The Tarland Catchment Initiative

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Causes of Pollution 1995/96

Sewage effluent	34 %
Agriculture - diffuse	26
Acidification	12
Urban drainage	11
Mine drainage	9
Agricultural -point	6
Industrial effluent	2

SEPA have published a list of the factors which contribute significantly to water pollution in Scotland. These are shown in this slide

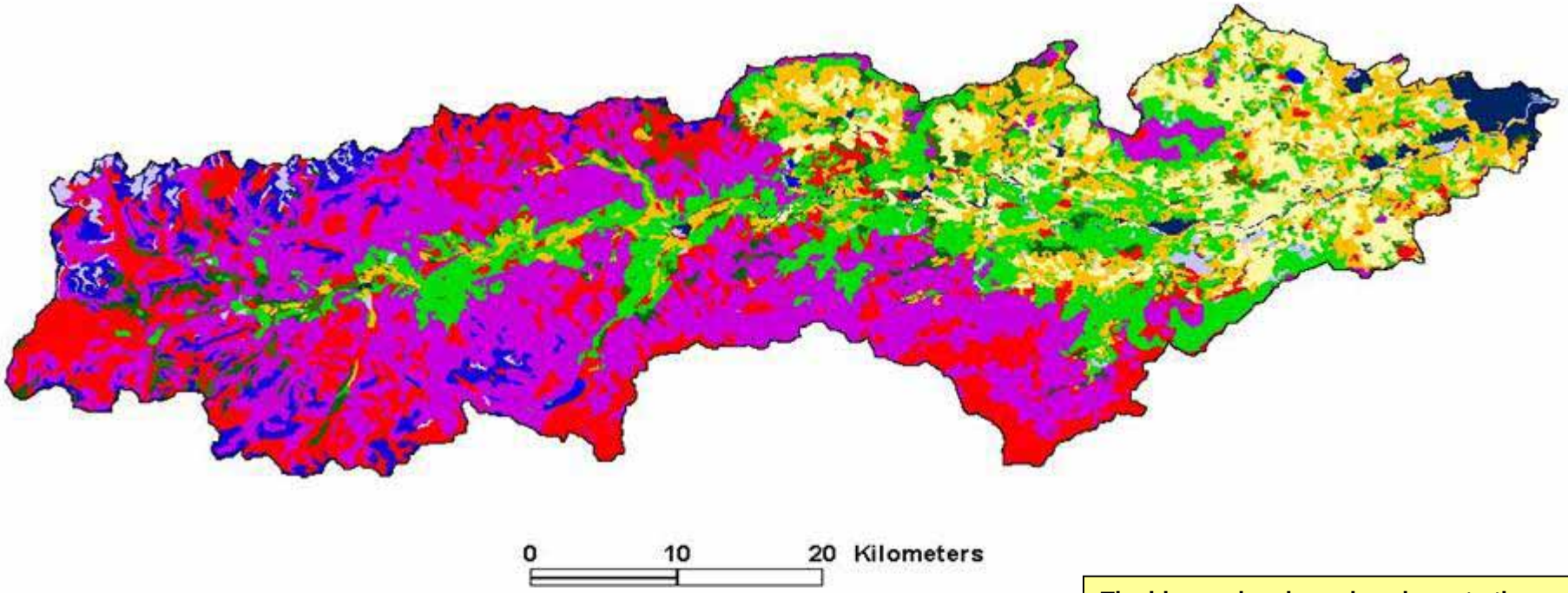
Context of Tarland within the Dee

- Catchment management issues

- Atmospheric pollution
- Climate change
- Land use change
- Agricultural intensification

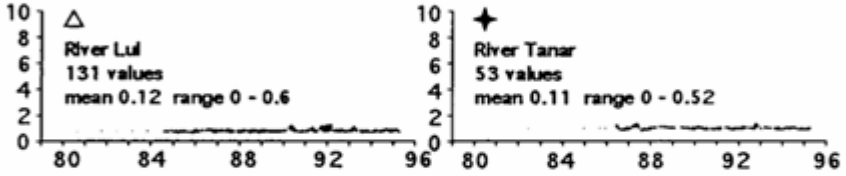
The western area of the River Dee catchment is influenced by external national and international factors and pressures such as acid rain and climate change. The eastern part of the catchment is more strongly influenced by pressures from development and land management.

The land cover of the Dee river catchment

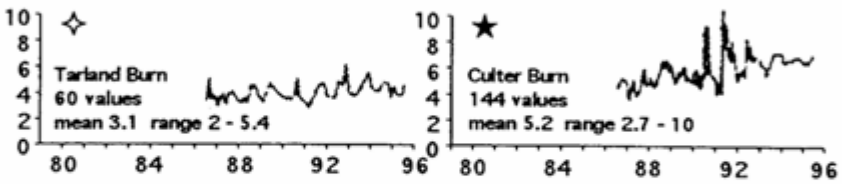


The blue, red and purple colours to the west (left) reflect the montane, peatland and heather moorland land covers. The green and yellow colours represent improved grassland and arable farming. These increase in importance moving eastwards.

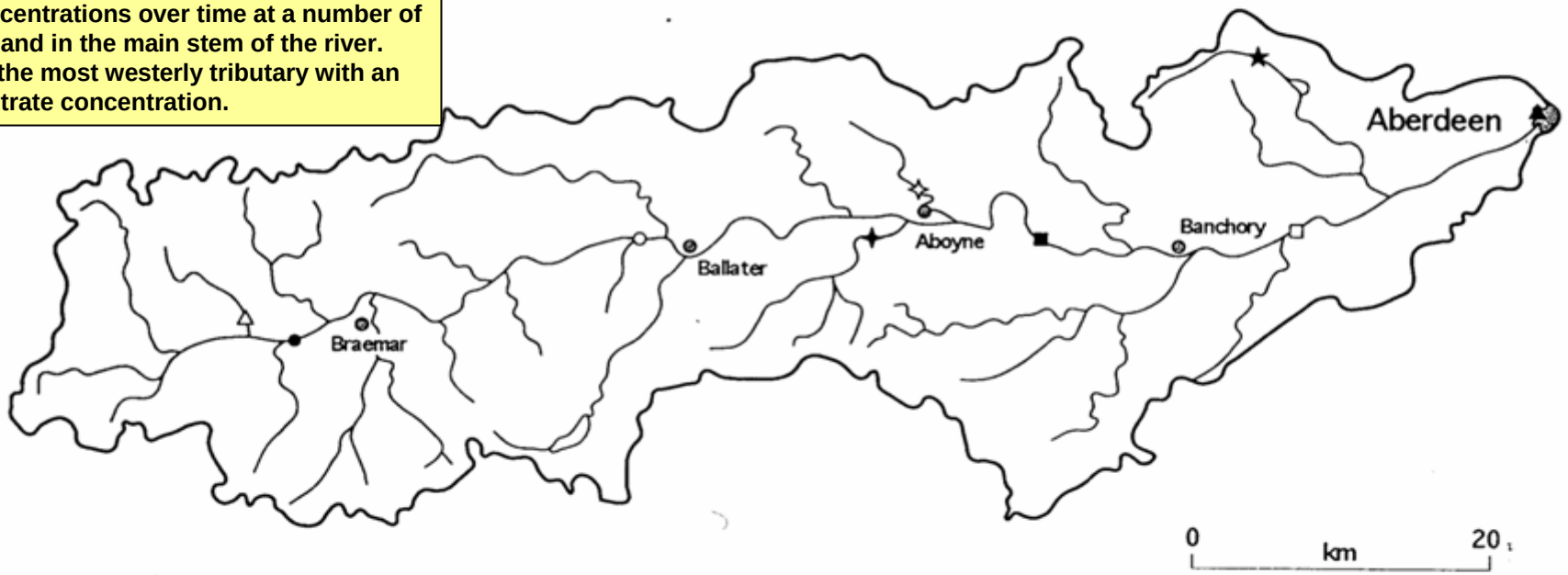
Upland sub-catchments



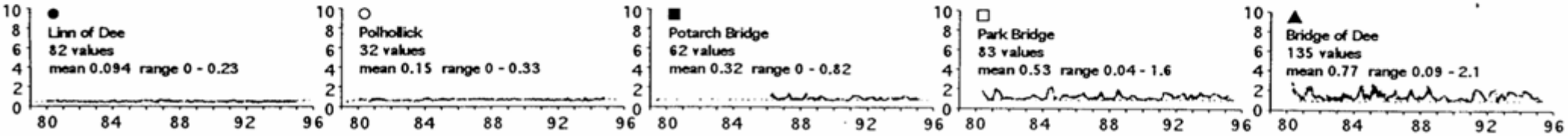
Agricultural sub-catchments



This diagram shows the variation in river water nitrate concentrations over time at a number of tributaries and in the main stem of the river. Tarland is the most westerly tributary with an elevated nitrate concentration.



Sampling points down the major stem of the River



The Tarland catchment

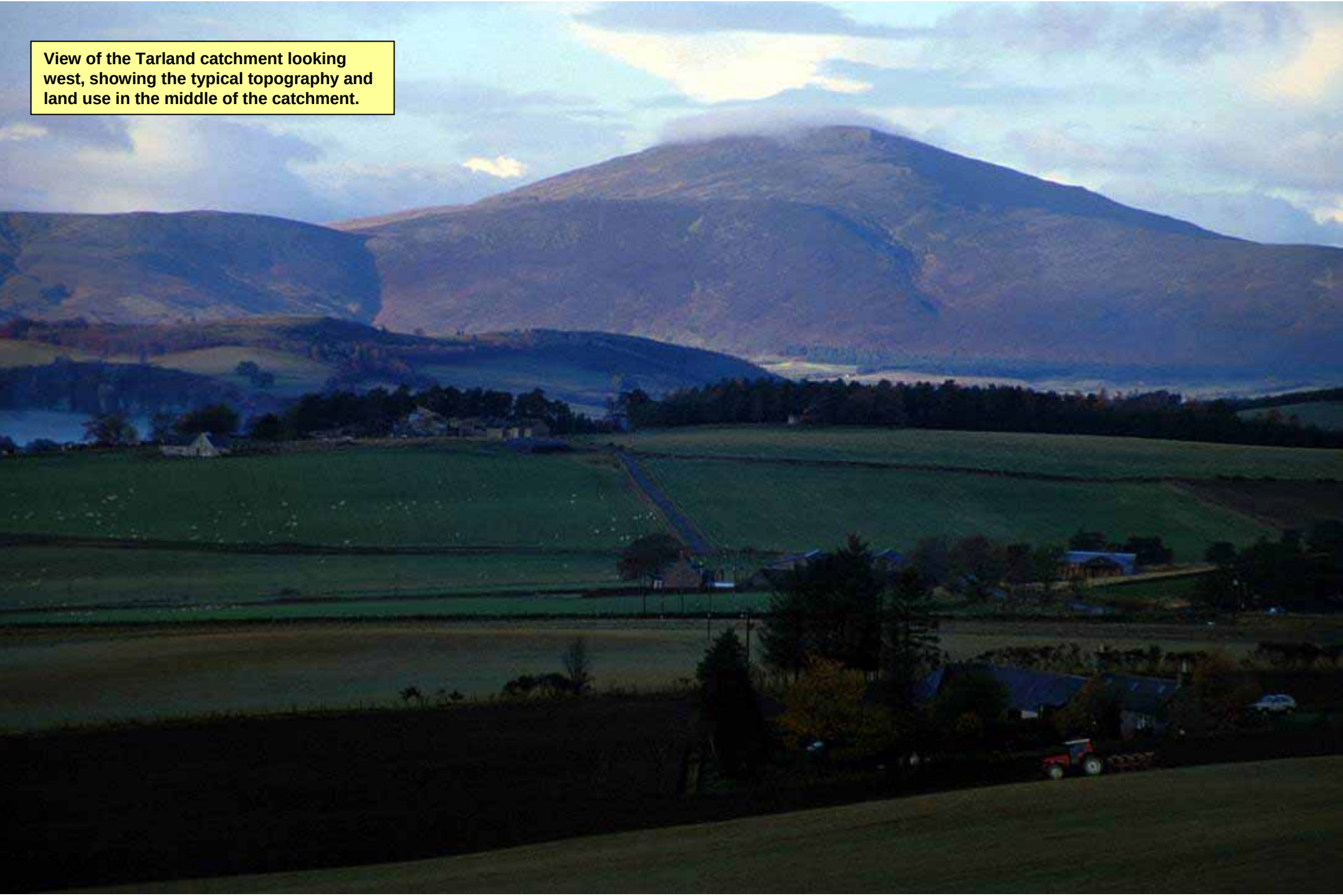
- Contains a range of land uses and management practises.
- Water quality, aquatic and riparian habitat in the catchment are degraded.
- Particular concern suspended sediments, phosphorus, nitrate, coliforms and poor habitat.

The pressures

- Historical legacy of land improvement,
- The intensification of land management
- Enlargement of the village of Tarland and outlying communities.

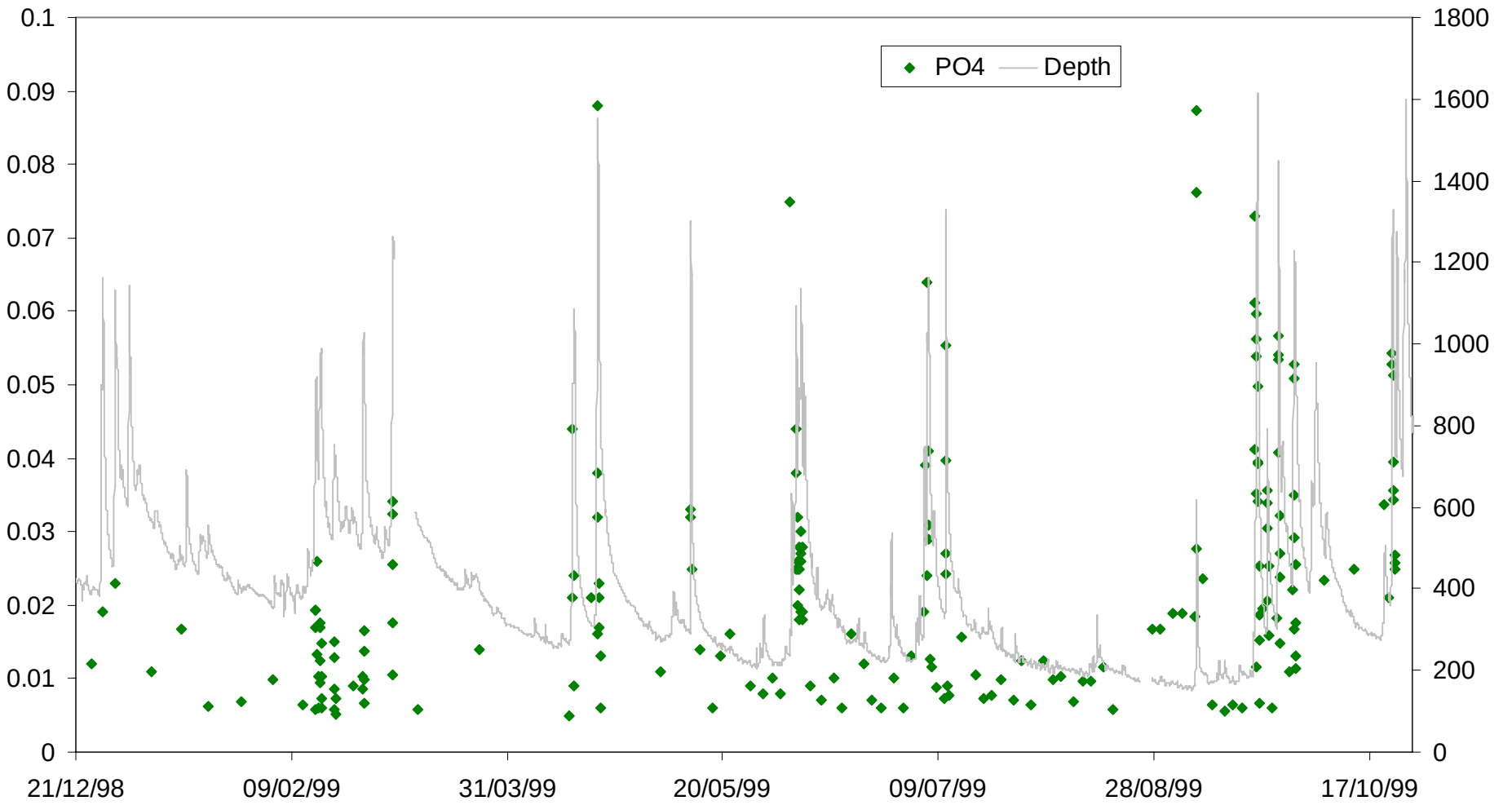
The Initiative

- To demonstrate the potential for reversing and improving aquatic and riparian habitat within the context of sustainable development
- Provide a scientific assessment of the efficacy of different measures used to make improvement
- To utilise a participatory approach

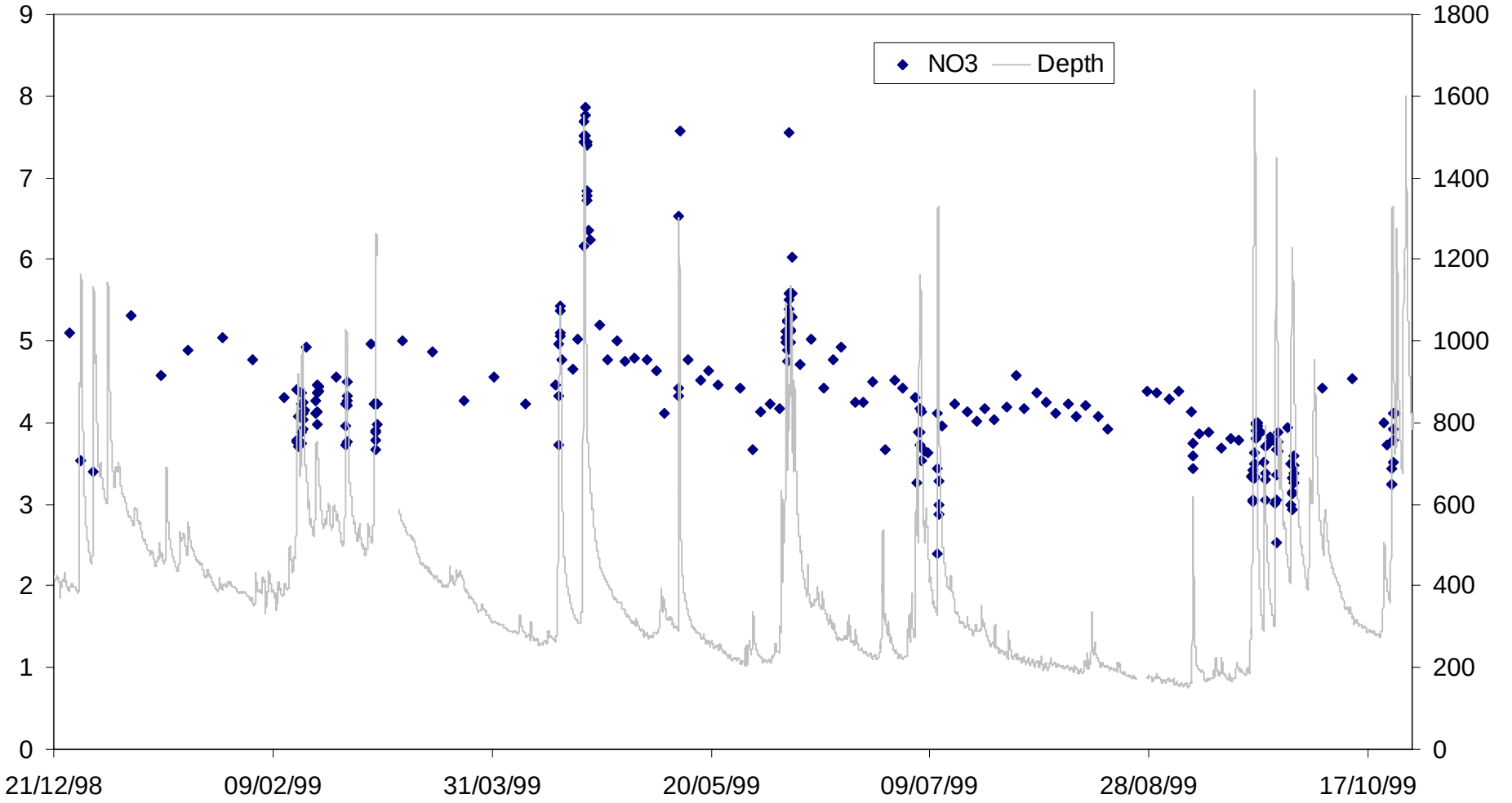


View of the Tarland catchment looking west, showing the typical topography and land use in the middle of the catchment.

River water quality monitoring station on the Tarland burn. Samples and data are collected which show the change in flow and temperature over time. Samples of water are collected and analysed in laboratories.



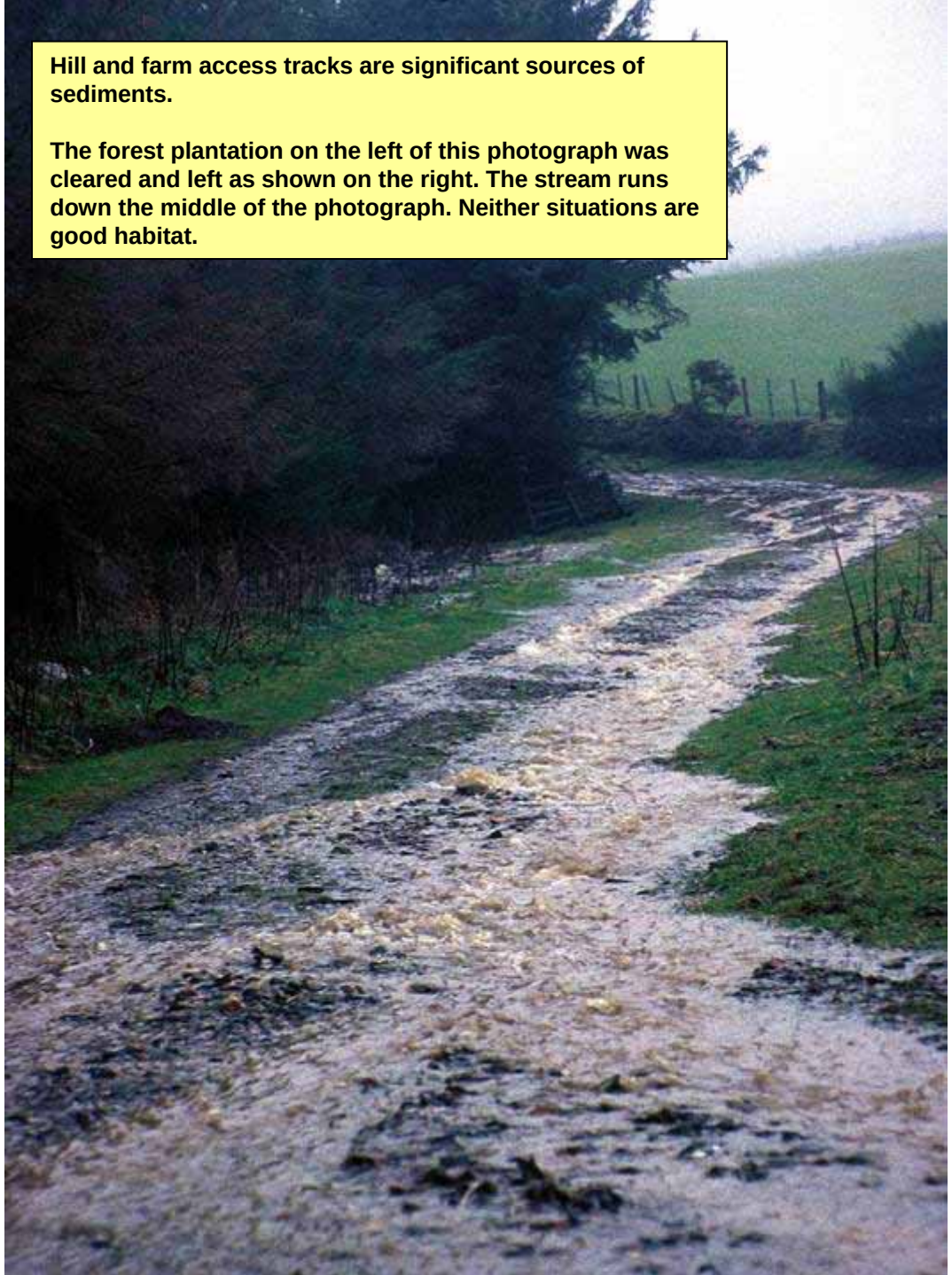
An example of typical information collected at the monitoring station. This example shows the change in flow during 199 and the dots show differences in phosphate in collected samples. Phosphate is associated with sediment particles washed into the stream. When soil is lost and washed off the fields during storms the concentrations of phosphate rise.



In this second example of changes in water quality over time, nitrate is shown. The response of concentrations of nitrate in the stream reflect land management and seasonality. The storm in early March during which there is an increase in nitrate is probably the influence of a storm occurring soon after crops had been planted and fertilised. In contrast the storms during July and September show a decrease in concentration as the nitrate has been utilised and is not available to be lost through leaching.

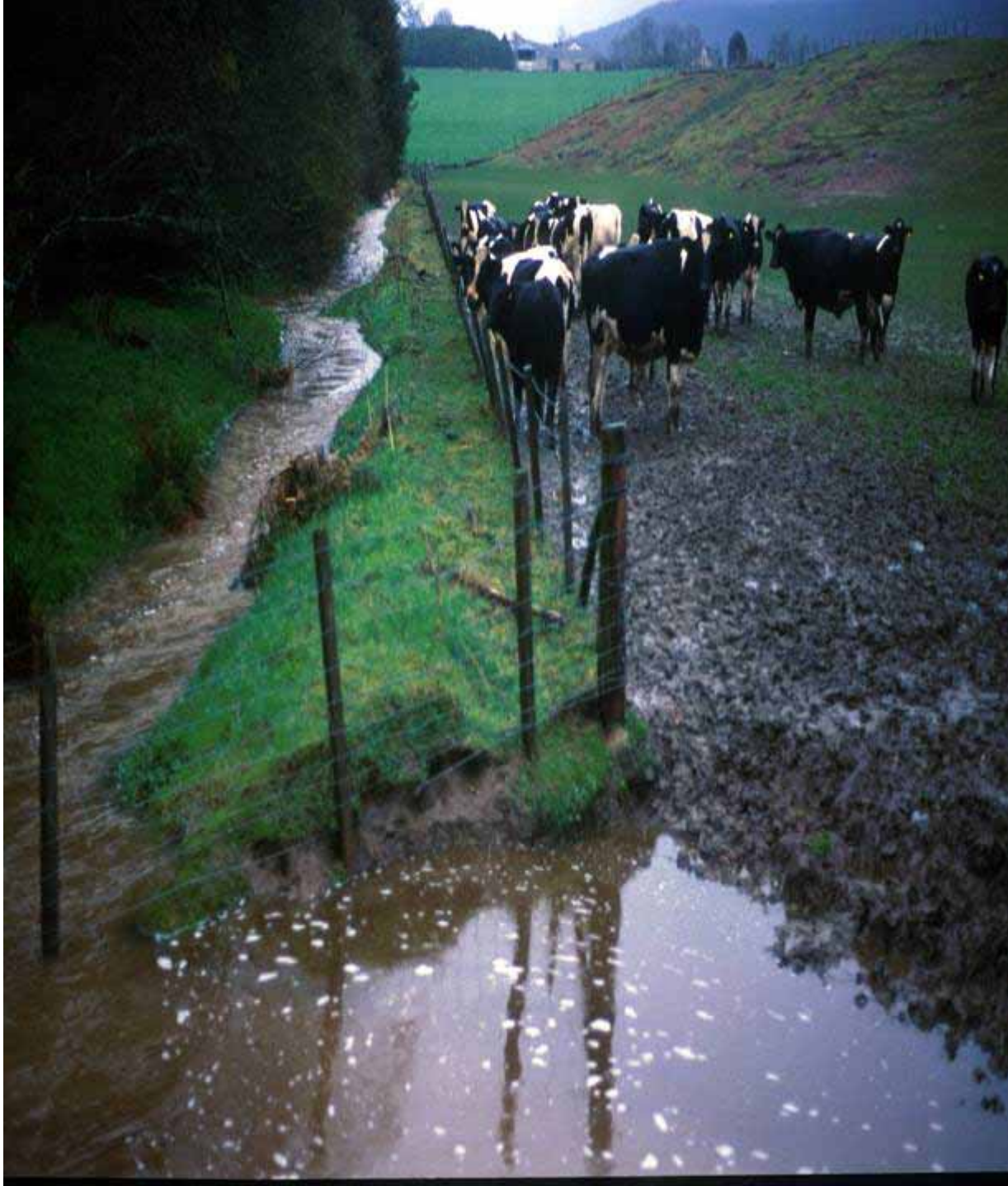
Hill and farm access tracks are significant sources of sediments.

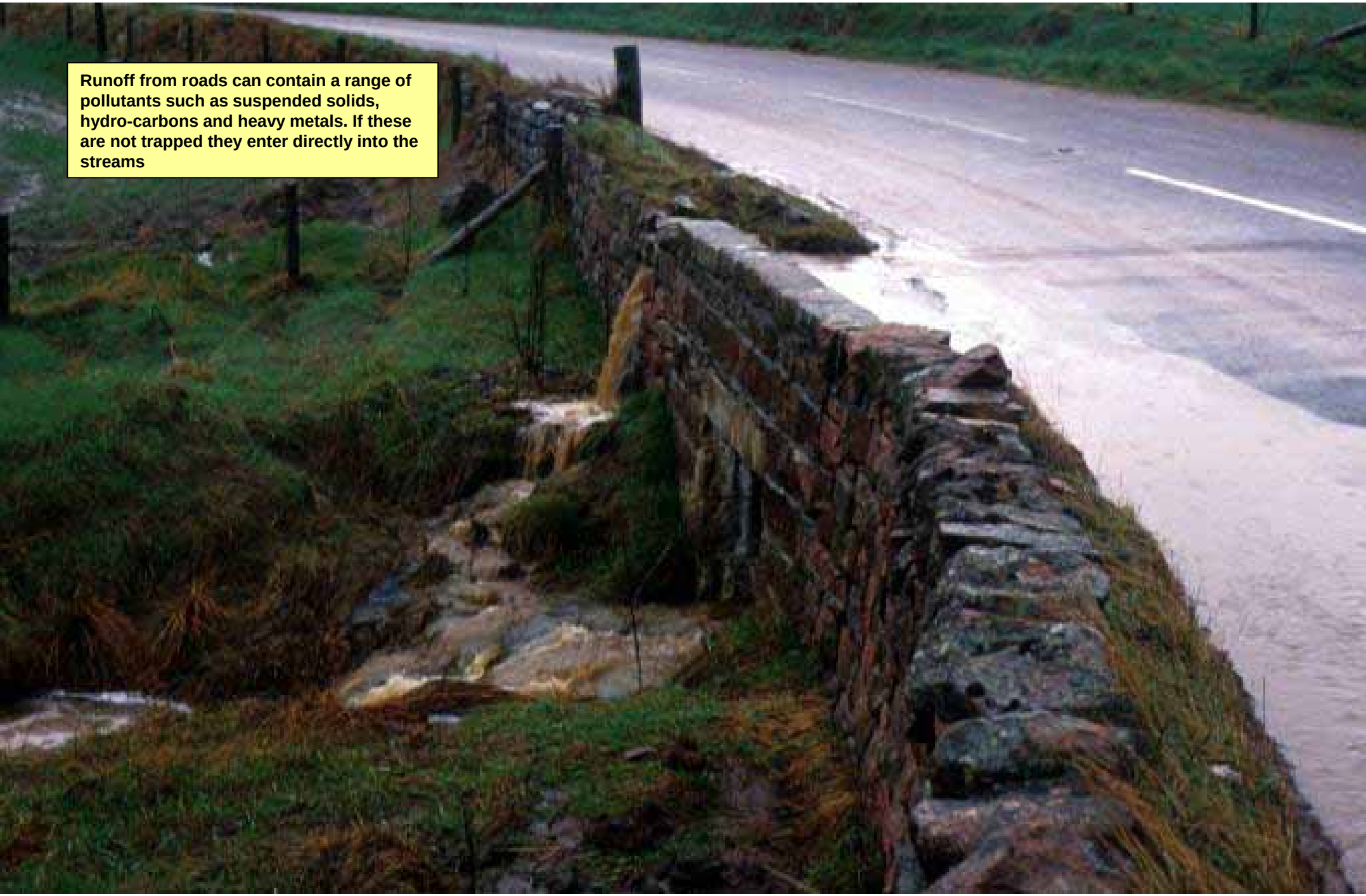
The forest plantation on the left of this photograph was cleared and left as shown on the right. The stream runs down the middle of the photograph. Neither situations are good habitat.



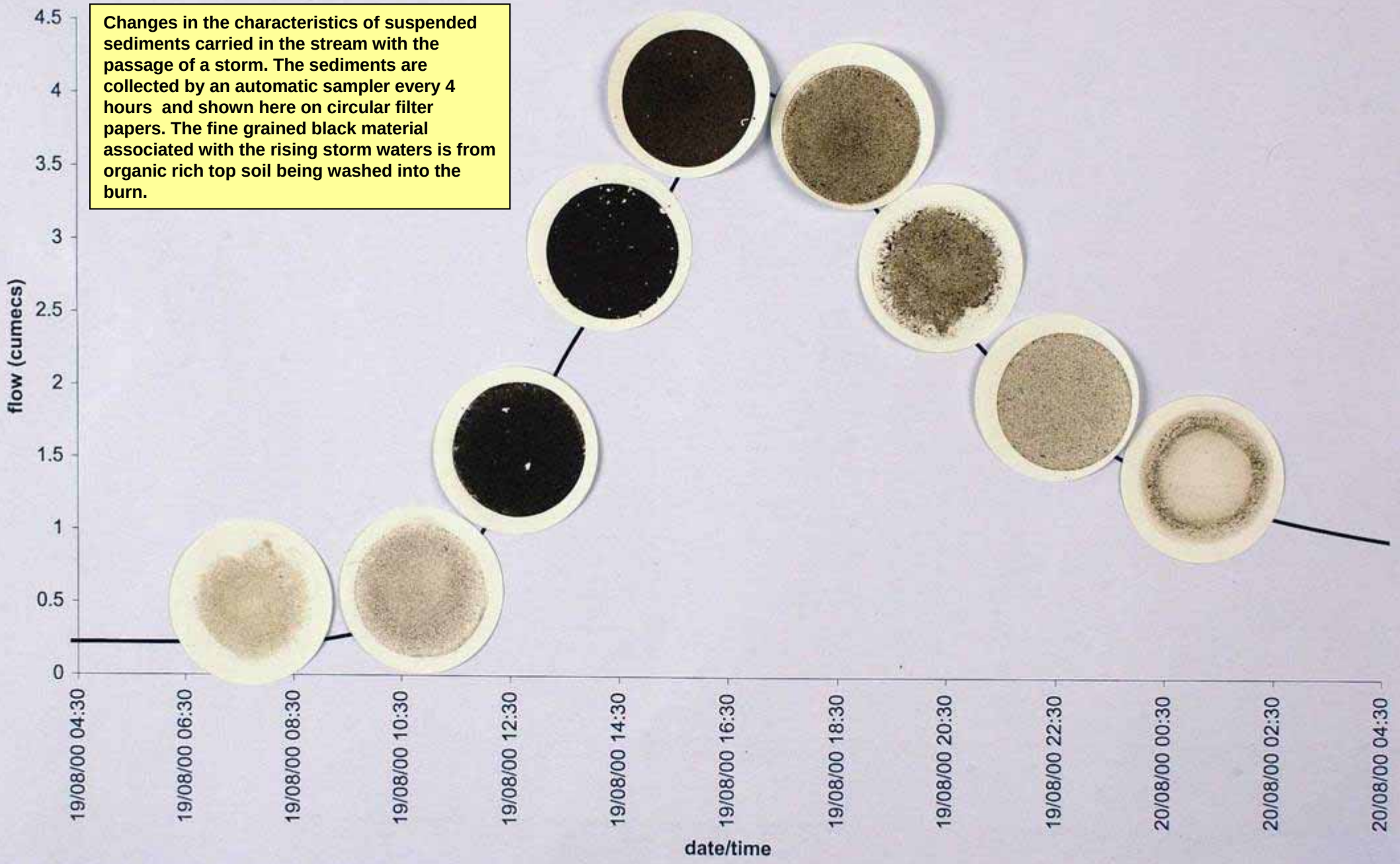

The photograph shows the loss of soil, together with nutrient fertilizer (nitrogen and phosphorus). This is a loss for the land manager and is degrading for water quality and fish spawning habitat.


Livestock using streams for waterings lead to degraded habitat and are source areas for suspended sediments and faecal contamination.




Runoff from roads can contain a range of pollutants such as suspended solids, hydro-carbons and heavy metals. If these are not trapped they enter directly into the streams


The sewage treatment works serving the village cannot cope with the growth of the village and requirments of a modern society. The treatment works needs to be replaced


Changes in the characteristics of suspended sediments carried in the stream with the passage of a storm. The sediments are collected by an automatic sampler every 4 hours and shown here on circular filter papers. The fine grained black material associated with the rising storm waters is from organic rich top soil being washed into the burn.
flow (cumecs)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
19/08/00 04:30
19/08/00 06:30
19/08/00 08:30
19/08/00 10:30
19/08/00 12:30
19/08/00 14:30
19/08/00 16:30
19/08/00 18:30
19/08/00 20:30
19/08/00 22:30
20/08/00 00:30
20/08/00 02:30
20/08/00 04:30
date/time


Much of the Tarland Burn has been modified to reduce flooding and maximise agricultural productivity. This restricts the types of habitats available to support biodiversity.

The Scientific approach

(i) A baseline assessment of the spatial and temporal variability in water quality and habitats across the catchment.

(ii) Implementation of a series of remedial measures aimed at improving water quality, aquatic and riparian habitats. These measures will be undertaken in a systematic controlled manner based on the results of (i).

(iii) A post implementation assessment of the effectiveness of the various treatments.

Phase	Activity	Timescale
1. Assessment (2000 to 2001)	Water quality monitoring	Ongoing
	Water quality survey	Summer/Autumn 2000
	Riparian habitat survey	Summer 2000
	Electrofishing survey	Autumn 2000
2 Implementation (Spring 2001 to Spring 2002)	Fencing	Throughout 2001
	Planting	Spring 2001 and 2002
	Engineering	Summer 2001
	Stocking	Summer 2001
	(Tarland WWTP)	Unknown
3 Post treatment assessment (2002 to 2005)	Water quality monitoring	Ongoing
	Water quality survey	Annually
	Riparian habitat survey	Biannually
	Electrofishing survey and restocking	Annually

Outcomes (1)

- An objective assessment of the efficacy of land management practises which will result in improved water quality, associated habitats and public access.
- An increased understanding of different land management practises which can be promoted, through demonstration, to a wide range of land managers.
- The actions will be visible, accessible and repeatable in other locations.
- The information on which the assessments have been based will be freely available to help develop the approach to other areas and catchments

Outcomes (2)

- The initiative will provide an educational resource, which the consortium will act to promote through both the local schools and community.

- A demonstration that individuals and organisations from a variety of backgrounds and interests can work together to bring about real changes in their local environment.

- The work will have a direct input to other initiatives such as the Dee Catchment Management Plan

Participants

- MLURI
- MacRobert Trust
- SEPA
- SNH
- Dess and Aboyne Water Project
- Dee Salmon Fishery Board
- Aberdeenshire Council