

**Lunan Water Diffuse Pollution Monitoring Project: Contributing a catchment science evidence base for diffuse pollution mitigation in Scotland. 9th February 2011.
Finavon Hotel, By Forfar, Angus**

On 9th February MLURI hosted the third annual science update on the Lunan Water Diffuse Pollution Monitoring project. This was one of the closing events for the Waters Objective component of the 2011-2016 Scottish Government funded Environment-Land Use and Rural Stewardship research programme. The project is a partnership between MLURI, SEPA and SAC, and has the objective of assessing effectiveness of measures to control diffuse pollution and improve water ecological status in the catchment.

The first session explored the national policy for diffuse pollution mitigation, presented by Jannette Macdonald (SEPA), and Susan Arnott (SEPA) summarised the evidence gathered to assess levels of compliance at a local level, with the General Binding Rules regulations, for mitigating diffuse pollution. This was followed by a description of the Environmental Focus Farm scheme, led by Carol Christian (SAC) and an analysis, for the Rescobie Loch catchment, of the costs and effectiveness of measures to control pollution of the Loch by Phosphorus from soil erosion and sewage sources, by Andy Vinten (MLURI).

The second session described the practical approaches to mitigation of both pollution and ecological pressures. Soil erosion mitigation methods using reduced cultivation, soil bunds, interrupted tramlines and filter fences were described by Bill Jeffrey (SAC). Tom Sampson of Mains of Balgavies Environmental Focus Farm emphasised the challenges of meeting environmental standards when food prices were high because of concerns about global food security; he recognised that modern farming practices such as de-stoning prior to potato cultivation had a significant effect on soil erosion



and a review of such methods was appropriate. Marshall Halliday (Esk Rivers Fishery Trust) emphasised that the low salmon and sea trout numbers in the Lunan were the result of both marine and river habitat factors, and described the installation of a new fish pass at Boysack weir and work to control invasive weeds in riparian areas. Mark Moore (SNH) and Sandy Forgan (Rescobie Loch Development Association) described efforts at conservation of Balgavies Loch and maintenance of a sustainable trout fishery on Rescobie Loch.

In the third session, Bryan Spears (CEH) gave an analysis of the nutrient dynamics of Rescobie and Balgavies Lochs, showing how sediment phosphorus (P) release was the dominant P source in summer and that phytoplankton biomass is kept in check by N limitation in summer and not P. Bryan then gave a summary of available in-lake nutrient management techniques including controlled flushing and sediment capping to reduce internal loading. Sarah Dunn presented work on dating of groundwater using tracers and illustrated how this evidence could be used to assess turnover and recovery times for groundwater nitrate in the catchment (a nitrate vulnerable zone). Marc Stutter showed how the monitoring of turbidity, flow and water chemistry was enabling reliable estimates of pollutant loads, and the impacts of farm scale mitigation, to be made.

In the final workshop session, introduced by Keith Marshall, the participants were invited to contribute their assessment of how the catchment had changed and how future change should be monitored. Concluding ideas were gathered on the future direction of the Lunan catchment project, which are being collated and circulated to participants. In the afternoon workshop, we split up into 3 groups, facilitated by Keith Marshall, Susan Cooksley and Andy Vinten. Each group was asked the same 3 questions, and the lists below summarises responses in each group.

Andrew Vinten

Responses to questions in afternoon workshop session.

A. Susan Cooksley group

1. How has the catchment changed over the last 40 years?

- a. Fisheries (25yrs) – decline in fisheries from 25-15 years ago, increase in last 10yrs
- b. Netting exploitation has declined
- c. Mid 90s – C&R, now accepted
- d. Acceptance of ecological impact of angling.
- e. In last 5yrs much more fishery led management initiatives in recognition of decline in stocks + more money spent.
- f. Invasive species – control – biosecurity plans.
- g. High hopes for WFD.
- h. Perception that water levels decline due to abstraction. Not much evidence but includes awareness locally of extent.
- i. Increased use of polytunnels (- potential problem discharge & abstn).
- j. Flooding – serious flood in middle catchment – 2yrs ago. Pressure to remove trees as farmers' perception that increases flooding.
- k. Climate change: there has been uptake of mitigation measures.
- l. Farmer & land management awareness increase & legislative constraints.
- m. Will interact with economic climate – food policy etc.
- n. 3 pumps are abstracting for agriculture.
- o. Licensing – pressure when least available.
- p. Improvements in lochs in last 8-10yrs. Now relatively clear water – weed growth.
- q. Blooms Aug/Sept uncertain effect of barley straw bales, which started 9-10yrs ago. Need increased evidence of efficacy in future.
- r. New weed species in Balgavies.
- s. (Quarry settling ponds – food out).
- t. Decreasing area of open water – need for dredging a couple of years ago.
- u. Loss of eels/eel fisheries (several in past). In lower part of catchment substantial areas dredged (flooding) removing salmon habitat.
- v. Increased flooding over river.
- w. Swan & duck mussels.
- x.

2. How should we gather evidence about change?

- a. Lakes – lack of understanding of ecology to underpin understanding of effects of measures.
- b. Need baseline for thorough understanding of ecology.
- c. Difficult to justify when long timescales unvalued – but justifies spend.
- d. Do we have a baseline?

3. How should the Lunan project develop?

- a. Increased awareness.
- b. Need to build relationships with stakeholders in lower half of catchment e.g. quarries.
- c. Increase size and range of catchment group.
- d. Timeline of responses of systems – management expectations.
- e. Identify other DP saves.
- f. Mitigation of septic tanks.
- g. Assessing sediment loading (internal).
- h. Encouraging open-ness.
- i. Farmer feedback re: lines of communication, how to improve?

Andy Vinten group

1. How has the catchment changed over the last 40 years?

- a. Less mixed farming (40yrs).
- b. Fields have got bigger.
- c. Potatoes were seed – now ware 1m longer from October.
- d. Destoning – mechanisation 80's.
- e. Fencing flooding more.
- f. Winter cropping 50% (ploughing much quicker).
- g. NNI's.
- h. Steading conservations. Water useage.
- i. Less eutrophic 20=30yrs.
- j. Less pigs.
- k. Fertiliser – organic never enough = more mineral.

2. How should we gather evidence about change?

- a. Clarify purpose.
- b. Gather more information on inputs & land use.
- c. Core the loch sediment.
- d. Soft observation from public (e.g. Ythan volunteers, e.g. GBR, gauge boards).
- e. Use of microcopter to identify
- f. Site condition.
- g. Multiple benefits of measures.
- h. Denitrification (EGS).

3. How should the Lunan project develop?

- a. Precision farming?
- b. Remote sensing.
- c. Increase benefits.
- d. CC and impacts on management e.g. increase autumn rainfall.
- e. Aeration.
- f. Flushing.
- g. Fishers value.
- h. Visibility an issue.
- i. DP is too narrow.
- j. Lower aim – flooding.

Keith Marshall group

1. How has the catchment changed over the last 40 years?

- a. Increase downstream of lochs (5yrs).
 - a. Himalayan Balsam leads to decreased vegetation cover in winter = increased runoff (N,P & soil) & they exclude other plants (decrease biodiversity).
- b. Polytunnels (downstream) = potential increase in runoff offset by cover.
- c. Increased field size, decreased pasture, increased arable (in past decade).
- d. ? decrease gravel extraction.
- e. Increase greylag geese.these were seasonal – and now resident. Feeding on arable ground (5yrs). Feeding impacts. Cull being discussed.
- f. Rainfall pattern changes (spikes in autumn)

2. How should we gather evidence about change?

- a. Meteorological data (storm events etc).
- b. Atmospheric monitoring – pollution and other.
- c. Access to farm level change data, relevant to local level.
- d. SNH/SWT monitoring of in stream biodiversity - can this be systematic? Need a baseline.
- e. More site specific economic data (costs etc) (inputs to models).
- f. Identify sites with potential for improvement with future funding.
- g. Self assessment of catchment farms - *coordinated (prior to priority catchment)
*in group increase engagement.

3. How should the Lunan project develop?

- a. Get the farmers/land managers round a table.
- b. Effectively communicate science in catchment to the other land managers, propose follow on activity from group (e.g. closing open day for priority farm project).
- c. Bottom up – encourage with success so far.
- d. Group decide on coordinating mechanism e.g. Carole? But funding for coordination? SAC coordination possibility?
- e. Learn from other erosion management systems (e.g. agroforestry).
- f. What intensity of ‘meetings’ – time is money! (4 meetings per year max).
- g. Science not in isolation – work with end users. Action research.
- h. Whole catchment or sub-catchment? – currently all catchment covered.