Waters of LIFE Advisor training

Module 2 – Introduction to Water Quality

Co-funded by
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Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

What is a healthy river?

The factors:

- Form and function
- Water parameters
- River corridor ecology
- Ecosystem services

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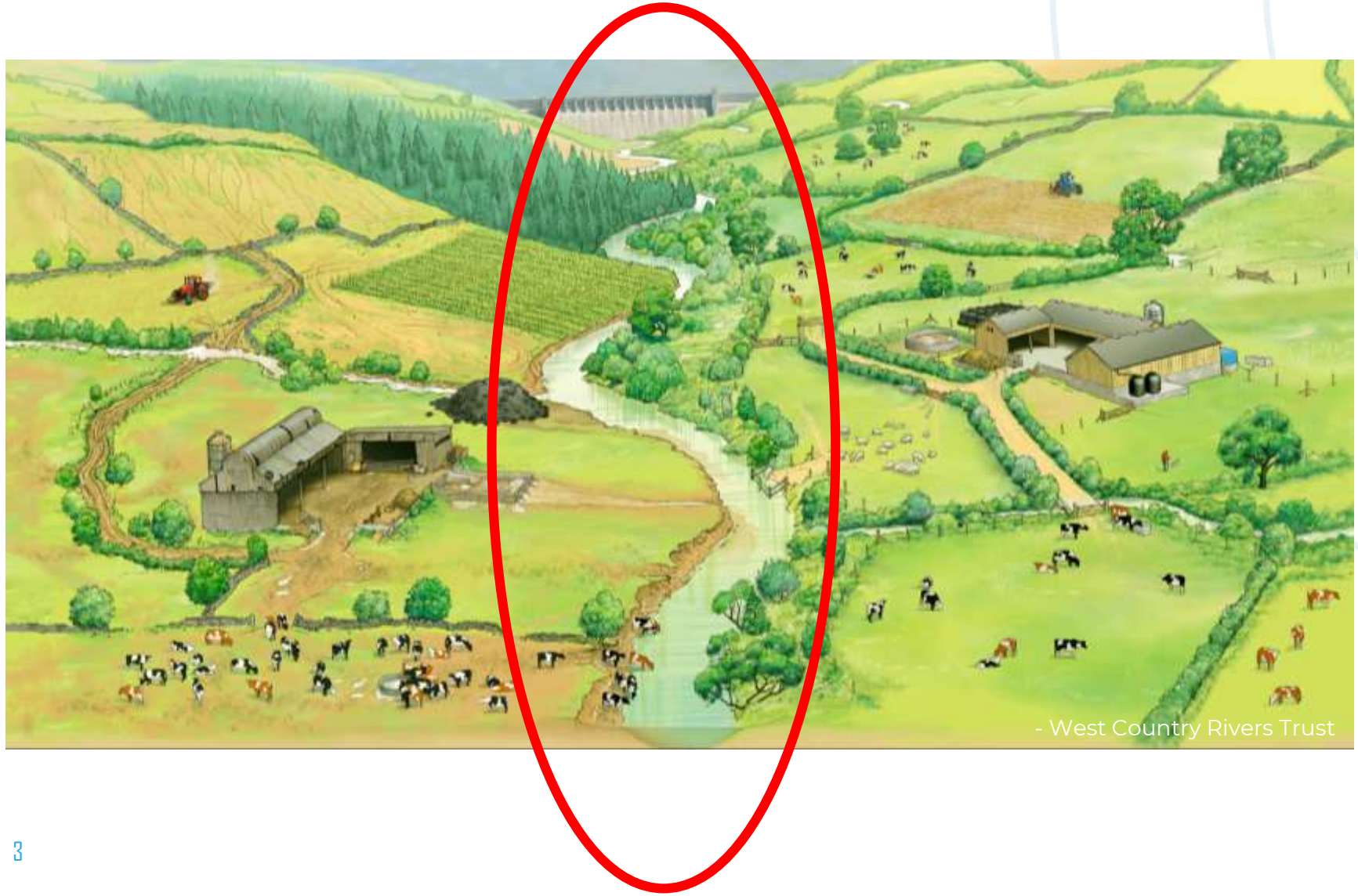
What is a healthy river?



Hydromorpholgy:

The form and function of the river

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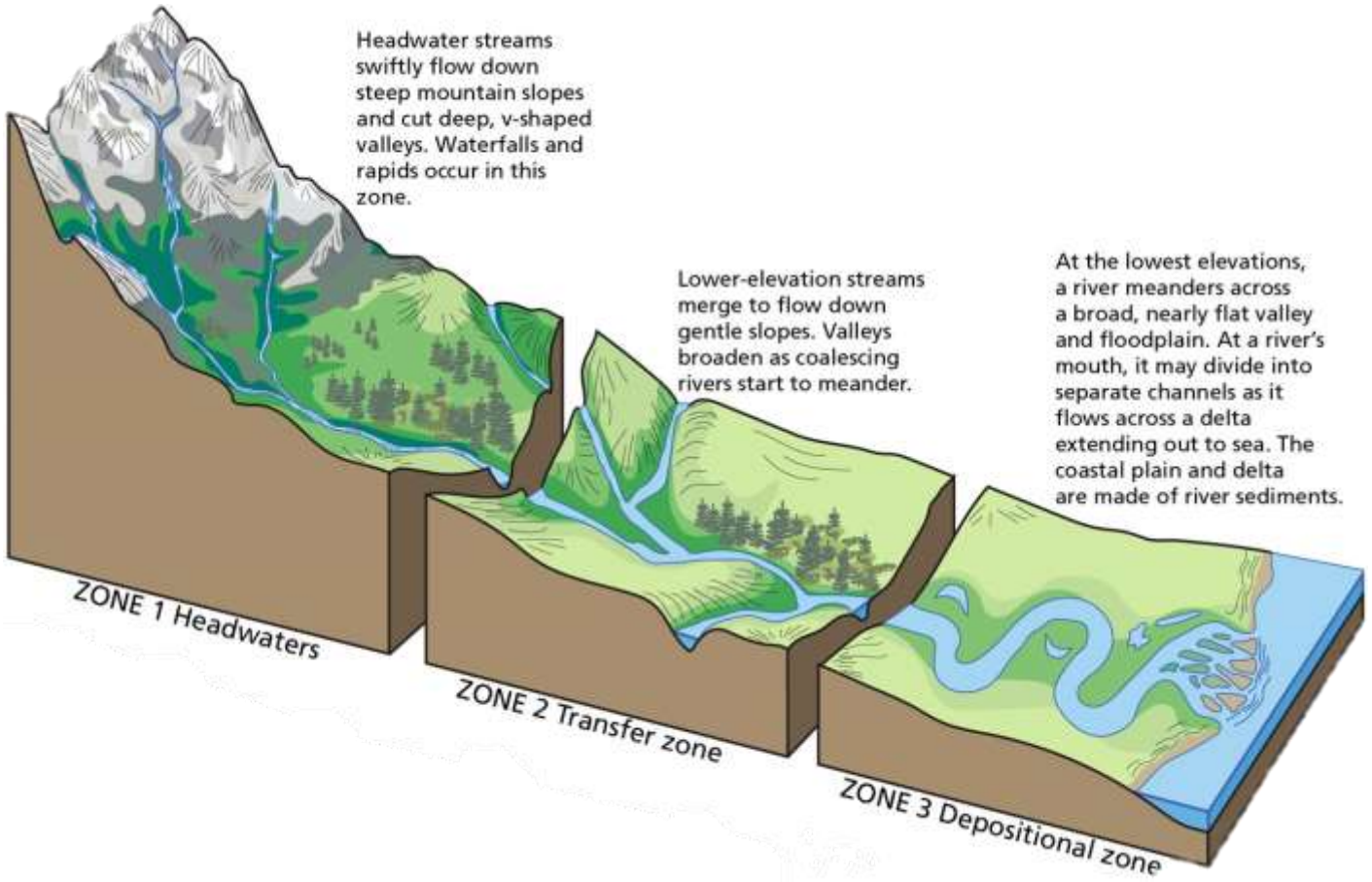
Natural form of a river



Different forms for different landscapes

Different divergence for different landscapes

- Trista Thornberry-Ehrlich

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Natural form of a river

Hydromorpholgy:
The form and function of the river

Avonmore_20 in the Avonmore Demonstration Sub-Catchment

Blackwater (Munster)_90 in the Awbeg (Kilbrin) Demonstration Sub-Catchment

Islands_30 in the Islands Demonstration Sub-Catchment

- Trista Thornberry-Ehrlich

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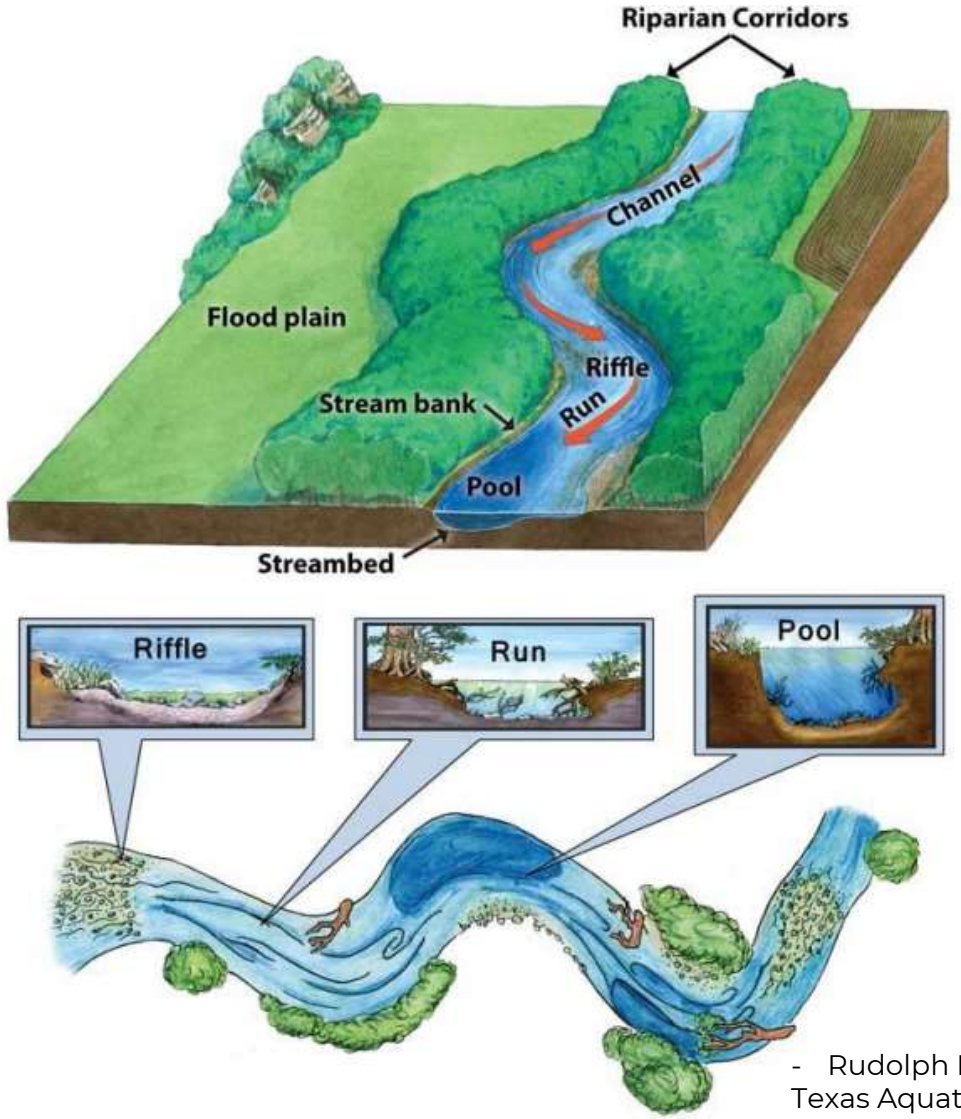
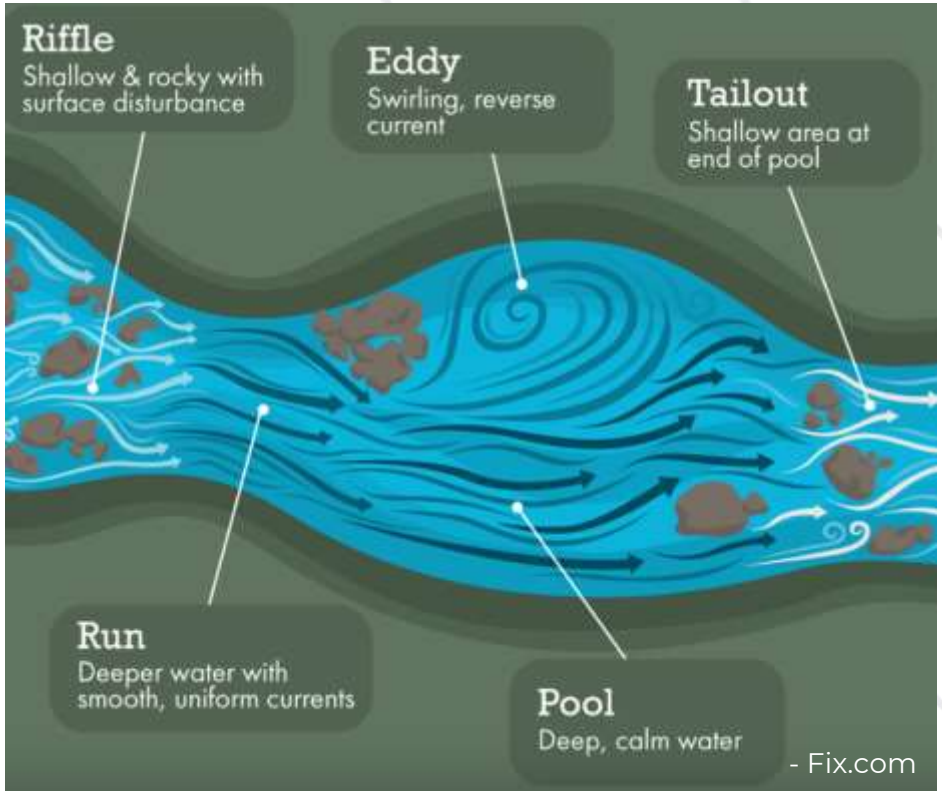
Natural form of a river



- Rudolph Rosen, Texas Aquatic Science

Hydromorpholgy:

The form and function of the river



- Fix.com

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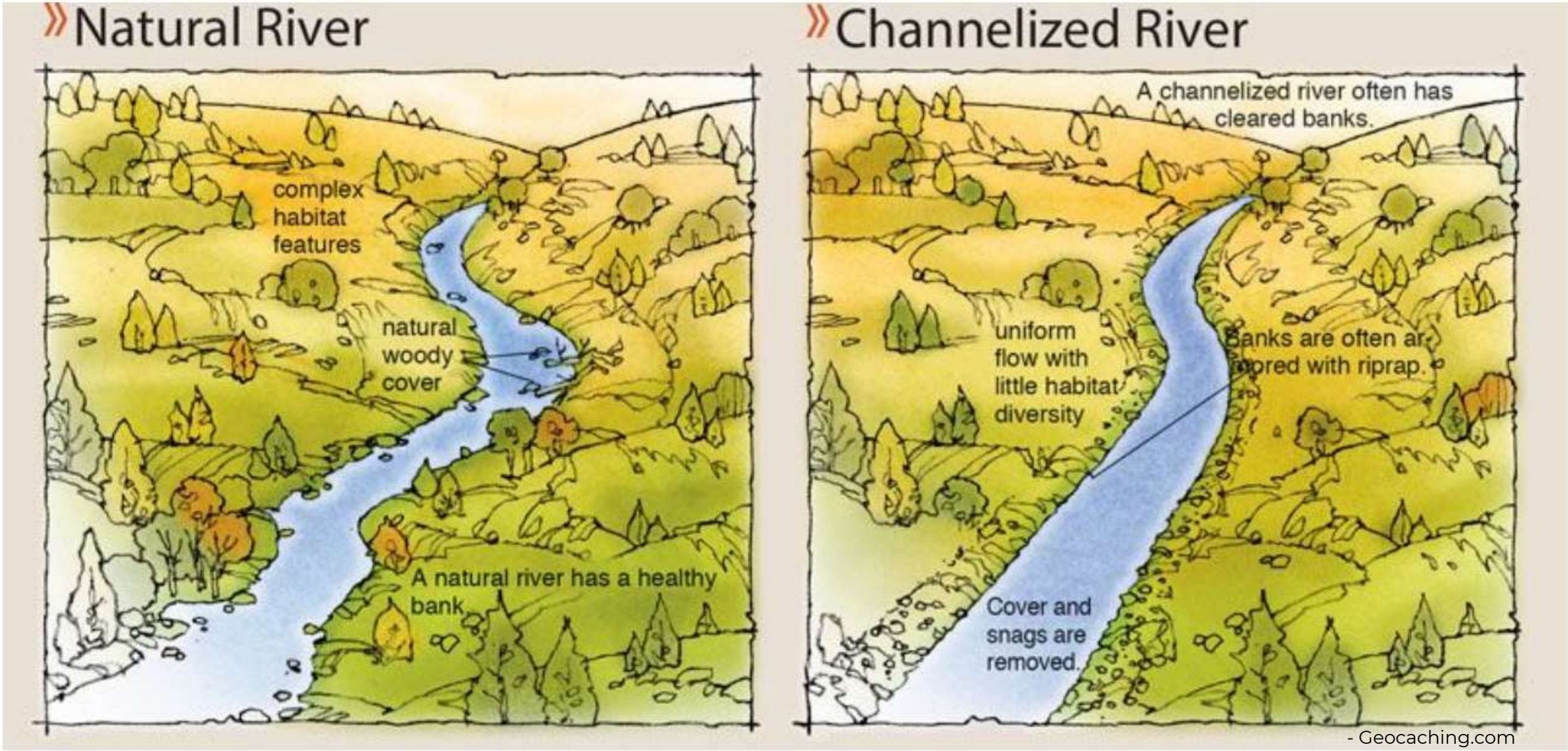
Natural form of a river



Natural form of a river

Island_20 in the Islands Demonstration Sub-Catchment

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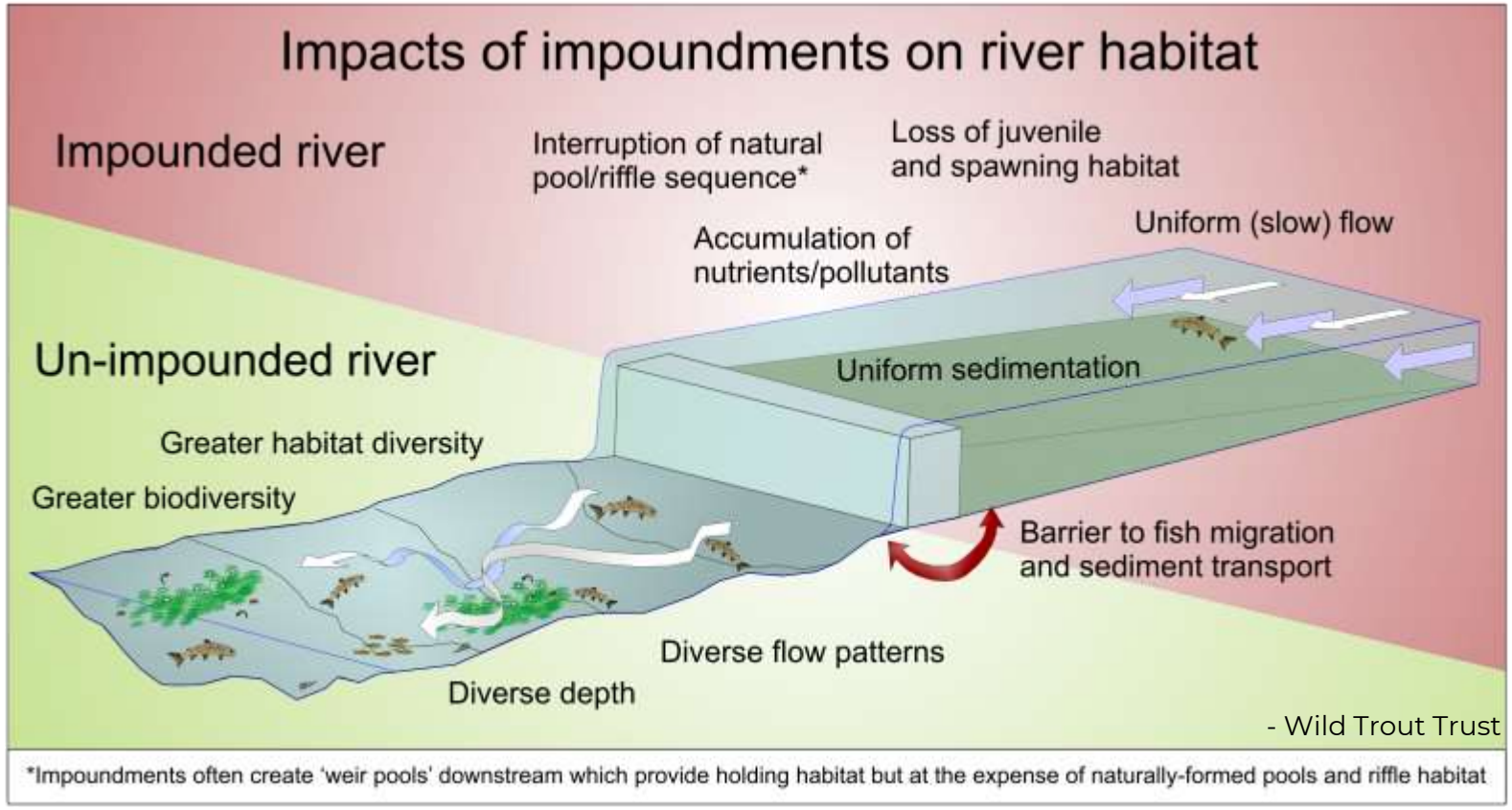
Natural form of a river

Barriers to movement

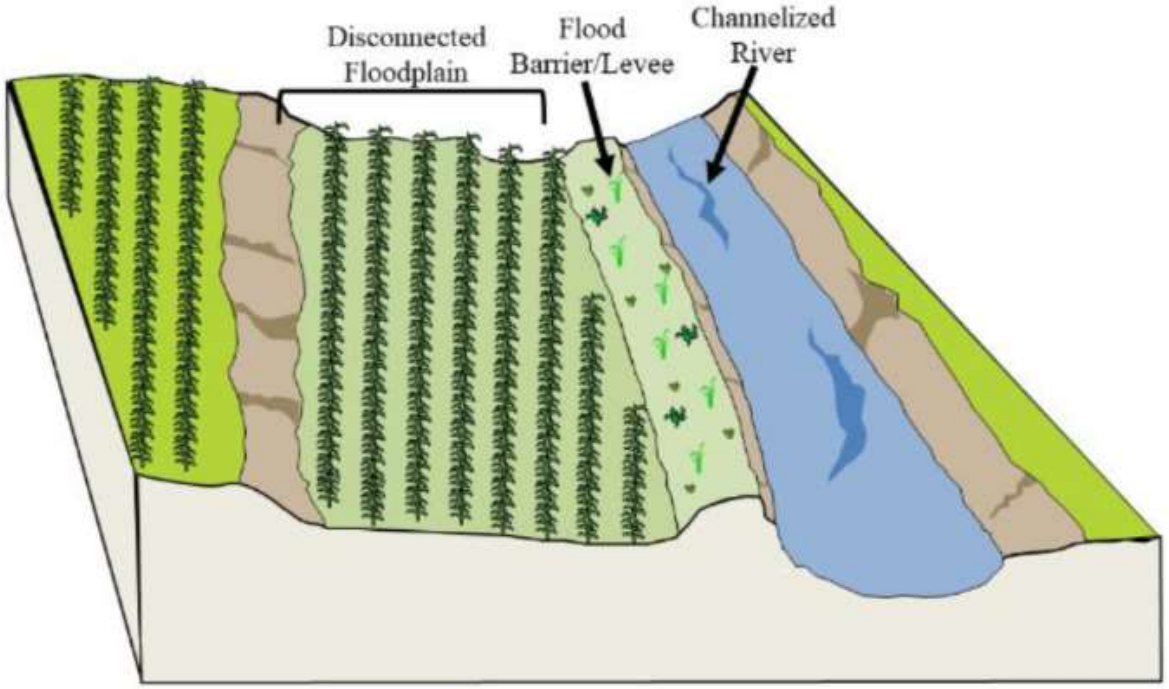


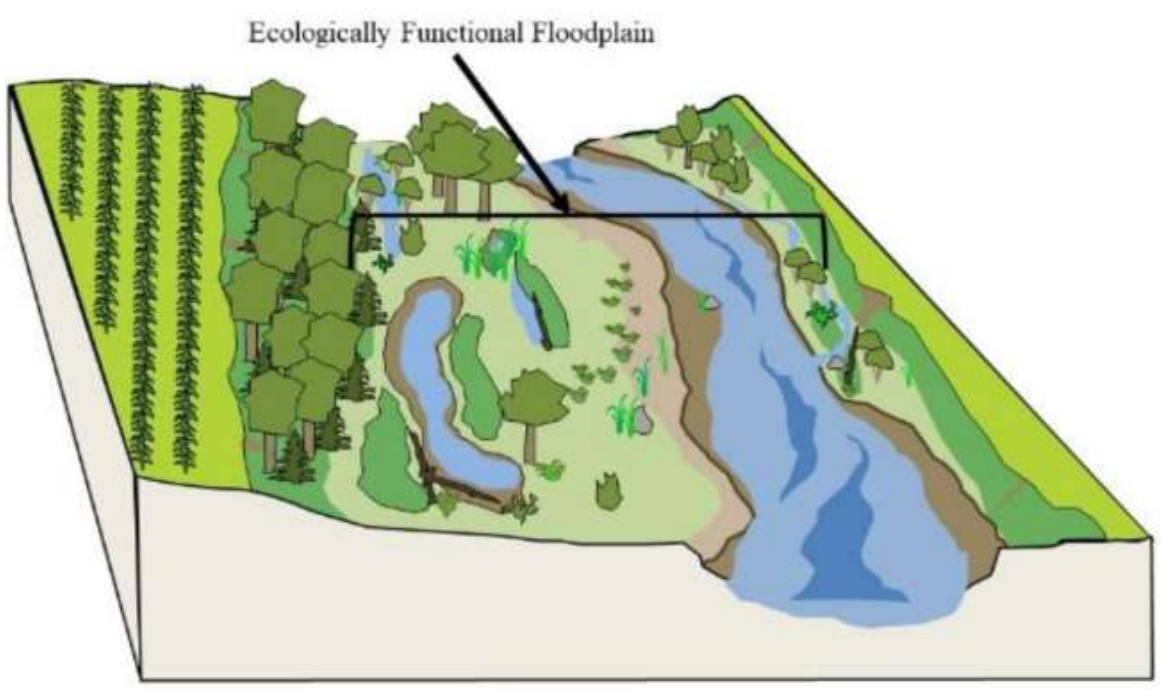
Ketragh Bridge in Lisduggan_North_10 water body, Awbeg (Kilbrin) demonstration sub-catchment.

Bridge near outlet of Blackwater (Munster)_90, Awbeg (Kilbrin) demonstration sub-catchment.

Natural form of a river

Floodplain connectivity





- American Rivers

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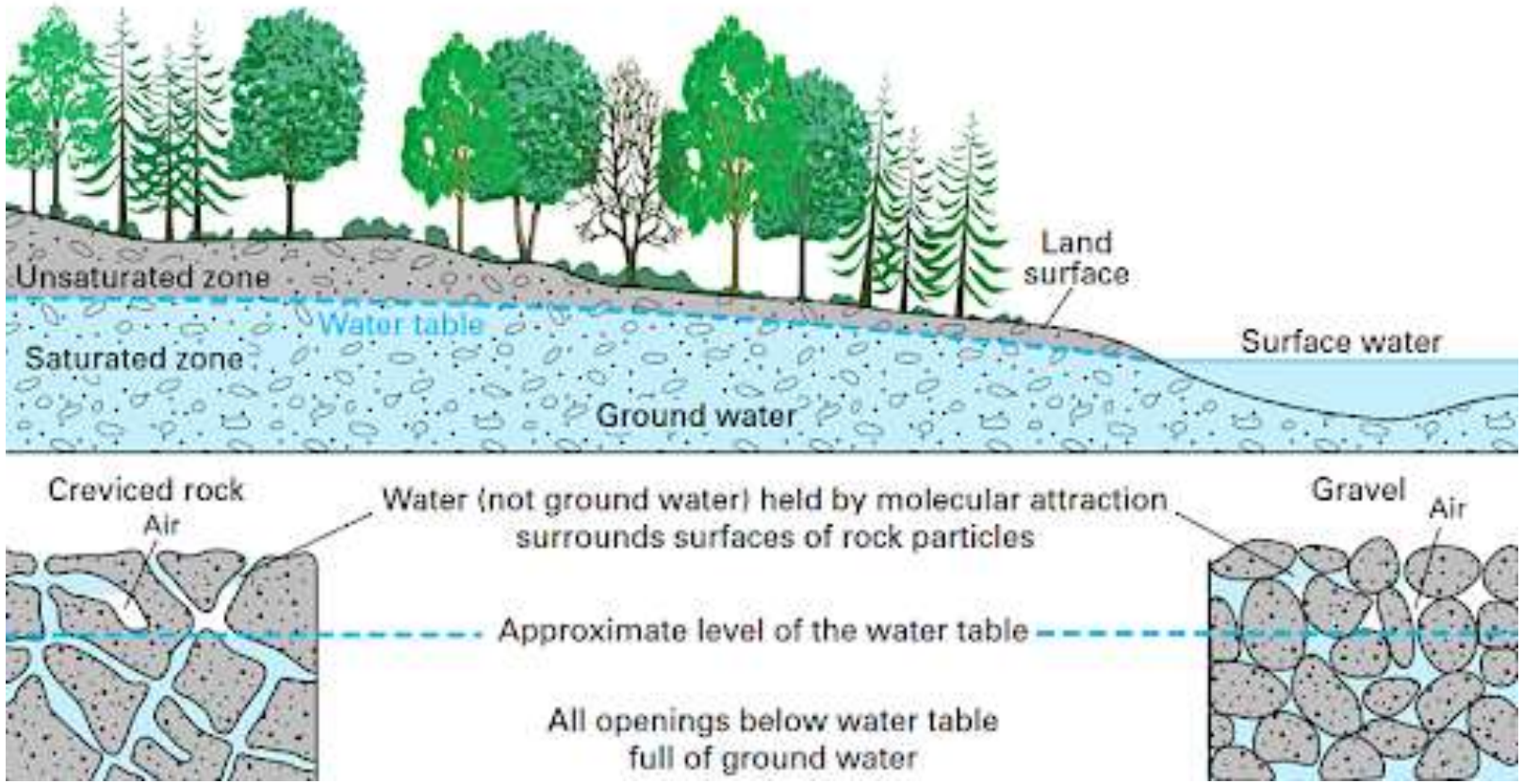
Natural form of a river

Water tables



- United States Geological Survey

- Donal Daly

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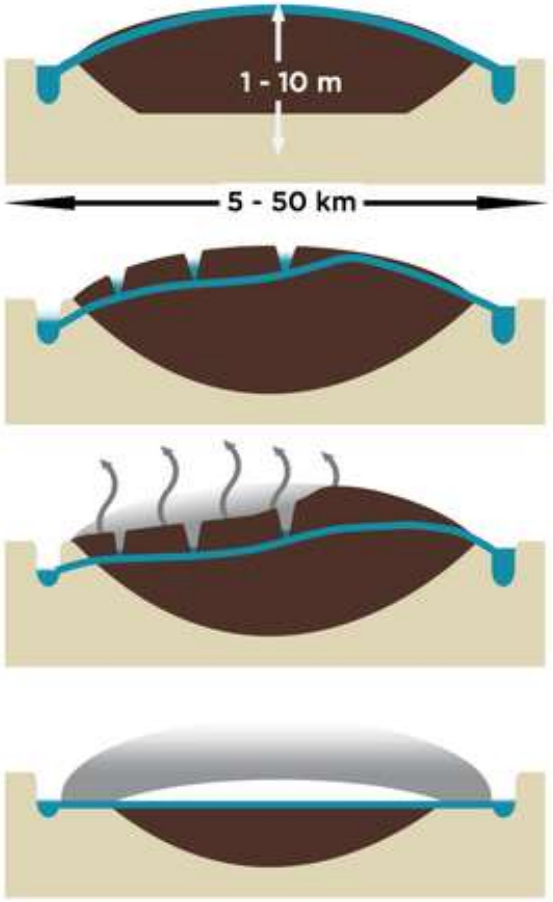
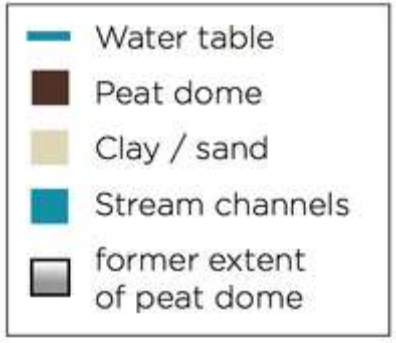
Natural form of a river

Water tables



- Susan Page, University of Leicester

- Pearl Mussel Project



What is a healthy river?

What do we mean when we refer to a polluted waterbody?

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What is a healthy river?

What do we mean when we refer to a polluted waterbody?

EPA have their own definition of EQS for High Status and Good Status Rivers, which we will discuss later.

But really it's the correct water chemistry parameters for that river in its natural form without human pressures present

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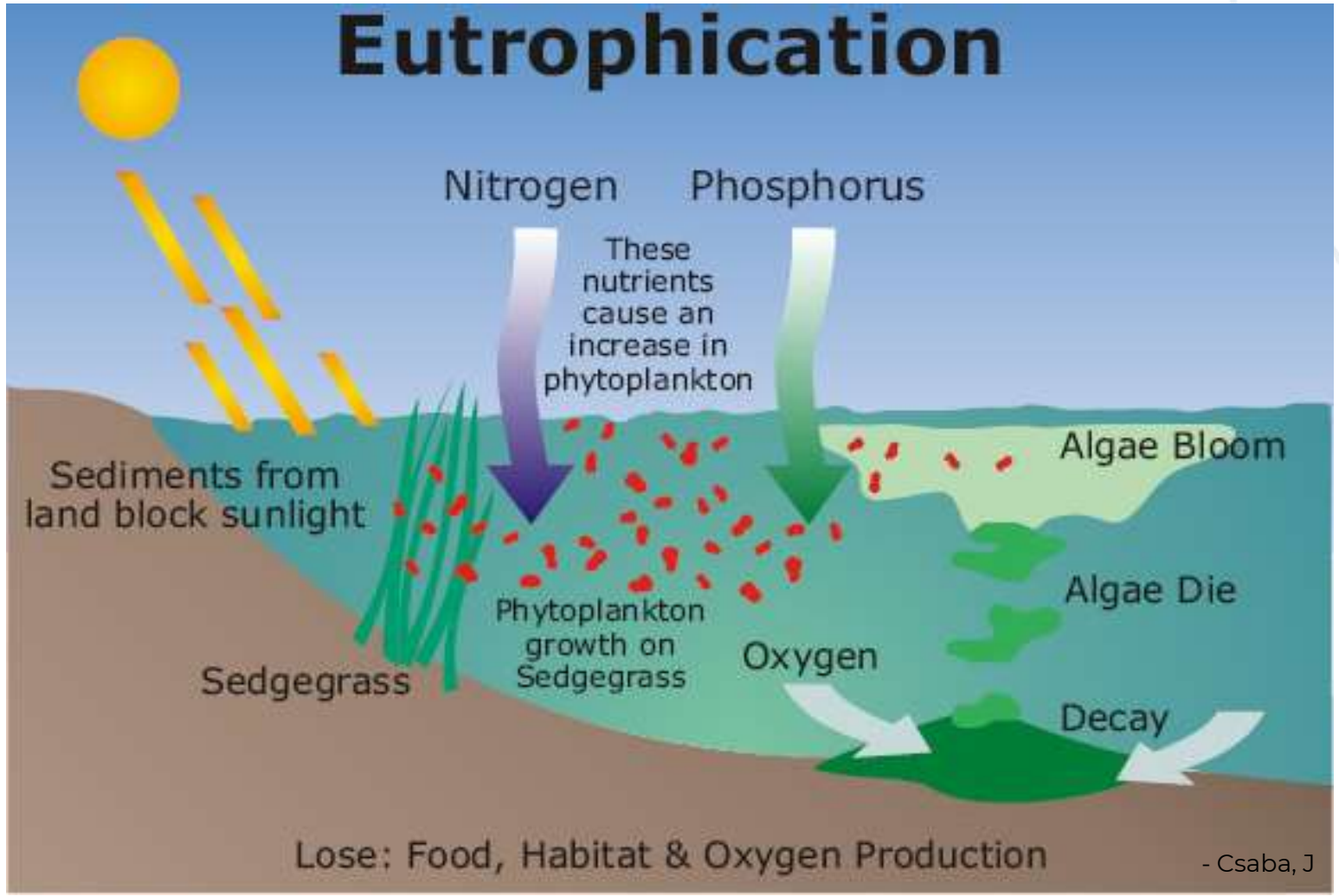
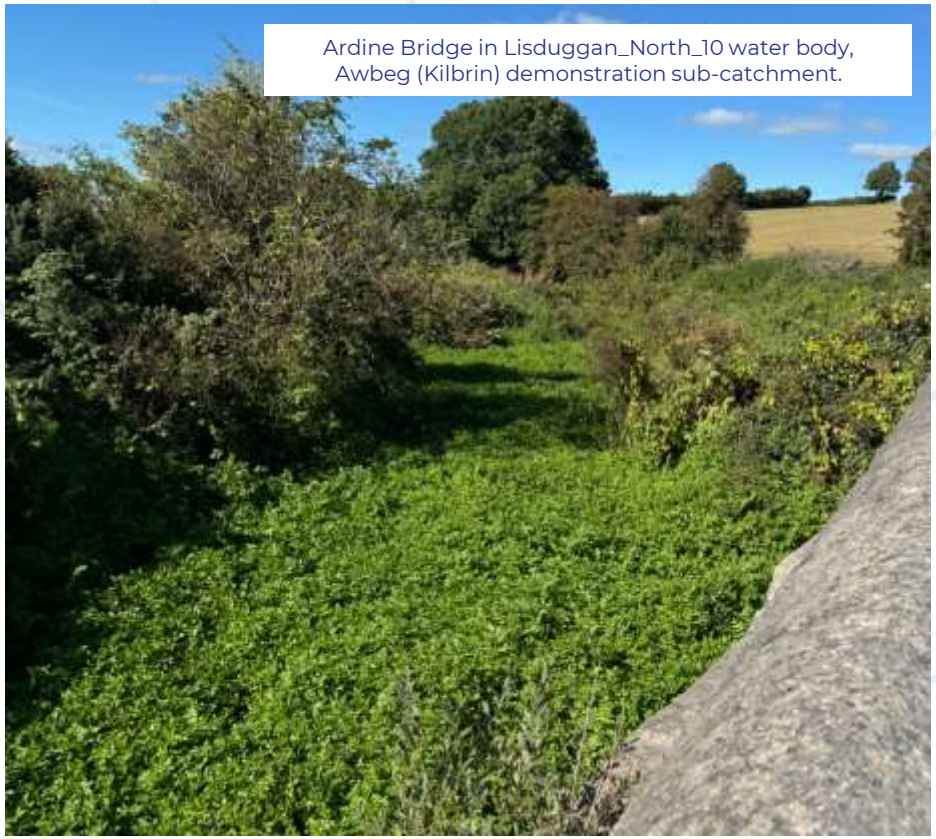
What do we mean when we refer to a polluted waterbody?





Ardine Bridge in Lisduggan_North_10 water body, Awbeg (Kilbrin) demonstration sub-catchment.

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What is a healthy river?

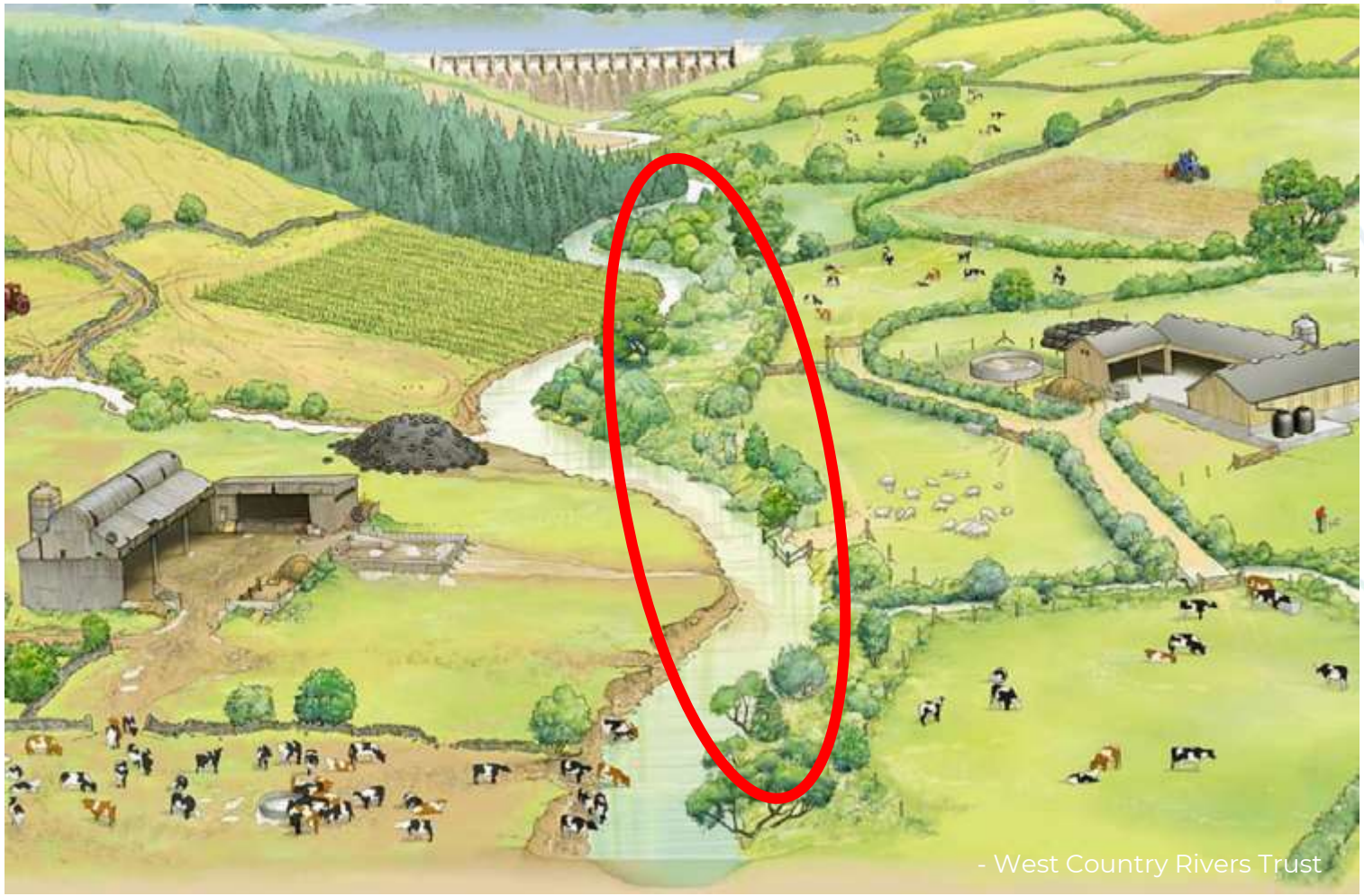
What do we mean when we refer to a polluted waterbody?

- Inland Fisheries Ireland

- BBC

- Pry House Farm

What is a healthy river?



Riverside Habitats

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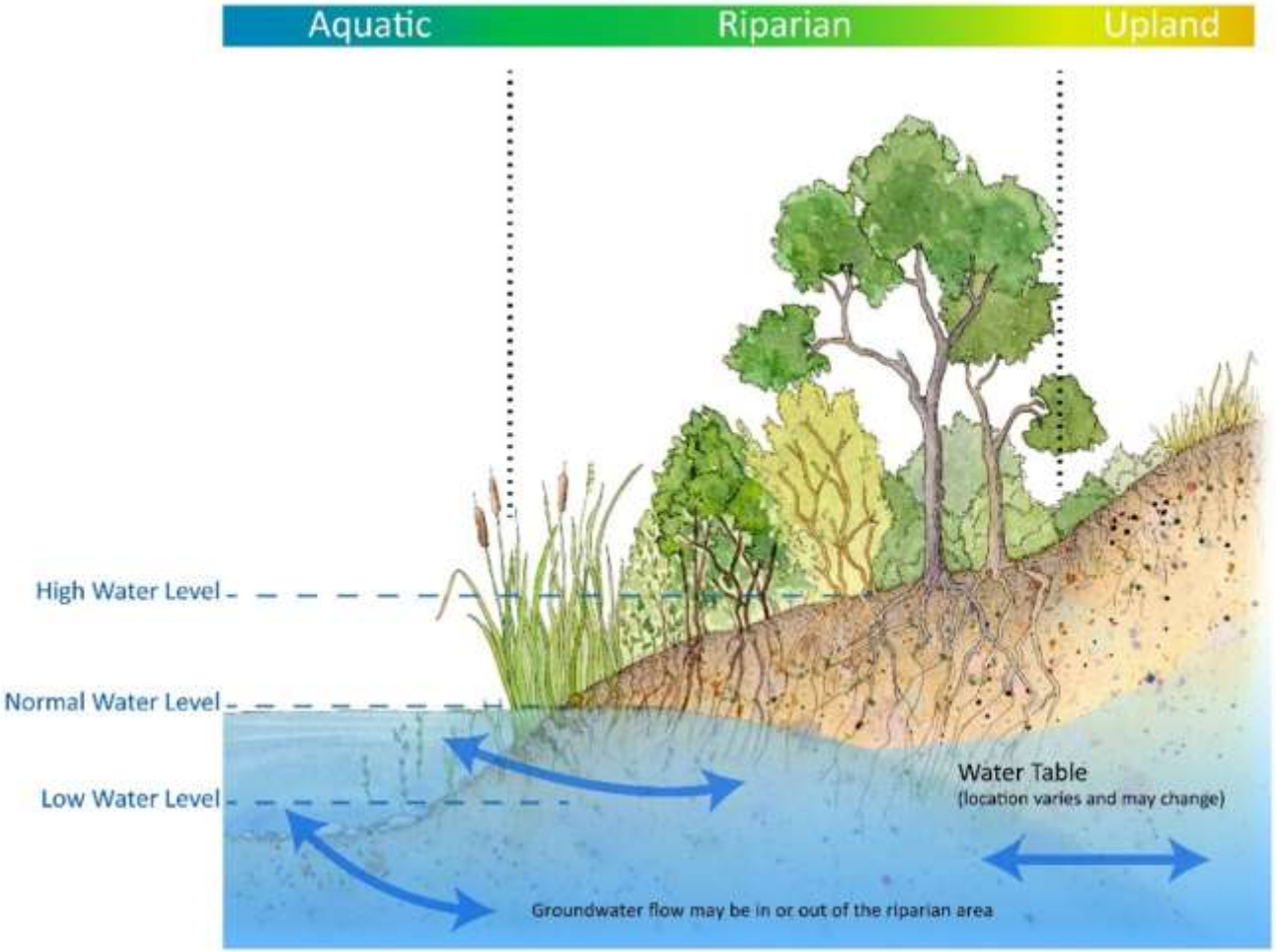
Rivers as ecosystems



- Elbow River Watershed Partnership

Riverside Habitats

- Gloucestershire Wildlife Trust

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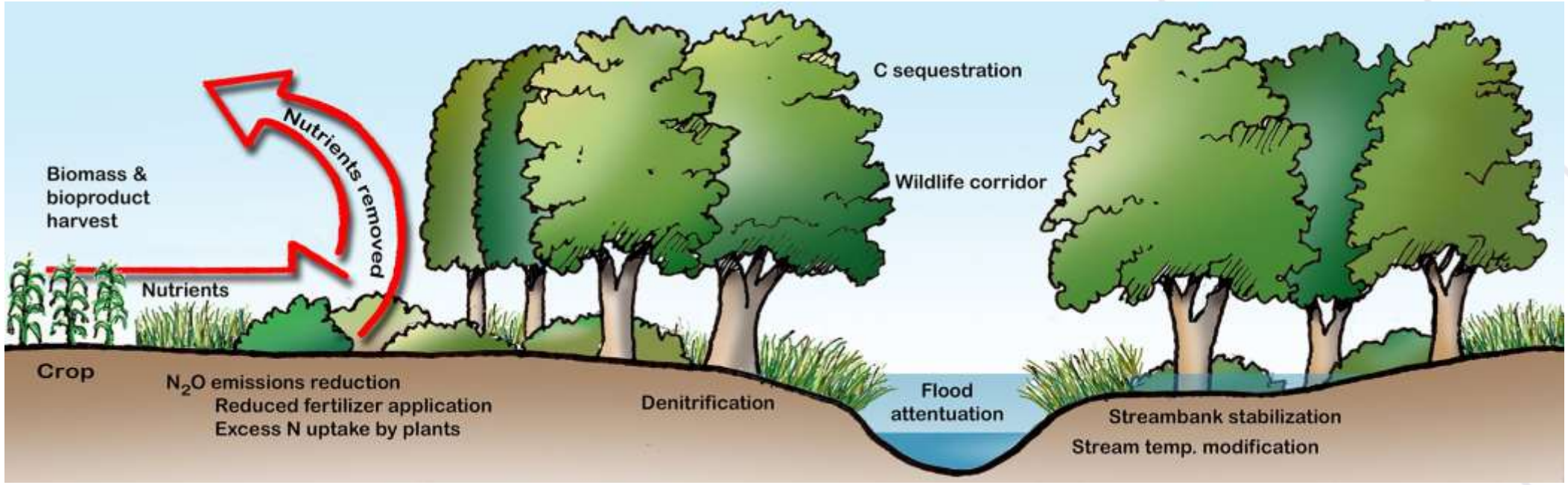
Rivers as ecosystems



- USDA National Agroforestry Centre

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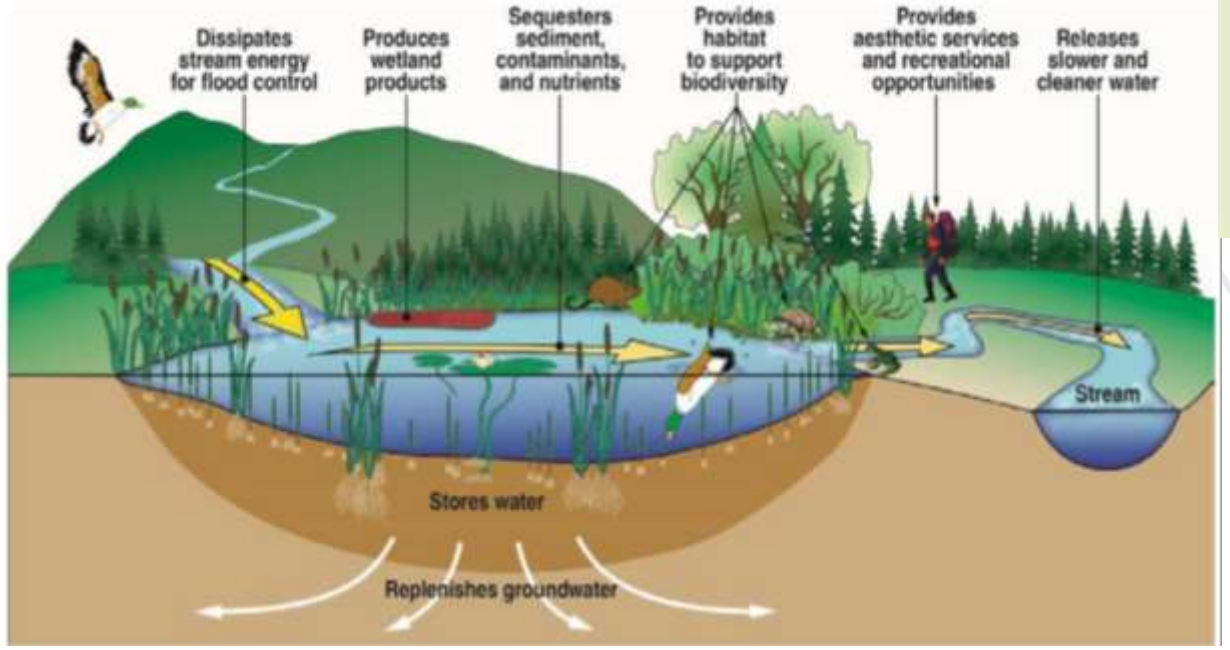
Ecosystem services

Provisioning

- Food
- Medicine
- Fresh Water
- Raw Materials

Regulating

- Pollination
- Lessen Weather Impacts
- Air Quality
- Soil Protection



- Ducks Unlimited

Cultural

- Cultural Heritage
- Recreation & Tourism
- Education & Research
- Aesthetic

-Wetland Surveys Ireland

Supporting

- Soil Formation
- Photosynthesis
- Nutrient Cycling
- Habitats

Exercise:

Using the model can you describe some of the ‘good’ features shown.

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How do we monitor the health of our rivers?

WFD and River Basin Management Plans

Rialtas na hÉireann
Government of Ireland

Water quality has to be protected and restored where necessary to reach these environmental objective.

No deterioration with a minimum objective of good.

River Basin Management Plan prepared every six years

Sets out the measures that are necessary to protect and restore water quality in Ireland.

How do we monitor the health of our rivers?

National Water Monitoring Programme

Conducted by EPA with support from LAs, IFI and other state agencies

2,899 waterbodies representing – **60% of the total number** of water bodies

2,429 Rivers 45 Coastal waters,
224 Lakes, 16 Canals
80 Estuaries 121 Groundwater bodies

Classification:

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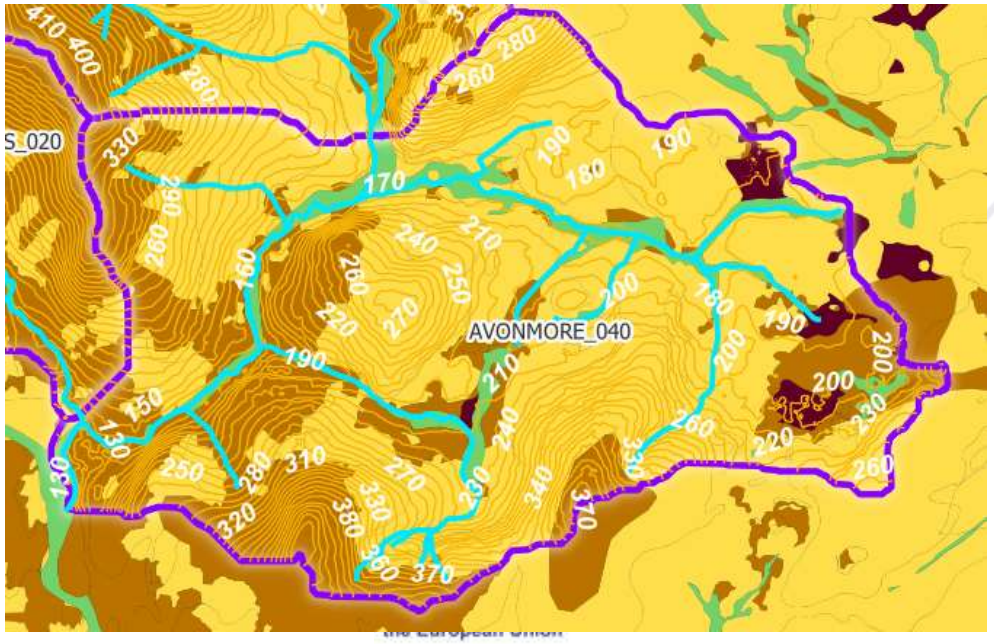
How do we monitor the health of our rivers?

Sampled vs modelled??

Monitored sites are actually visited, and water chemistry parameters, HyMo assessments and biological indices are tested in situ.

Modelled sites are based off of predictive desktop studies



Frequency?

Physiochemical: 4 times per year for operational and 12 times for surveillance.

Biological: Every 3 years

RESTORE
Inland fisheries Ireland, UCD, EPA funded

Monitoring programme for Waters of LIFE

A multidisciplinary monitoring programme to detect change in high status objective river waterbodies

Assess the effectiveness of measures to protect and restore them.

Bespoke to pressures in each catchment

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But how do we actually do the assessments?

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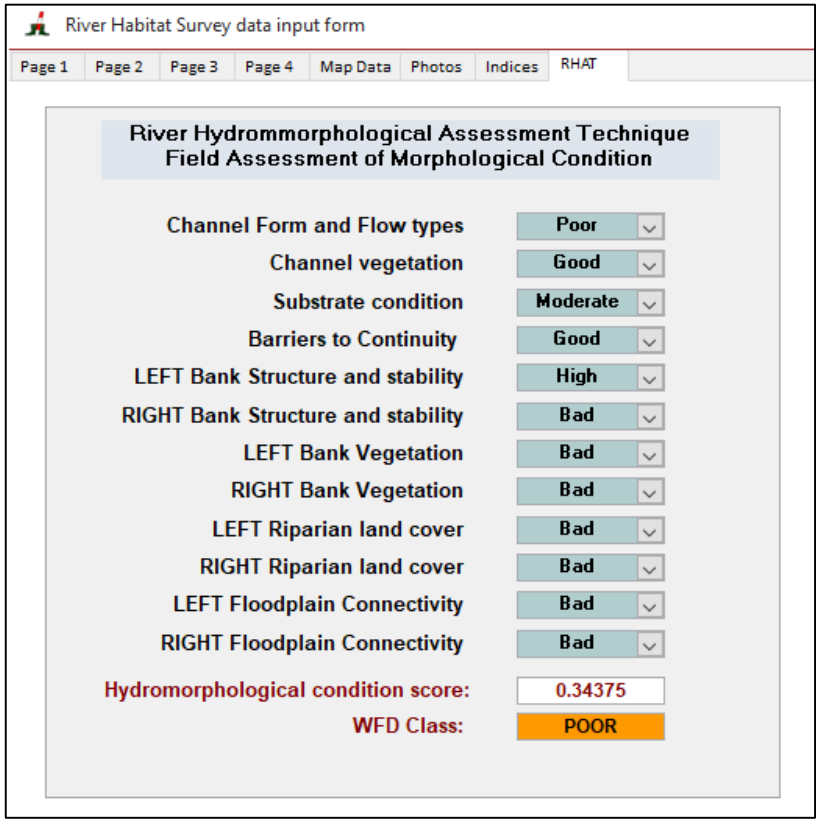
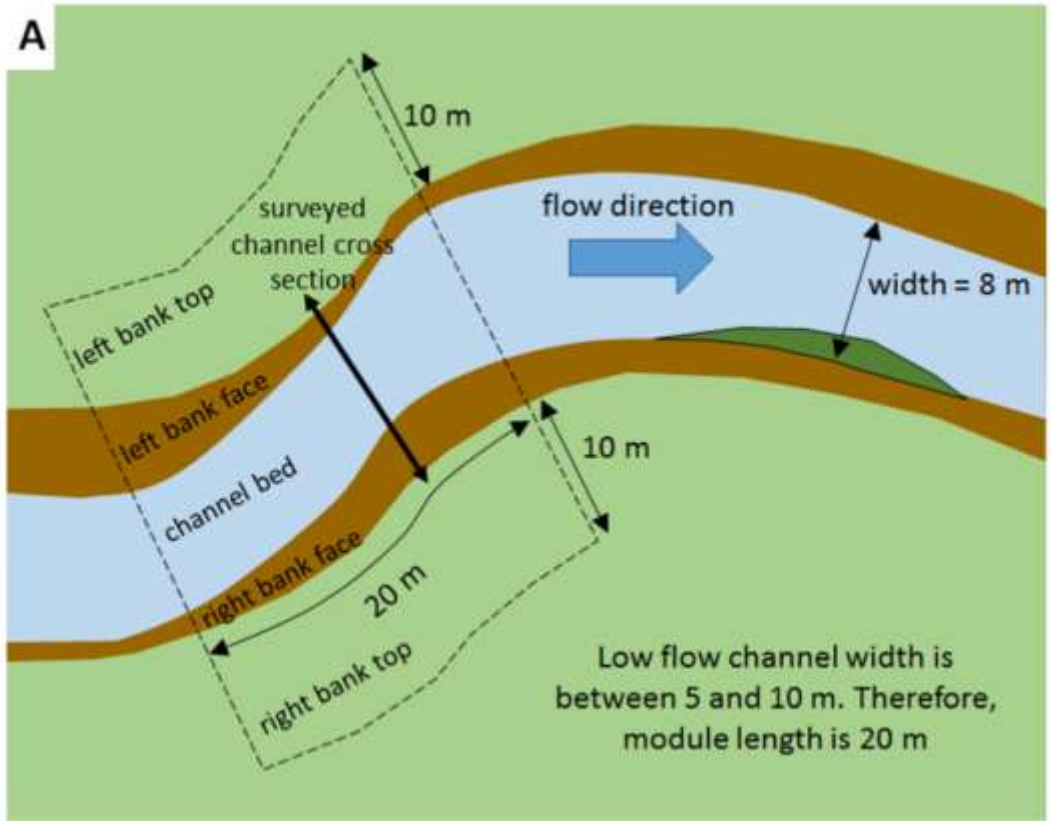
How do we assess hydromorphology?

RHAT Surveys, Morph Surveys, Desktop Assessments, River Restoration Plans



- River Habitat Survey



-Modular River Survey

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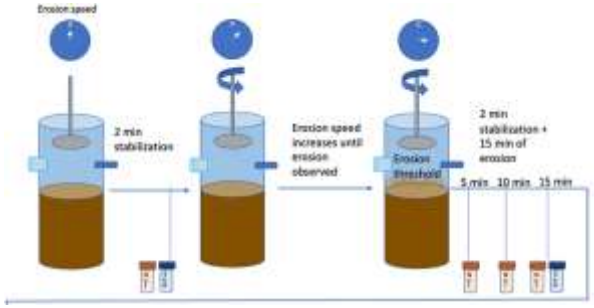
How do we assess water chemistry/parameters?



-Dunia Rios-Yunes *et al* 2023

Location	Ammonia mg/l as N	Nitrate mg/l as N	Nitrite mg/l as N	Phosphorus (React) mg/l as P	TON mg/l as N
M-1	0.01	0.11	<0.005	<0.01	0.11
M-2	0.03	< 0.10	<0.005	<0.01	<0.10
M-3	0.02	< 0.10	<0.005	0.02	<0.10
M-4	0.02	< 0.10	<0.005	<0.01	<0.10
M-5	0.01	0.65	<0.005	0.01	0.65
M-6	0.02	0.56	<0.005	0.02	0.56
M-7	0.01	0.54	<0.005	<0.01	0.54
M-8	0.03	< 0.10	<0.005	0.02	<0.10
M-9	<0.01	0.12	<0.005	<0.01	0.12
M-10	<0.01	0.63	<0.005	<0.01	0.63
M-11	0.01	0.52	<0.005	<0.01	0.52

Assessing water quality using biological indices

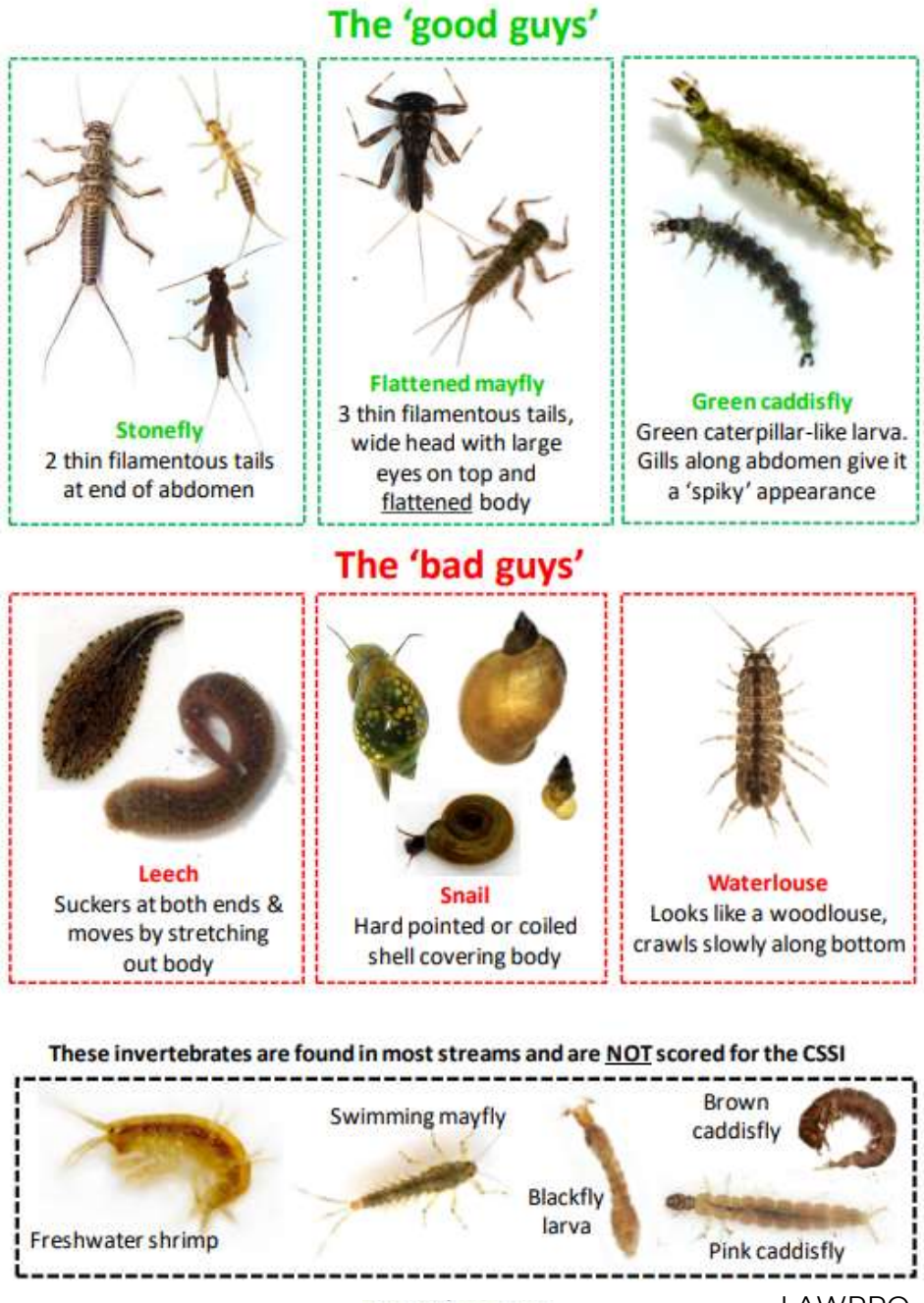
Macro-invertebrates

Diversity and abundance tells a story.

Sampled using Kick sampling techniques

Various stories can be told based on type of indicator presence: Acid indicators, sheep dip etc.

Tells a story longer than simple chemical parameters, life cycles take 1 – 2 years.



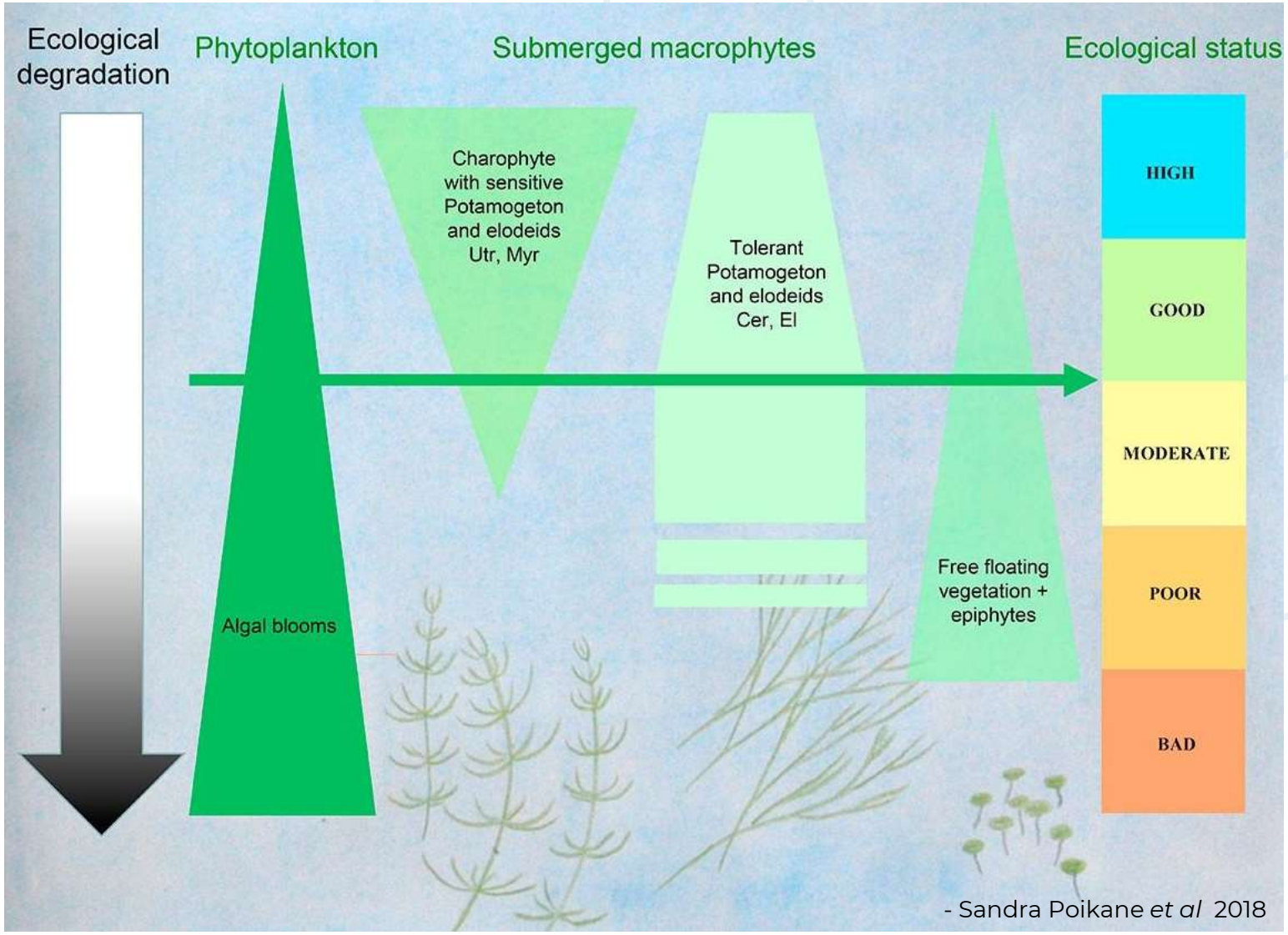
- LAWPRO

Assessing water quality using biological indices:

Other biological indices include:

- Fish
- Phytoplankton
- Macrophytes (plants)
- Benthic Algae

- Angling Ireland



- Sandra Poikane *et al* 2018

High Status Objective Waterbodies

- Are as close to natural conditions as possible and must be retained as a reference to these conditions.
- Are the last reservoirs of sensitive species which are endemic to Irish Culture and Ecology.
- Provide the highest value in terms of ecosystem services

Glenmacnass_10 in Avonmore demonstration sub-catchment.

Key takeaways:

1. Rivers have a natural form, functions and water parameters which must be protected or restored.

2. RESTORE project are responsible for monitoring, it is regular, locations picked based on measures implemented and not cross reported

3. HSO rivers act as reference of undisturbed and a refuge for those species dependent on these conditions

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