time, as they sometimes are in summer. Such conditions can have serious ecological consequence, for example fish migration can be prevented.
- The Parliamentary Powers for major drainage schemes carried out in the past authorise a perpetual maintenance commitment irrespective of impact on the catchment.
- Extremes of flow appear to be more likely in the future: climate change predictions indicate that North East Scotland will experience less snow but more rainfall and increased storminess in the future leading to more extremes of flow, more regularly.

EXISTING / RECENT INITIATIVES

- Developers must submit Drainage Impact Assessments with planning applications.
- New development proposals are required to include SuDS to attenuate the discharge to watercourses.
- Regular maintenance of watercourses, where carried out by Aberdeenshire Council, is carried out only where appropriate to improve the efficiency of flow.
- A demonstration scheme to re-introduce flood plain storage has been carried out at Mill of Gellan on the Tarland Burn.
- Drains have been blocked in order to recreate wetlands on Invercauld Estate and Muir of Dinnet National Nature Reserve.
- The North East Scotland Wetland Inventory examined the current wetland resources of Moray, Aberdeenshire and Aberdeen City.
  - The principal aim was to identify wetland sites with potential for restoration, expansion or creation.
  - It was estimated that the region holds c.153 ha of reedbed, c.1, 630 ha of fen and c.1, 490 ha of wet woodland.
  - Five reedbeds and nine fens were found to be suitable for expansion. Four wet woodlands were also identified as suitable, although the potential expansion area for this habitat was

WHO IS INVOLVED?

- Aberdeenshire Council
- Aberdeen City Council
- Cairngorms National Park Authority
- Dee District Salmon Fishery Board
- Forestry Commission Scotland
- Forestry Owners
- Farming and Wildlife Advisory Group
- Landowners
- Land managers
- The Macaulay Institute
- Scottish Agricultural College
- Scottish Environment Protection Agency
- Scottish Government Rural Payments & Inspections Directorate
- Scottish Natural Heritage
- Scottish Rural Property & Business Association

Further copies can be downloaded at www.theriverdee.org. For further information contact the Dee Catchment Officer
c/o The Macaulay Institute, Craigiebuckler, Aberdeen AB15 8QH Telephone: 01224 498200 email: info@theriverdee.org

deecatchment partnership

relatively small. In addition, 73 ha of forest wetland and 772 ha of potential wet grassland sites were identified for habitat restoration.

- The information collated in this study has formed the basis of the Local Biodiversity Action Plan for wetland habitats.

ACTIONS REQUIRED

- Encourage land use managers to review existing methods of land use.
- Promote land management practices which retain surface water, such as contour ploughing, and improvements such as buffer strips alongside rivers.
- Ensure that all land-based activities are assessed for their potential impacts on drainage rates.
- Implement schemes to create flood plain storage (to attenuate surface water run-off before entering the watercourse).
- Implement schemes to re-create wetlands.
- Ensure that the need to minimise adverse impacts of abstraction during low flow periods is recognised.
- Ensure that no further large scale drainage schemes are carried out.
- Raise awareness of the consequences of wetland loss through land drainage.
- Discourage the replacement of permeable surfaces with impermeable ones that will transfer an increased volume of water, at an increased rate, to watercourses.
- Encourage the removal of unnecessary hardstanding.
- Steer development away from areas liable to flood to ensure flood plains function as they should.

LEGISLATION

See Action Pack Annex for information sources

- Controlled Activities Regulations (2005)
- Environmental Impact Assessment regulations for uncultivated land.
- Conservation Regulations
- Environment Act 1995
- Flood Prevention & Land Drainage (Scotland) Act 1997
- Good Agricultural and Environmental Conditions
- Good Farming Practice Guidelines
- Section 17 of Agriculture Act
- Nature Conservation (Scotland) Act 2004
- Water Environment and Water Services Act (2003)
- Flood Prevention Act 1961
- Forestry Act
- Town and Country Planning (Scotland) Act 1997
- Scottish Planning Policy (SPP) 7. Planning and Flooding is the current national planning document on development and flood risk.
- Agricultural EIA Regulations

GUIDELINES AND INFORMATION

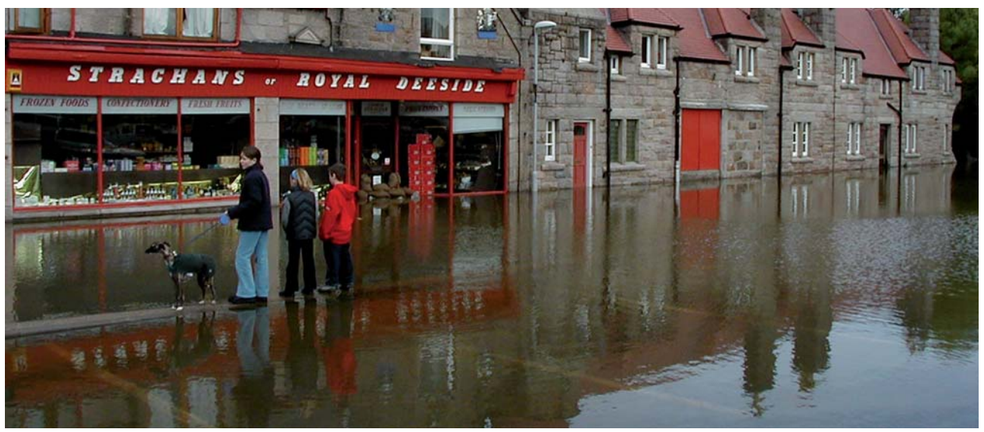
See Action Pack Annex for information sources

- River Restoration Centre guidance
- SEPA Best Management Practices guidance
- SNH muirburn code
- Prevention of Environmental Pollution from Agricultural Activities (PEPFAA) Code of Good Practice 2005
- PEPFAA DOs and DON'Ts guide

BENEFITS TO PROTECTED SPECIES

The following specially protected species will benefit from the Actions:

- Freshwater pearl mussel *Margaritifera margaritifera*
- Stone fly *Brachyptera putata*
- Atlantic salmon *Salmo salar*
- Brook lamprey *Lampetra planeri*
- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*



Flooding in Aboyne (S. Langan)

REF.	ACTIONS	PARTNERS (lead partners in bold)
15.1	**Promote land management practices in the catchment which will encourage the retention of water on the land.**	**SGRPID** / SNH / AC / ACC / Landowners / Farmers / Forestry owners
15.1.1	Regulate land drainage schemes to help safeguard wetlands, reduce rates of runoff and resultant spate flows in receiving watercourses.	**SGRPID** / SNH / AC / ACC
15.1.2	Restore natural storage capacity of agricultural wetlands and peatlands by blocking or restoring artificial drainage where appropriate (needs of watervoles must be considered).	**SGRPID /** Land Owners / SNH / AC / ACC
15.1.3	Promote good practice and the adoption of land management contracts among farming communities (in order to encourage the creation of buffer strips, re-meandering etc).	**SGRPID** / SNH / AC / ACC / Landowners
15.1.4	Seek Scottish Government (or other) funding to facilitate compensation for lost revenue or land value.	**SGRPID** / SNH / AC / ACC
15.1.5	Raise awareness of the fact that permitted development rights are subject to the demonstration of no adverse impact.	**AC** / **ACC**
15.2	**Promote land management practices in upland catchments that will encourage the retention of water on the land.**	**SGRPID** / **AC** / **ACC** / **FCS** / **Land Owners** / SNH / Land managers
15.2.1	Identify and remedy poorly designed hill tracks.	AC / ACC / **Land Owners** / SNH
15.2.2	Adhere to Forests and Water guidelines in order to: 1) Retain buffers against soil erosion and consequent sedimentation of water courses, and 2) Take opportunities to modify drainage networks within forest areas when replanting.	**FCS** / Land Owners
15.2.3	Take opportunities to restore drained wetlands within forest areas as contribution to open space provision and to reduce water runoff.	**FCS** / SNH
15.2.4	Create retention/attenuation strips by contour planting of tree belts at the base of hillsides.	FCS / **Land Owners** / SGRPID
15.2.5	Adopt contour ploughing generally in agricultural operations to reduce runoff and soil erosion (*this is limited to slopes < 1 in 5 = 11°*). Initiate demonstration projects.	**SGRPID** / Land owners / Land managers
15.2.6	Create filter strips by leaving untouched buffer strips and uncropped strips within field margins adjacent to watercourses. Contour plough where slopes < 1 in 5 (11°).	**SGRPID** / Land Owners / SNH
15.2.7	Promote good muir burn & hill grazing practices (identify 'at risk' areas and target promotion accordingly).	**SGRPID** / **SNH** / Land Owners
15.3	**Raise awareness amongst landowners throughout the catchment of the potential impact of land use decisions on surface water runoff and river ecology.**	SEPA / **AC** / **ACC** / **SNH** / FWAG / SAC / SGRPID
15.4	**Seek to ensure that proposed land use changes (e.g. further afforestation, moorland drainage, agricultural and urban development) 1) are assessed for their potential impact on surface and groundwater resources 2) will not result in more rapid run-off into the receiving watercourse 3) will not reduce the storage capacity of the functional flood plain.**	**FCS** / **SGRPID** / AC / ACC / Land owners / SRPBA / SEPA / SNH / DDSFB

RELATED ACTION CARDS

1. Agricultural diffuse pollution
3. Woodland management)
4. Road and access track drainage
14. Abstraction
16. Flood alleviation
19. Changes of land use