

Translating resilience and SMNR into effective actions for freshwater biodiversity



Introduction

Environment (Wales) Act 2016

(1) A public authority must seek to maintain and enhance biodiversity... and in so doing promote the resilience of ecosystems...

(2) In complying with subsection (1), a public authority must take account of the resilience of ecosystems, in particular...

- (a) **diversity** between and within ecosystems;
- (b) the **connections** between and within ecosystems;
- (c) the **scale** of ecosystems;
- (d) the condition of ecosystems (including **structure & functioning**);
- (e) the **adaptability** of ecosystems.

How Could We Think About This?

Pressures

Discharges

Development

Climate Change

Plastics

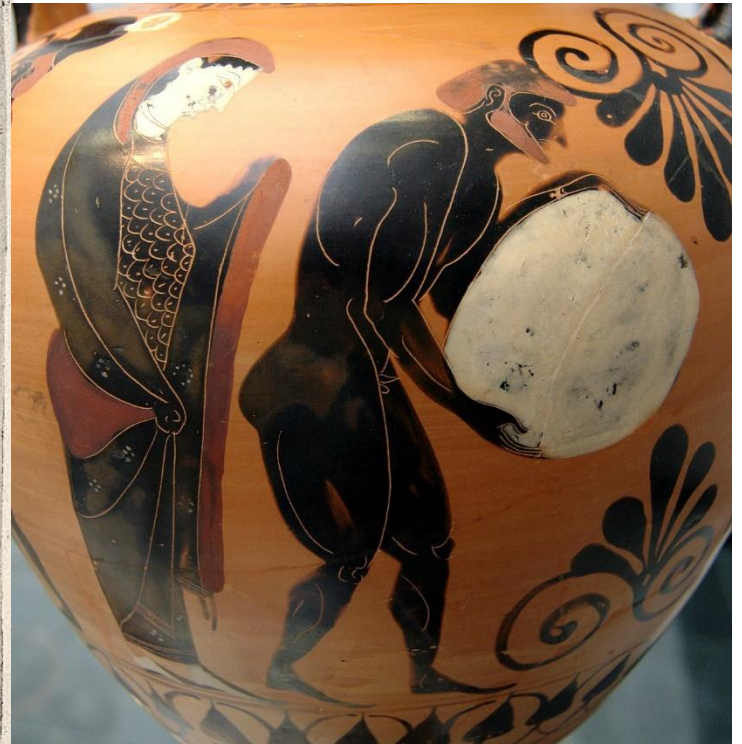
Pollution

**Agriculture /
Land
Management**

Water Abstraction

The Problem With Pressures

- They are always with us;
- Require continuous management.



Rivers Are About Flow...

- Water
- Silt
- Sand
- Gravels
- Pebbles and Cobbles
- Woody debris

...and we need to slow it down

Headwaters



**Cyfoeth
Naturiol
Cymru**
**Natural
Resources
Wales**



Headwaters



Instream



Sediment Sorting



Sediment Sorting in a Chalk Stream. © Wild Trout Trust 2018.

Benefits of Boulders

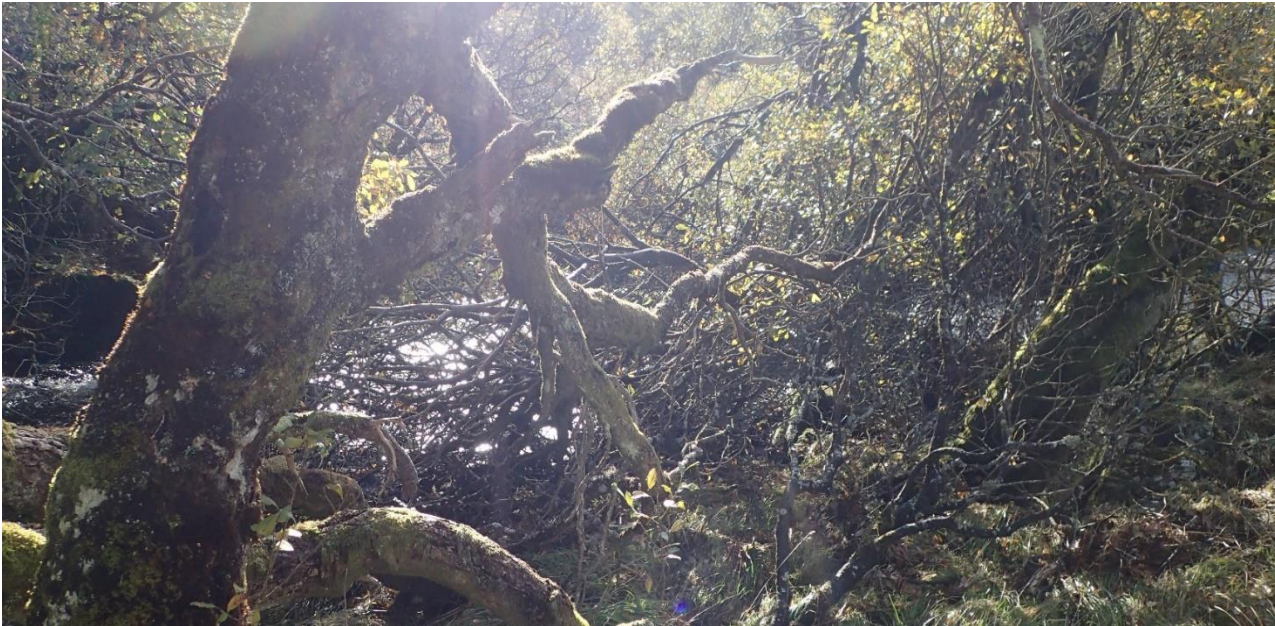
Gravel Trapped



Cover for Fish

Oxygenation

...and large woody material



Fish Live in Trees Too!



Riparian Zone



Riparian Zone

**Cover and Nectar for
Insects**



**Shade and Cover
for Fish**

Exposed Riverine Sediment



Nesting Habitat

Flooding and Floodplains



Flooding



Why do Rivers Need Floodplains?

- Deposition of Nutrient-Rich Silt;
- Protects the riverbed from excessing scour, preventing Washout of sands and gravels;
- Habitat Complexity and Diversity;
- Very biodiverse in their own right.
- Prevents more serious flooding downstream.

Freshwater Diversity

- In-channel flow diversity – boulders; woody material; riparian trees; sinuous channel.
- Substrate diversity – well sorted;
- Areas of fast flow even in drought = oxygen
- Riparian habitat diversity;
- Floodplain habitat diversity;

To improve resilience, we need more:

- Intact headwater wetlands (block ditches, recreate natural rills and other drainage pathways);
- Instream boulders and woody debris;
- Riparian broadleaved woodland and other low intensity habitats;
- Connection to floodplains and secondary channels
- Clean water ponds

Case Study: Afon Merin

- Tributary of the Rheidol nr Devil's Bridge;
- NRW-managed WGWE;
- 3km section, landscape-scale;
- Formerly more dynamic prior to afforestation and land drainage;
- River incised resulting in loss of spawning gravels.

Damage to Resilience



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