

*The voluntary  
Farmer led  
approach to  
'Nutrient  
management'  
programme*



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# Project

## Proposal

Explore options to develop a farmer led approach to delivery of water quality improvements, and reduce nutrient enrichments to water courses caused by N, P, and soil particles.

## Aim

Design a blue print for Welsh agriculture to demonstrate improvements on water quality by enabling farmers to utilise their on farm nutrient assets more accurately and efficiently.

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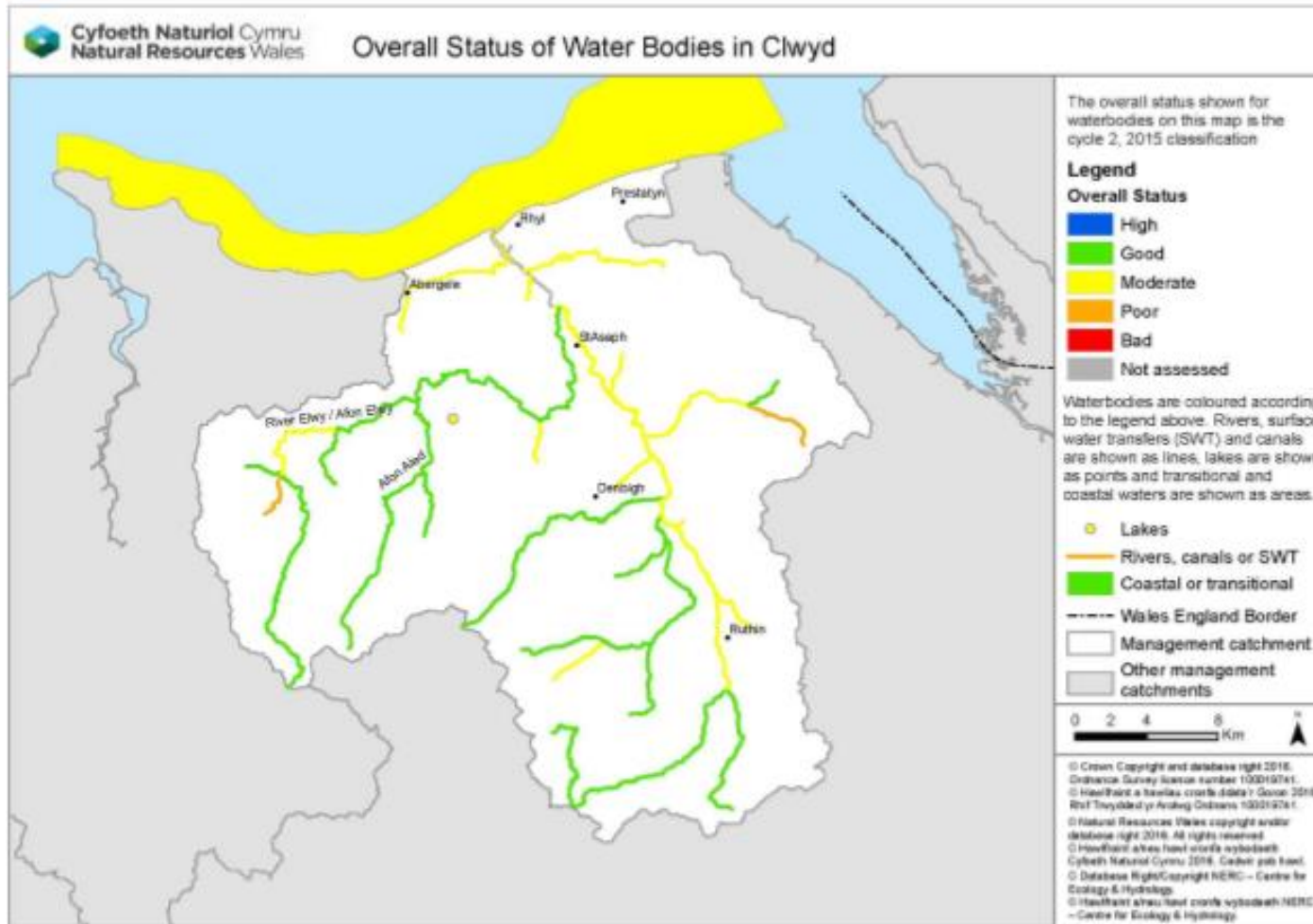
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# Your water.



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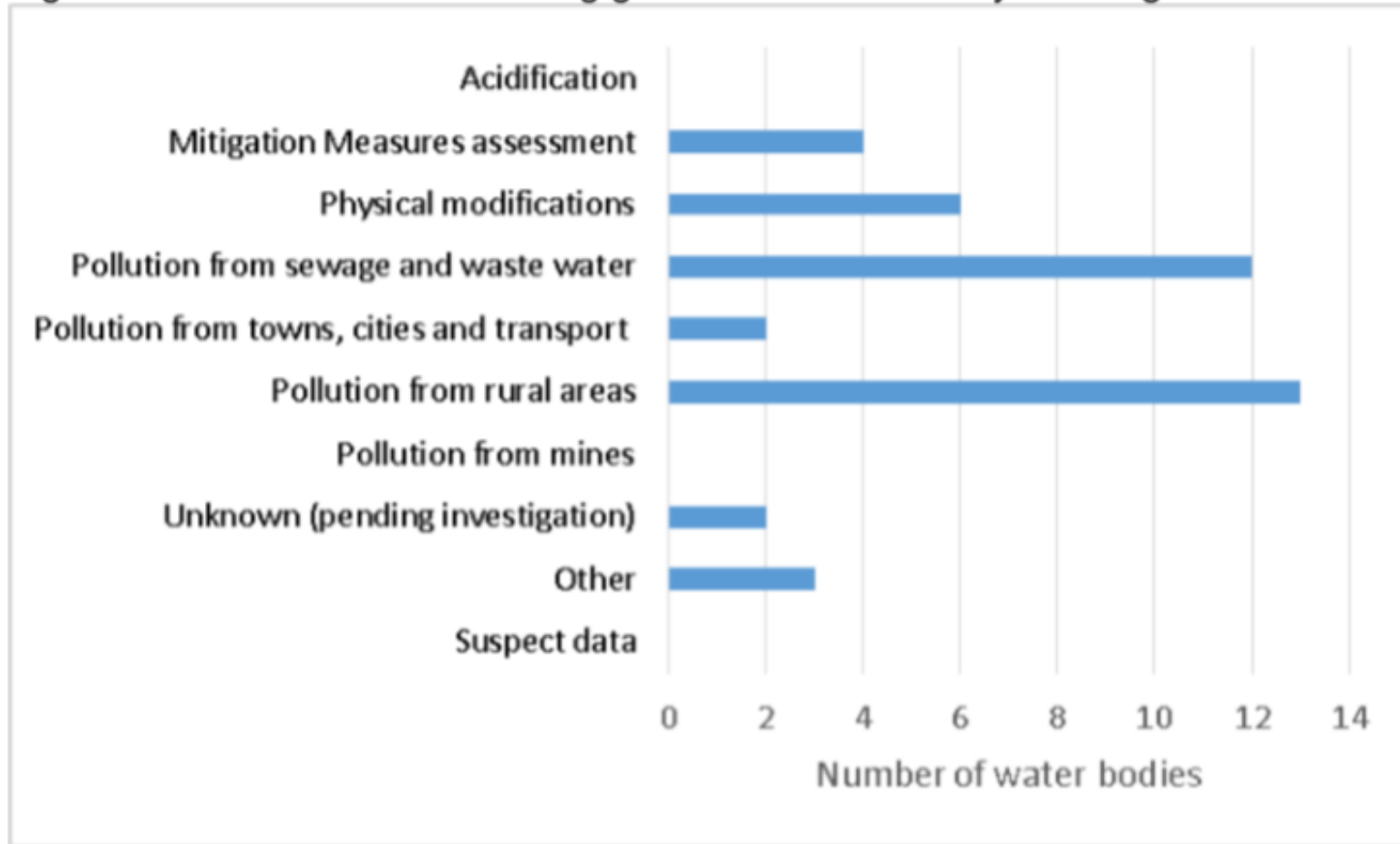


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# Your water – reasons for failure

Figure 3. Reason for not achieving good status in the Clwyd Management Catchment



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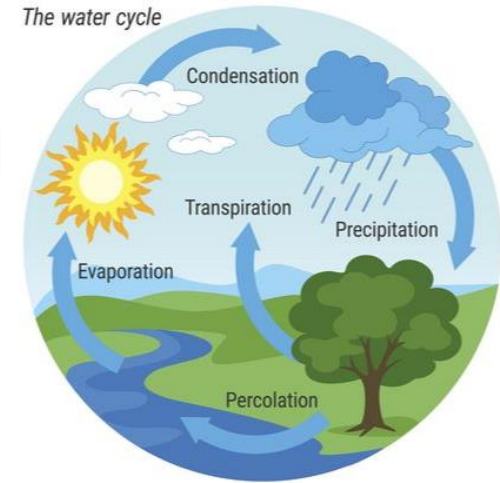
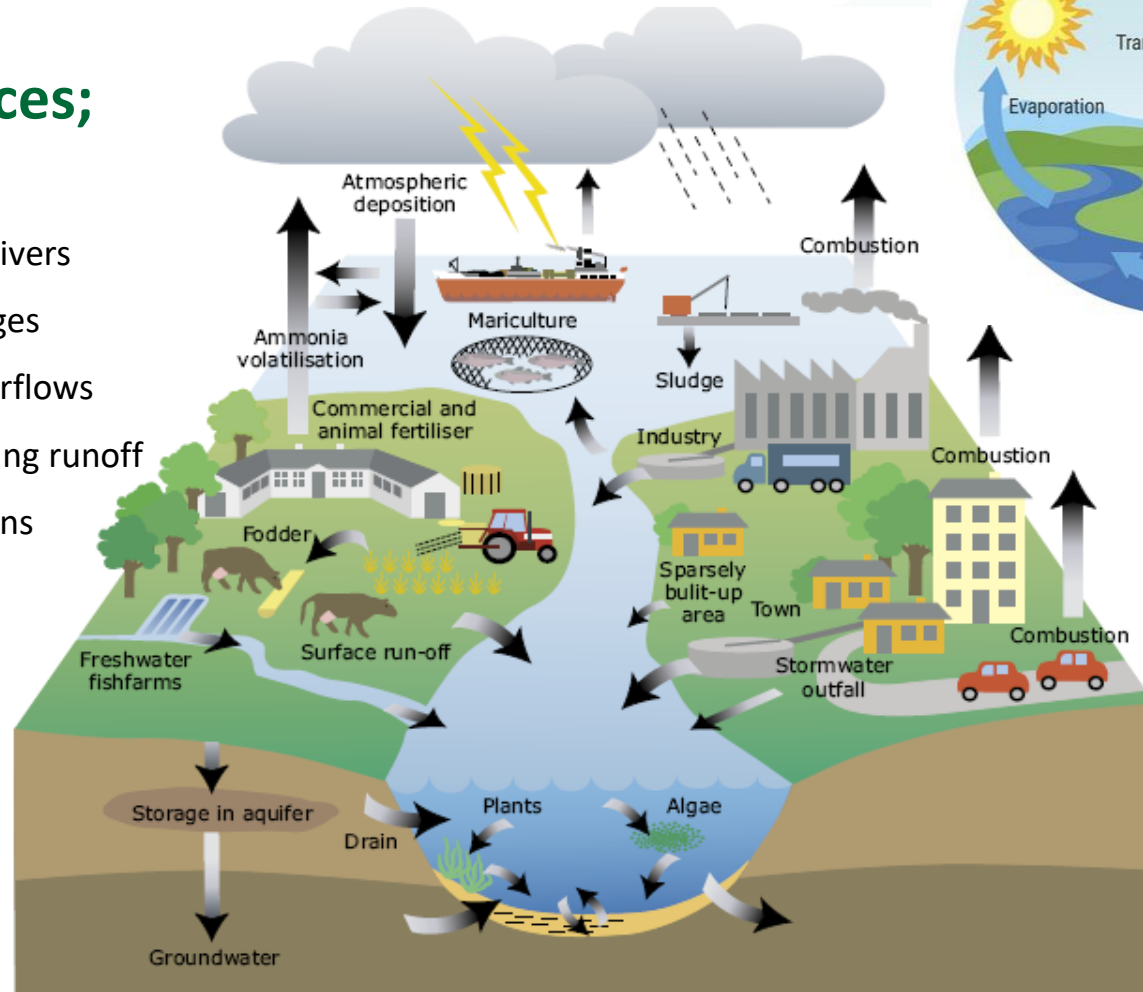




# Where nutrients come from

## Pollution sources;

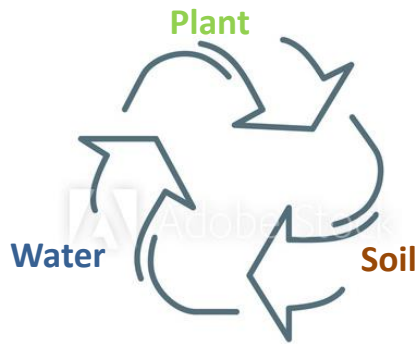
- Forestry
- Nutrient build up in rivers
- Waste water discharges
- Combined sewer overflows
- Road and hard standing runoff
- Nutrients from gardens
- Agricultural pollution
- Septic tanks
- Mine leaching
- Natural discharges



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# Nutrient management – what do you do?



## Benefits

- Best value from fertilisers and organic manures used
- Enhanced crop yield and quality
- Reduced environmental risks due to field losses of excess nutrients
- Potential cost savings when all nutrient inputs are accounted for
- Improved crop and livestock performance from a balanced supply of nutrients

- *Do you carry out soil sampling on your farm?*
- *Do you do any other sampling? If so what?*
- *Do you have an active nutrient management plan?*
- *If so – how do you keep it active?*
- *If not would you consider doing a NMP?*

*including soil supply + organic manures (livestock manures, sewage sludge, digestate, compost, industrial waste)*



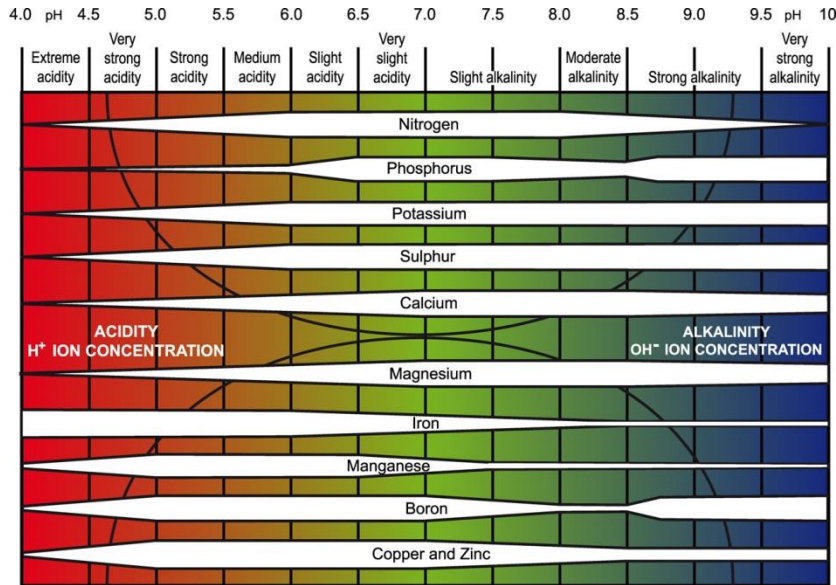
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# Nutrient management - Benefits



*including soil supply + organic manures (livestock manures, sewage sludge, digestate, compost, industrial waste)*



- Nutrient budget will help you to make best use of nutrients across the farm
- Helps save you money and reduce diffuse pollution risks.
- Soil testing every three to five years enables better plan nutrient applications.
- Identify the nutrient value in farm slurry and manures.

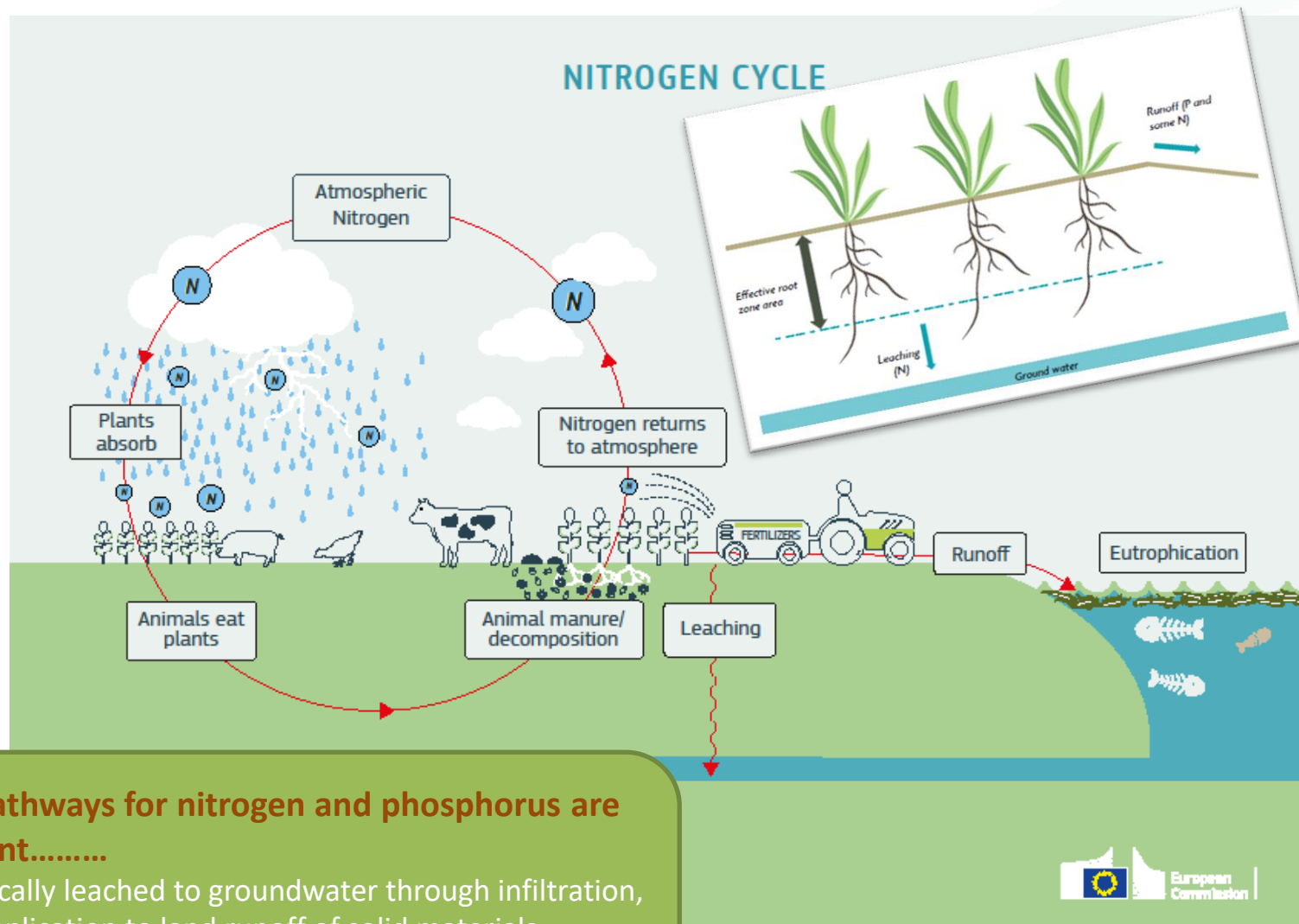
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# Water – How are nutrients lost to water bodies?



**Loss pathways for nitrogen and phosphorus are different.....**

**N** – typically leached to groundwater through infiltration, or on application to land runoff of solid materials.

**P** – Attaches to soil particles and is lost through runoff to surface water courses.



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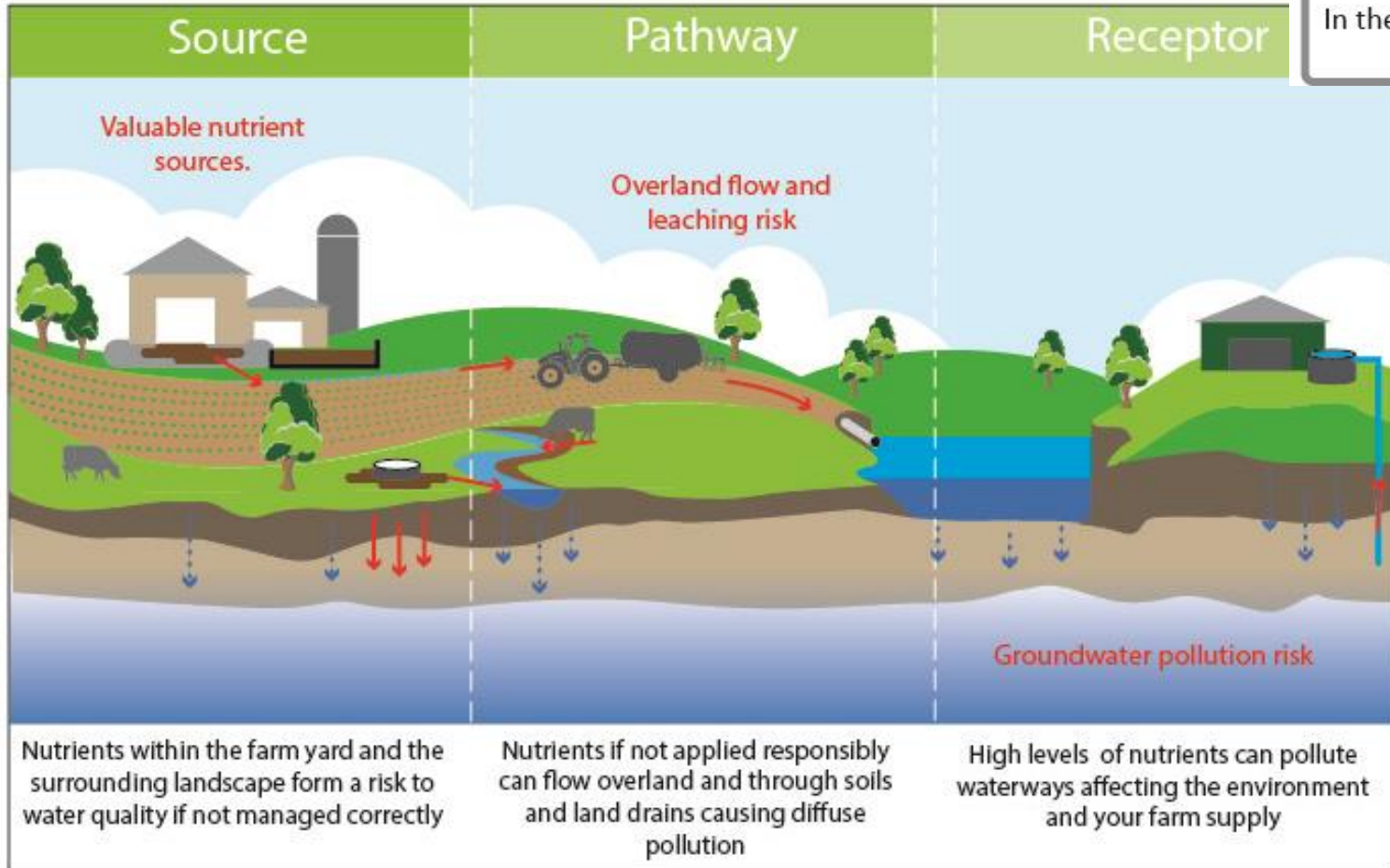
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# Water - What were looking to identify.

**The 4 R's.....**  
The RIGHT source  
At the RIGHT rate  
At the RIGHT time  
In the RIGHT place



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# Why?

## The effects of diffuse pollution include:

- **Increased risk** to farm biosecurity and livestock health
  - **Toxic substances** in drinking water for livestock and humans
  - **Excess nutrients** causing algal problems in rivers, lakes and estuaries
  - **Damage** to wildlife, fish stocks, invertebrates and habitats
- 
- Economic impacts for the farm etc.



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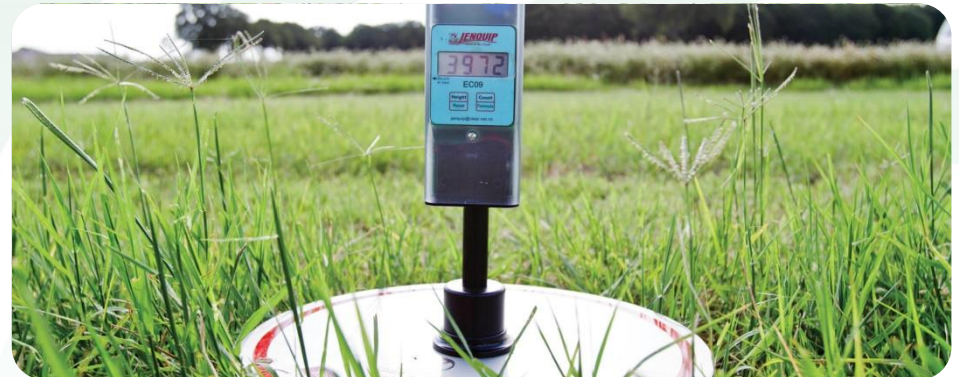
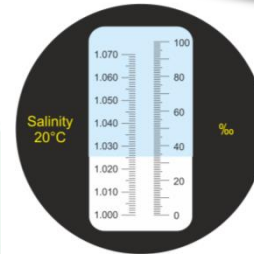


# Tools for change – Measure 2 manage

## Brix for the stock farmer

Knowing the sugar content of forage is important for a stockman. Ruminants are relatively poor at converting grass protein to milk protein; they achieve a conversion efficiency of only 20% to 25%.

A cow's milk production can be increased by improving this conversion efficiency, and research shows a direct correlation between conversion efficiency and sugar content. High sugar content forage has a positive effect on a cow's milk production efficiency.



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# Tools for change – Application and uptake



Analyte	Reporting Limit	Unit	Sampling Location (CLE)					
			Soil-01	Soil-02	Soil-03	Soil-04	Soil-05	Soil-06
<b>Particle Size Distribution</b>								
Gravel	N/A	%						
Sand	N/A	%	1.3	7.5				
Course Sand	N/A	%	20.9	25.0	4.7	5.0	0.7	0.4
Medium Sand	N/A	%	2.5	3.9	25.9	26.3	22.7	22.7
Fine Sand	N/A	%	6.2	8.4	4.2	3.4	2.6	3.1
Silt	N/A	%	12.2	12.7	8.5	9.1	7.6	7.7
Clay	N/A	%	34.9	30.1	13.2	13.8	12.5	11.9
			42.9	37.4	34.1	36.2	36.6	40.7
<b>Geochemical Analysis</b>								
Solids (%)	10	%	85.1	82.2	80.2	82.7	81.3	80.7
pH (solid)	N/A	S.U.	9.4	8.6	8.3	8.3	8.4	7.9
Electrical Resistivity	N/A	ohm-cm	1,243	1,243	1,094	1,392	1,343	1,293
ORP	10	mV	383	385	384	333	353	345
Cation Exchange	2.42	meg/100g	10.3	7.0	8.1	12.2	9.8	6.7
Sulfide	35.3	BRL	BRL	BRL	BRL	BRL	BRL	BRL
Sulfate	11.8	mg/kg	42.1J	45.7J	26.4J	15.0J	19.9J	0.2J
Chloride	11.8	mg/kg	148	172	235	157	157	157

N/A = not applicable  
J = estimated value  
BRL = below reporting limit



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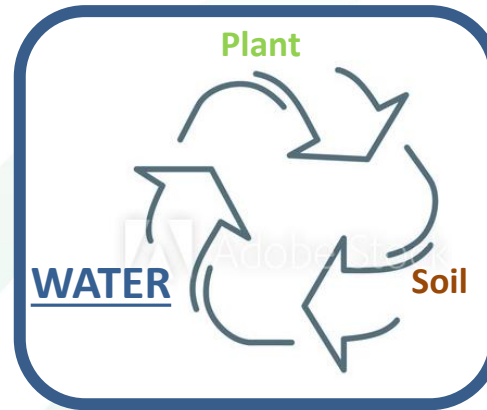
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# Drafting Water Standard content

- **Deliverables / outcomes**

- Improved water quality
- Environmental benefits
- Business benefits
- Social benefits



Environmental Effects	pH Value	Examples
ACIDIC	pH = 0	Battery acid
	pH = 1	Sulfuric acid
	pH = 2	Lemon juice, Vinegar
	pH = 3	Orange juice, Soda
	pH = 4	Acid rain (4.2-4.4) Acidic lake (4.5)
	pH = 5	Bananas (5.0-5.3) Clean rain (5.6)
	All fish die (4.2)	
	Frog eggs, tadpoles, crayfish, and mayflies die (5.5)	
	Rainbow trout begin to die (6.0)	
NEUTRAL	pH = 6	Healthy lake (6.5)
	pH = 7	Milk (6.5-6.8) Pure water
	pH = 8	Sea water, Eggs
	pH = 9	Baking soda
	pH = 10	Milk of Magnesia
	pH = 11	Ammonia
BASIC	pH = 12	Soapy water
	pH = 13	Bleach
	pH = 14	Liquid drain cleaner

- **Timescales**

Timescales to evidence change

Jan 2020  
Water  
Standard

**Deliverables: Farming..... Science.....**  
**Environment..... Society.....**  
**Markets.....**

**WFD**  
**Improvements**  
 How long to  
 change?

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# Evidencing.



## Good management practices



### 1 Identify areas where runoff may occur and manage to avoid runoff entering waterways | GMP 6

✓ PRACTICE	YES	NO
Identify risk areas where surface runoff may enter waterways	<input type="checkbox"/>	<input type="checkbox"/>
Leave a grass buffer strip or riparian plantings between waterway and fence	<input type="checkbox"/>	<input type="checkbox"/>
If cultivating paddocks leave an uncultivated buffer strip between cultivation and waterway (the steeper the land the wider the buffer strip needs to be)	<input type="checkbox"/>	<input type="checkbox"/>
Ensure bridges and culverts have raised sides or mounds to stop runoff entering waterway	<input type="checkbox"/>	<input type="checkbox"/>
If the track is beside a waterway, slope the track in the opposite direction to avoid effluent and sediment flowing into the waterway	<input type="checkbox"/>	<input type="checkbox"/>
Maintain track cut-outs to appropriately direct track runoff	<input type="checkbox"/>	<input type="checkbox"/>

- EVIDENCE**
- Risk areas identified on farm map
  - Record any riparian fencing, planting or buffer strips on farm map
  - Cropping / pasture renewal policies and procedures
  - Culvert or bridge design plans
  - Track maintenance records

### Example:

[https://www.dairynz.co.nz/media/4106341/Good\\_management\\_practices\\_April\\_2016.pdf](https://www.dairynz.co.nz/media/4106341/Good_management_practices_April_2016.pdf)

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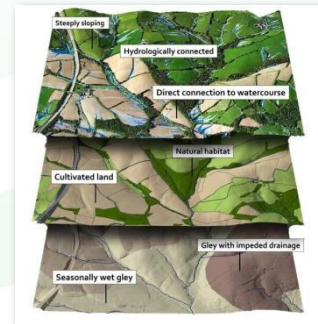
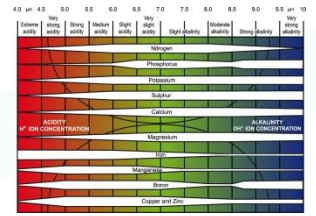
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# The farmer led approach

- Whole industry engagement to assist in the design and delivery of the 'land management programme' and best practice in farming
- Awareness raising, design and deliver business efficiencies (LEAN)
- Improved data collection on impacts affecting water quality / quantity - capture existing and improvements made through the delivery of a farmer led scheme
- Create a nationwide programme, reducing risk of future failure
- Improve business efficiencies and resilience



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Thank you  
for listening.

# HOW FARMERS IMPROVE SOIL HEALTH ALL YEAR ROUND

## WINTER

### BUFFER STRIPS ON FIELD MARGINS

- Act as a barrier to reduce wind erosion in bare soils.



### LIVESTOCK HOUSED INDOORS OVER WINTER

- Reduces soil erosion and poaching in wetter months.



### ANNUAL CROP ROTATION

- Maintains soil fertility.
- Helps replenish nutrients.
- Helps to control weeds.
- Reduces crop specific pest and disease problems.

## SPRING

### SPREADING OF SLURRY AND FARM YARD MANURE

- Less requirement for artificial fertilisers.
- Helps increase organic matter and encourages earthworms.



### COW TRACKS AND MULTIPLE GATEWAY ENTRY

- Multiple gateways helps reduce soil compaction.
- Cow tracks avoid poaching.



### GRASS LAND SOIL CAN BENEFIT FROM AERATION

- Aeration improves soil drainage & helps keep soil aerobic.



## SUMMER

### CONTROL TRAFFIC FARMING, GPS & REDUCTIONS IN TYRE PRESSURES

- Reduces soil compaction, fuel consumption and the need for traditional cultivation methods.



### 450,000 KM OF HEDGES IN THE UK

- Hedges act as a barrier to help reduce wind erosion.



### STRAW CHOPPING AT HARVEST TIME

- Helps increase the soils organic matter content to help for the next crop.



## AUTUMN

### COVER CROPS AND CATCH CROPS

- Prevent post-harvest soil erosion, helps increase organic matter and rooting systems.
- Improves soil structure and infiltration.



### DIRECT DRILLING OF WINTER CROPS FOLLOWING HARVEST USES A MINIMUM-TILLAGE METHOD

- Min-till or no-till methods mean fewer soil disturbances & increases in organic matter at the top level of soil.



### SOIL SAMPLING AND VISUAL ASSESSMENTS

- By monitoring, measuring & managing soil health, farmers ensure that plants get the nutrients needed and earthworms are encouraged.



### 62% OF AGRICULTURAL LAND IS PERMANENT GRASSLAND & MEADOW

Acting as a permanent carbon storage area, this locks in greenhouse gases otherwise emitted to the atmosphere.



**Lorna Davis**

Nutrient management programme  
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