PART 1

INTRODUCTION AND OVERVIEW

1. SCOPE AND PURPOSE

BRIEF

This report aims to provide an independent assessment of the state of Scotland's farmed environment in 2005. It uses the best available data and collated information to give a national overview of:

- **The state of Scotland's farmed environment**
- **Analysis of change (according to data available)**
- **Environmental measures available (including incentives and obligations), uptake of incentives, and assessment of compliance with obligations**
- **Potential and trends 2006-13**

The definition of 'environment' covers the breadth of remit of Scottish Environment LINK in an agricultural context. Although both 'conventional' and 'organic' farming are considered throughout, the section on environmental measures available considers organic agriculture as a system in its own right, and its specific environmental effects.

The report is intended to provide a resource for Scottish Environment LINK, its member organizations, and others in the Scottish policy environment to support the Scottish Rural Development Plan 2007-13. It is primarily seen as a Web publication, with the aim of making it easy to extend and update.

METHOD

Material and data were collated over a 6 week period in September/October 2005. The guiding principles were that all information should be publicly available and related to the whole of Scotland. The material was summarized in a standard 'briefing note' format with all references and relevant web addresses.

BACKGROUND

This is the third set of reports commissioned by Scottish Environment LINK on the state of the Scottish environment. The first report, commissioned in April 1991, with support from the then Scottish Office Environment Department (SOEnD), aimed to provide a "*broad brush assessment of selected environmental resources in Scotland"* (Dargie and Briggs, 1991). That report was written against the background of the publication in 1990 of the UK government's environmental strategy statement *"This Common Inheritance"* (Dept. of the Environment, 1990), and provided a resource-based (e.g. air, soils, agriculture, forestry, natural and semi-natural terrestrial habitats etc.) assessment. The *"State of the Scottish Environment 1991"* report was possibly the first attempt to synthesise such a wide range of information from a multitude of sources. Despite the authors' recognizing "*the limitations of a brief requiring a concise report on a very large subject area, within a short time frame and a small budget"* there is little doubt that the report was influential not only in terms of the information it contained but also in

demonstrating the highly sectoral and incomplete nature of the data that we gather and hold on the environment of Scotland (Bayfield, *et al.* 2005; Birnie *et al*., 2002; 2005).

During the 1990s environmental management in Scotland experienced major changes (Warren, 2002), partly through institutional (e.g. creation of SNH) and political reforms (e.g. devolution). In the late 1990s, LINK published a series of publications entitled *"Scottish Environmental Audits"*. Funded through a consortium which included the Esmee Fairbairn Trust, Scottish Natural Heritage, Forward Scotland and members of LINK (WWF Scotland, RSPB, SWT), this series was intended to provide *"an authoritative, independent assessment and critique of the state of the Scottish environment in the late 1990s"*, updating and expanding the analysis provided in *The State of the Scottish Environment 1991* (Dargie and Briggs, 1991), and aimed at informing debate and action. For this series of audit reports, LINK adopted a different approach by commissioning acknowledged experts in the field to write them. Whilst the original SoE report had systematically covered 10 different resource topics, the audit series was less comprehensive. It focused on specific topics of concern such as the marine environment (Gubbay, 1997), agriculture and the environment (Egdall, 1999), and planning and sustainable development (Raemakers and Boyack, 1999). It can be argued that by adopting this topic-based approach, the audit series failed to make the same impact as the original SoE report.

Despite significant efforts on State of the Environment reporting in Scotland especially by SNH e.g. Natural Heritage Trends Scotland, 2001 (Mackey et al. 2001) and SEPA e.g. State of the Environment: Soil Quality Report (SEPA, 2001), there is still no comprehensive SoE report for Scotland of the type envisaged by Dargie and Briggs in 1991, and as developed elsewhere (e.g. by the EEA and Environment Canada). There is possibly a lack of institutional capacity in Scotland to provide such a "joined-up" assessment at the present time.

This report is developed against this background and can be seen as the third in the set of reports sponsored by LINK on environmental auditing in Scotland. It focuses on the farmed environment of Scotland and builds upon Agriculture chapter (4) of *The State of the Scottish Environment 1991* and the Scottish Environmental Audit on agriculture and the environment (Egdall, 1999). It should be noted that this report **does not have the same conceptual structure as a State of the Environment Report** (e.g. systematic treatment of driving forces, pressures, states and responses). It has been conceived as first step resource (i.e. summarizes key points and points to further information), primarily as a Web rather than a printed publication. It has been written as a series of briefing notes on contemporary issues affecting the farmed environment in Scotland. Whilst these are primarily intended to inform debate on the future shape of the Scottish Rural Development Plan, the authors recognize that the material could also contribute to a more comprehensive overall assessment of the state of the Scottish environment.

SOURCES

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Raemakers, J. and Boyack, S. (1999) Planning and Sustainable Development. *Scottish Environment Audits No.3*. Scottish Wildlife & Countryside Link, Perth.

SEPA (2001) State of the Environment Soil Quality Report. SEPA, Stirling.

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2. OVERVIEW OF THE 1991 STATE OF THE SCOTTISH ENVIRONMENT REPORT

KEY ENVIRONMENTAL IMPACTS

The key environmental impacts of agriculture identified in the 1991 State of the Scottish Environment report (Dargie and Briggs, 1991) are summarised below in the order originally presented:

RESOURCE	KEY IMPACTS
Soils	peat erosion; localised overgrazing effects due to expansion of the national sheep flock; wind and water erosion of arable land often associated with tillage for winter wheat; the effects of intense field drainage in the periods 1935-50 and 1970-85 especially in Caithness, Tayside, Lothian and Borders. **Need for more detailed information on extent of soil erosion in upland Scotland and on blanket peats. Research on erosional processes and controlling factors (especially anthropogenic components) and soil restoration.**
Farmland wildlife	localised reductions in bird diversity and common bird numbers due to intensification of arable farming (noted that the major problem pesticides aldrin/dieldrin were withdrawn from use as seed treatments in the 1970s following high bird deaths); continued persecution of "perceived pest species"; loss of semi-natural grasslands through drainage and re-seeding; conversion of heather moorland to grassland by sheep grazing.
Fresh and marine waters	localised and temporary slurry and silage pollution events but new legislation introduced under The Control of Pollution Regulations; leaching of fertilizers especially N and P contributing to eutrophication of nutrient-poor waters including marine systems and general rises in nitrate in major rivers (e.g. Clyde and Tweed); serious but localised (e.g. small rivers in Forth and Tay catchments) problem of water abstraction for irrigation. **Information on the extent of eutrophication in smaller lowland lochs and ponds required to assess the possible impact of agricultural nutrients**
Archaeology	use of heavy machinery for ground improvements and drainage has damaged and destroyed sites through removal of field boundaries, upstanding earthworks and stone monuments, especially in arable areas; soil erosion is an active problem; isolated upstanding sites in areas of intensive agriculture are often not managed resulting in damage from invasive plants and animals, stone and rubbish dumping; localised damage through trampling by domestic stock; statutory protection does not yet cover all sites of national importance (4,800 scheduled out of *c.*18,000) and although management agreements are available for protected sites, take up has been poor.

	Information on the extent of damage to the cultural heritage in terrestrial and aquatic environment is limited and would benefit from more data to assess the problem.
LINKED ISSUES	Acid deposition on sensitive soils; enhanced nitrogen deposition (primarily from intensive animal production) on sensitive upland and mire habitats

Dargie and Briggs (1991) concluded that there were signs "*that a watershed has been reached in terms of the significance of environmental policy*", however restructuring of the NCC and Clause 12 of the Natural Heritage (Scotland) Act 1991, allowing retrospective challenges against SSSI designations, gave cause for concern. The indirect effects of non-environmental policy were also of concern, particularly reform of the Common Agricultural Policy. They observed that: "*the potential impacts of policy change on the Scottish environment are far from clear, demonstrating the need to integrate environmental considerations into other policy areas*" (p.73).

SOURCES

Dargie, T.C.D. and Briggs, D.J. (1991) State of the Scottish Environment 1991. A report to Scottish Wildlife and Countryside Link. Perth 73pp.

3. OVERVIEW OF THE 1999 SCOTTISH ENVIRONMENT AUDITS 2: AGRICULTURE & THE ENVIRONMENT.

KEY ENVIRONMENTAL IMPACTS

The key environmental impacts of agriculture identified in the 1999 Scottish Environmetal Audit on Agriculture and the Environment (Egdell, 1999) are summarised below in the order originally presented:

RESOURCE	KEY IMPACTS
Nature conservation	Three areas of concern related to the UK Biodiversity Action Plan (1994): continuing loss and fragmentation of habitats due to **intensified farming practices**, land drainage, water abstraction and road construction; loss of habitats, linear features and individual species due to neglect or **abandonment and the decline of traditional forms of management**; damage to soils, water and ecosystems due to **inappropriate use of fertilizers and pesticides, and atmospheric pollution.** Documented declines of flora and fauna associated with farmland (SNH, 1995) e.g. adders, insectivores (hedgehogs, moles, shrews), and butterflies but major increase in rabbit populations with damage to agriculture estimated at £12m in 1994. Reported (RSPB, 1995, 1996) declines in upland bird species, common lowland farmland birds (grey partridge, skylark, linnet, song thrush, reed bunting, corn bunting) and farmland breeding waders (oystercatcher, lapwing, snipe, curlew, redshank). Specific examples of species decline are associated with agro-chemicals (e.g. chough and endectocides like Invermectin) but there have also been increases since the ban on organochlorides (peregrine and sparrowhawk). Highlights the **"very controversial" issue of geese and agriculture**. Specific goose management schemes being run by SNH on Islay, Solway, South Walls on Hoy, Loch of Strathbeg and the Uists (£364k in 1996), with a National Goose Forum set up in 1999. A recent, and potentially important, area of conservation concern relates to the **potential impacts of introducing genetically engineered crops.**
Cultural heritage & landscapes	Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) have *c.*120000 sites on their national database with new ones being added each year. Sites in upland areas have been damaged through changes to grazing regimes (under and overgrazing), afforestation or bracken encroachment. Lowland sites have been damaged by ploughing, drainage, and compaction. Historic field boundaries have been lost as farming systems have been simplified. Burrowing by rabbits and soil erosion seriously affect archaeological sites. Barclay (1998) argued that **afforestation is the greatest threat in the uplands whereas it is gradual attrition by agricultural management in the lowlands.** The landscape can be impacted by changes in land management (e.g. introduction of oilseed rape and linseed crops). Where management is not in sympathy with local conditions it can **erode local identity and**

	distinctiveness (SNH 1995). Farm buildings have become more numerous and prominent, with more housing of livestock, more capital investment and larger machinery. **Black bag silage is a recent and very visible innovation**. Most changes in agricultural practices and to agricultural buildings are not subject to planning controls.
Recreation	The Access Forum had advised government that a legal right of access to land and water should be introduced for informal recreation and passage (The Access Forum, 1998). The countryside has become more accessible with greater car ownership, wealth and leisure time, and an improved road network. The effects of recreation have spread to more distant areas, diminishing remoteness and solitude. **In 1996 *c.*75m leisure visits were made to the Scottish countryside and coast for informal recreation**, mostly walking (53%), sightseeing (19%) and cycling (6%). A survey in 1995 found that 55% of people had walked in the countryside in the last year and 33% walked at least once a month and **11% of the difficulties encountered on walks were related to land management** (e.g. locked gates, farm animals). The Scottish Rights of Way Society has catalogued almost 7000 rights of way covering 15000km but less than the distance covered by rights of way in England. Voluntary initiatives, including the Concordat on access to Scotland's hills and mountains and SNH's *Paths for All* initiative have been developed to address access problems but The Access Forum advises that **further action will be necessary, including public funding for agriculture to support access.**
Soil, air and water	Although the **extent of soil erosion is difficult to assess**, SNH (1995) assert that active erosion of peaty and mineral soils is taking place in parts of the Scottish uplands. In cultivated areas, the problem is even greater, as erosion often occurs where there is no vegetation cover, with **50% of recently seeded fields being affected by erosion, compared to only 10% of those with established crop cover**. The general shift from spring to autumn sowing of cereals may have reduced soil erosion in some areas. Water uses by Scottish agriculture are (in likely descending order): animal consumption, irrigation, on-farm washing and cleaning, domestic human consumption, off-farm food processing, sheep dipping and crop spraying. **Current water consumption by farming and farm household was estimated as below 50 cubic metres** (Daw *et al*. 1998). The total area irrigated is estimated to have doubled between 1982 and 1996 with 69% early and 48% main crop potatoes irrigated and 75% of other vegetables. **SEPA rarely uses its powers to restrict water abstraction suggesting that "Scotland's watercourses are essentially unprotected against over-abstraction"** (Adeloye and Low, 1996). Water pollution by agriculture results from both point and diffuse sources. **Point source pollution events (e.g. leaks from silage clamps) seem to have stabilized** but the level of **diffuse agricultural** pollution (e.g. run-off from slurry spread on fields) is **still of considerable concern** (Scottish Agricultural Pollution Group, 1998). The Prevention of Environmental Pollution form Agricultural Activity (PEPFAA) Code of Good Practice has recently been revised and distributed to all farmers in an attempt to reduce the level of agricultural pollution. The Scottish Agriculture Pollution Group propose more use of detailed Farm Waste

	Management Plans to prevent further pollution incidents. Greater use of nutrient budgeting is being promoted through initiatives like the River Ugie Wetland Project run by FWAG/SNH. The full implementation of the **Urban Waste Water Directive (91/271)** in Scotland in 1998 puts an end to dumping of sewage sludge at sea. This is a particular problem since 57% of all sludge is disposed at sea. **Applying treated sewage sludge to agricultural land appears to be the "best practicable environmental option"** (Houldsworth, 1998). **Agriculture is an important source of greenhouse gases**; 41% of EU's methane and nitrous oxide emissions come from the agricultural sector, mainly directly from ruminants or from manure. Of this, the UK contributes 1.116M tonnes of methane (12.2% of EU total) and 0.01M tonnes of nitrous oxide (2.5% of EU total). Given that Scotland has around 19% of the livestock units in the UK, agriculture in **Scotland must contribute around 2.5% and 0.5% of the EU's total agricultural emissions of methane and nitrous oxides.**

Egdell (1999) observed that further reforms to agricultural policy are currently being discussed by the European Council of Ministers, driven by the desire to extend the European Union eastwards, to reach agreement on agricultural trade in the next round of negotiations of the World Trade Organisation , and to keep the Commission's budget within agreed limits. The Agenda 2000 proposals suggest that the environment should become much more central to agricultural policy, though still secondary to farm income objectives.

EDITORIAL COMMENT: Despite there only being 8 years between them, there are some specific differences in both topics and emphases between this and the earlier State of the Scottish Environment 1991 report of Dargie and Briggs (1991). These are worth noting. Although some of these may be related to their different reporting briefs, it is clear that some issues, like "acidification", have dropped off the environmental agenda, whilst others (e.g. recreation and access) receive much more attention. There is also a developing awareness of new issues (e.g. GM crops, sewage sludge disposal to agricultural land). Notably, however, the links between and agriculture and climate change exclude any reference to management of soil organic matter. Both reports conclude with comments concerning the importance of the Common Agricultural Policy in relation to future changes in the farmed environment of Scotland implying that they both accept changes in agricultural policy as the principal driver of future agricultural changes in Scotland.

SOURCES

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