

GCSE

FACT FILE

Agriculture and Land Use

Pollution and Farm Waste

For first teaching from September 2013

For first award in Summer 2015



agri
culture
and
land use

Pollution and Farm Waste



Learning Outcomes

Students should be able to:

- Use secondary sources of data, for example, such as biological oxygen demand (BOD) values, to analyse how pollution affects the natural environment.
- Define eutrophication and, using Lough Neagh as an example, explain how it is caused by over application of fertilisers, potentially leading to algal growth, bacterial decomposition and fish death.

KEY TERMS

- biological oxygen demand (BOD)
- water pollution – types of...
 - causes of...
 - danger of...
 - prevention of...
 - treatment of...

(series extracted from "water-pollution.org.uk")

- point source pollution
- diffuse pollution
- eutrophication

INFORMATION

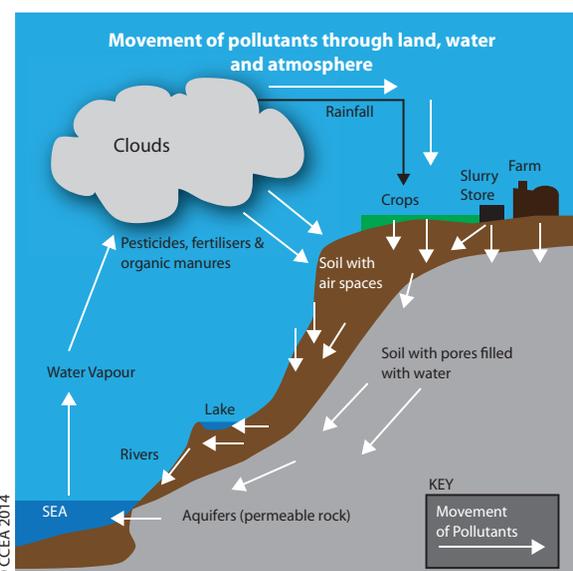
Normal livestock farming practice results in large quantities of collected animal excreta. Farm wastes such as cattle slurry, farm yard manure and silage effluent can cause significant water pollution if not managed correctly. With careful management these wastes can be utilized as valuable crop fertilisers, with minimal risk to the environment. Approximately 20 million m³ of farm waste is produced each year on NI farms. Almost all of this is spread back on the land, during restricted periods of the year, typically 1st February to the 15th October in NI although this can be 'relaxed' in certain extreme conditions such as torrential rain in October 2012. Typical farm waste is much less dilute than normal household waste, silage effluent is 200 times as polluting as raw domestic sewage. If it gets into watercourses then it can have dire effects on all species both macro and micro organisms.

Farming can produce two types of water pollution, point source and diffuse.

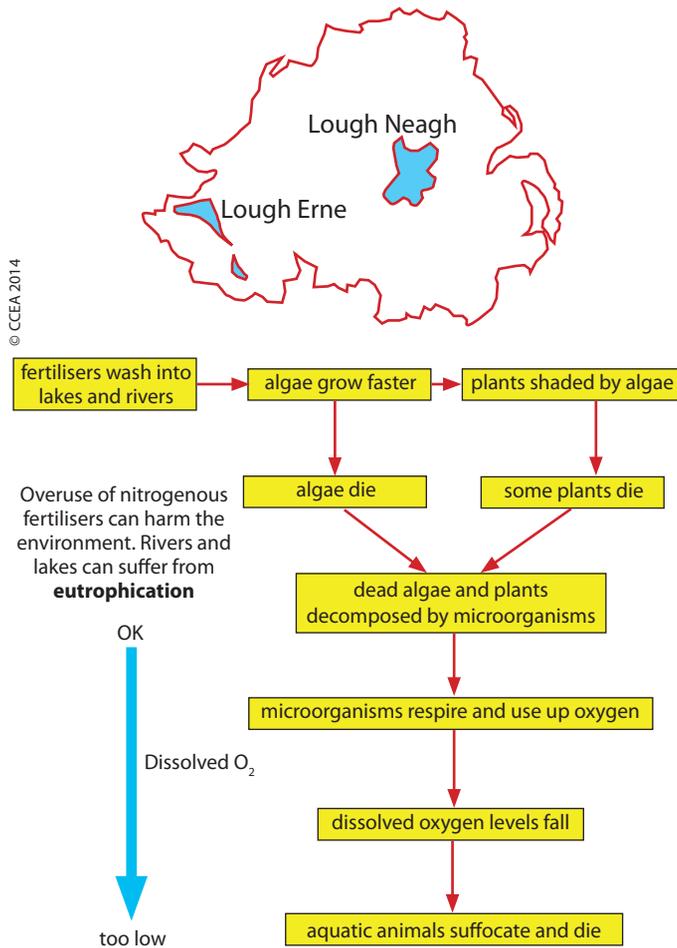
Where a water course has been polluted from a specific source e.g. a slurry tank, silage clamp, farmyard or a building, this is referred to as point source pollution. Point sources include: slurry, silage effluent, dirty yard water, oil and agrochemicals which can poison stream and river life.

Diffuse pollution is caused by nutrients such as nitrates and phosphates from animal wastes and fertilisers leaching from the farm land to the nearby water course. Across NI soils have become oversupplied with phosphorous. Diffuse pollution has resulted from a leakage of phosphorus from soils oversupplied with phosphate. As a result water such as in Lough Neagh has become enriched with nutrients leading to enhanced growth of algae and aquatic plants. This process is known as eutrophication, which can be a health risk to animals and humans.

Organisms present in healthy water can break down farm wastes that get into a waterway but the oxygen used in this process is needed by plants and fish. Biochemical oxygen demand (BOD) measures the amount of oxygen required by these microorganisms to break down the organic farm waste material such as cattle slurry. The higher the BOD the more polluting the waste. A serious pollution incident can result in all river life being killed for considerable distances downstream.



EUTROPHICATION



Lough Neagh is situated in the centre of Northern Ireland. It is the largest freshwater lake in the British Isles and is very shallow for its size.

Eutrophication is the biggest threat to water quality in the Lough Neagh wetlands, mainly due to the release of nutrients from point and diffuse sources of pollution.

- Point source pollution such as a sewage treatment plant discharge.
- Diffuse source pollution could be run-off from fields or seepage of nutrients from soil into ground water.



Learning Activities

- Rank the farm pollution sources for their respective BOD values, from lowest (least polluting) to highest (most polluting).
- Using the BOD overview, discuss in class the consequences of increasing BOD levels from 1-2 through to 100+.
- Discuss the effect of increasing water pollution on indicator species such as mayfly nymphs.
- Write a story, "I'm a grain of fertiliser", and how it could lead to eutrophication.
- Present a poster detailing how pollution damages all species in an aquatic environment.
- Prepare a powerpoint detailing possible pollution sources in you local area or local farm.



WEB RESOURCES/LINKS

www.dardni.gov.uk/ruralni/index/environment/countrysidemanagement/farm_waste_management.htm
water-pollution.org.uk website – the water pollution guide
www.polyseed.com/misc/BODforwebsite.pdf - BOD Overview
www.bbc.co.uk/schools/gcsebitesize/science/edexcel/problems_in_environment/pollutionrev4.shtml



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