

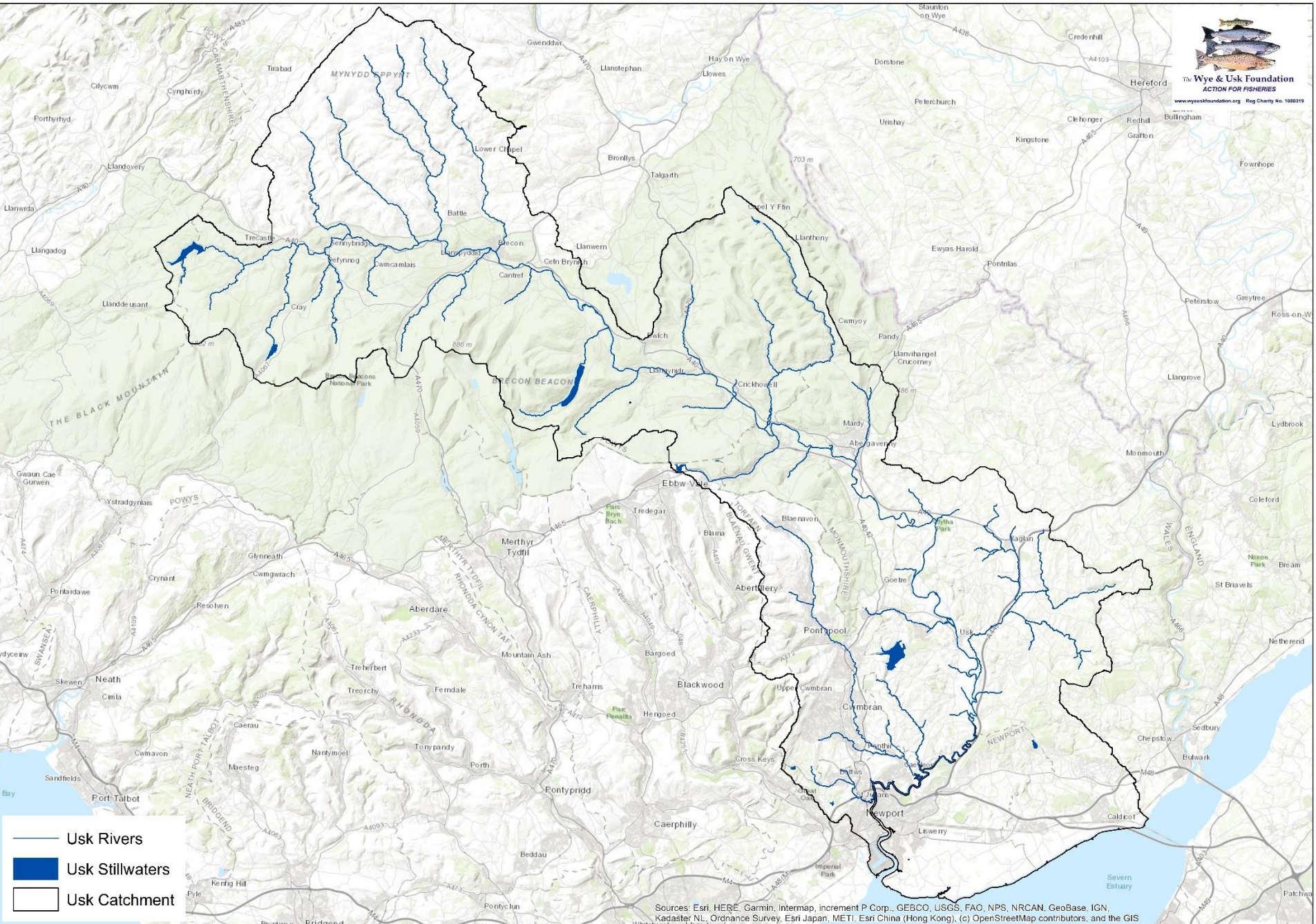
Is this inevitable?



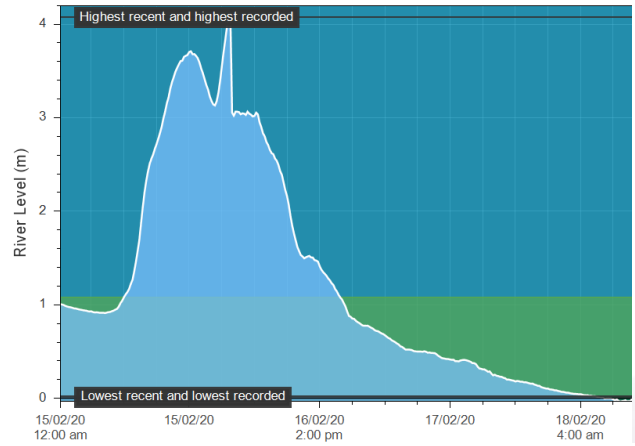


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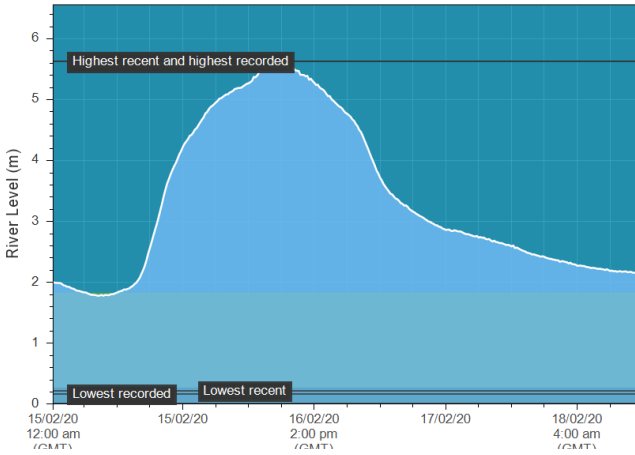
www.wyeuskfoundation.org Reg Charity No. 1082078



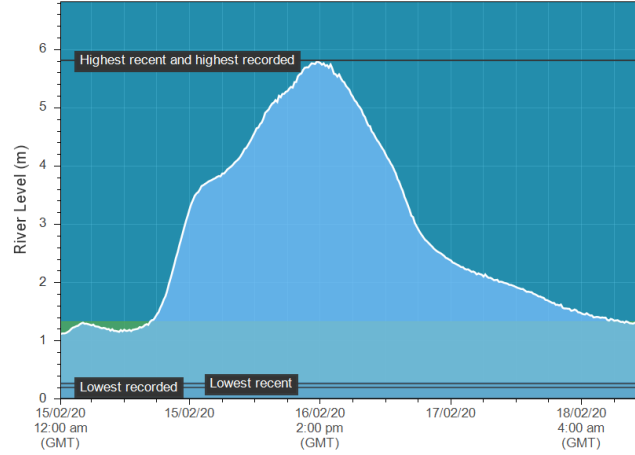
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS



Brecon 15th – 18th Feb 2020
 Note the very steep rise and fall

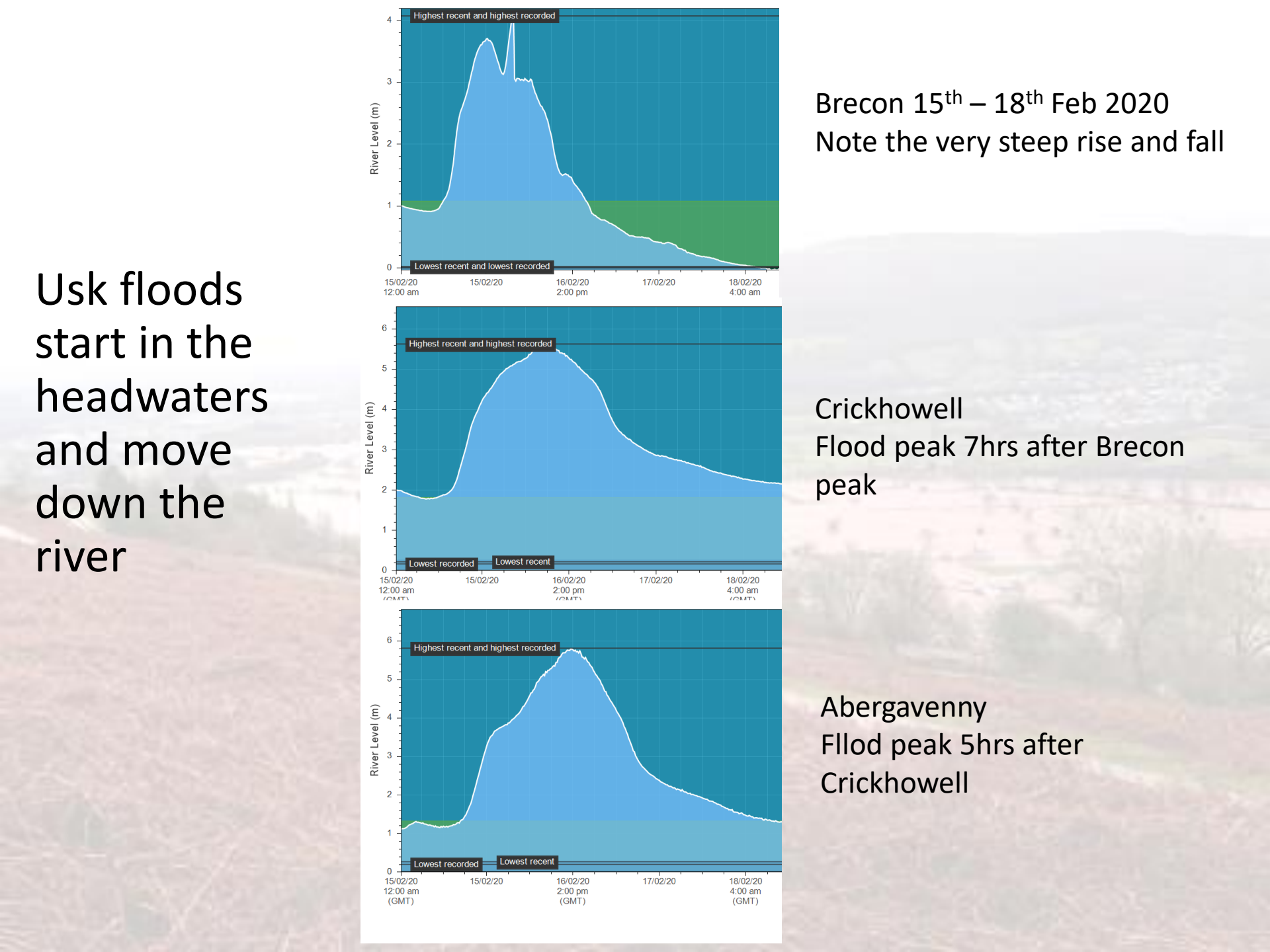


Crickhowell
 Flood peak 7hrs after Brecon peak



Abergavenny
 Flood peak 5hrs after Crickhowell

Usk floods start in the headwaters and move down the river



Floods are increasing..... fast

- Floods over 5m at Hereford and return periods (RP)
- 7 between 1945-2000 (RP 8 years)
- 6 since 2000 (RP 3.5 years)
- 4 since Oct 2019 (RP 4.5 months)
- 2 since Jan 2021 (RP 6 weeks)

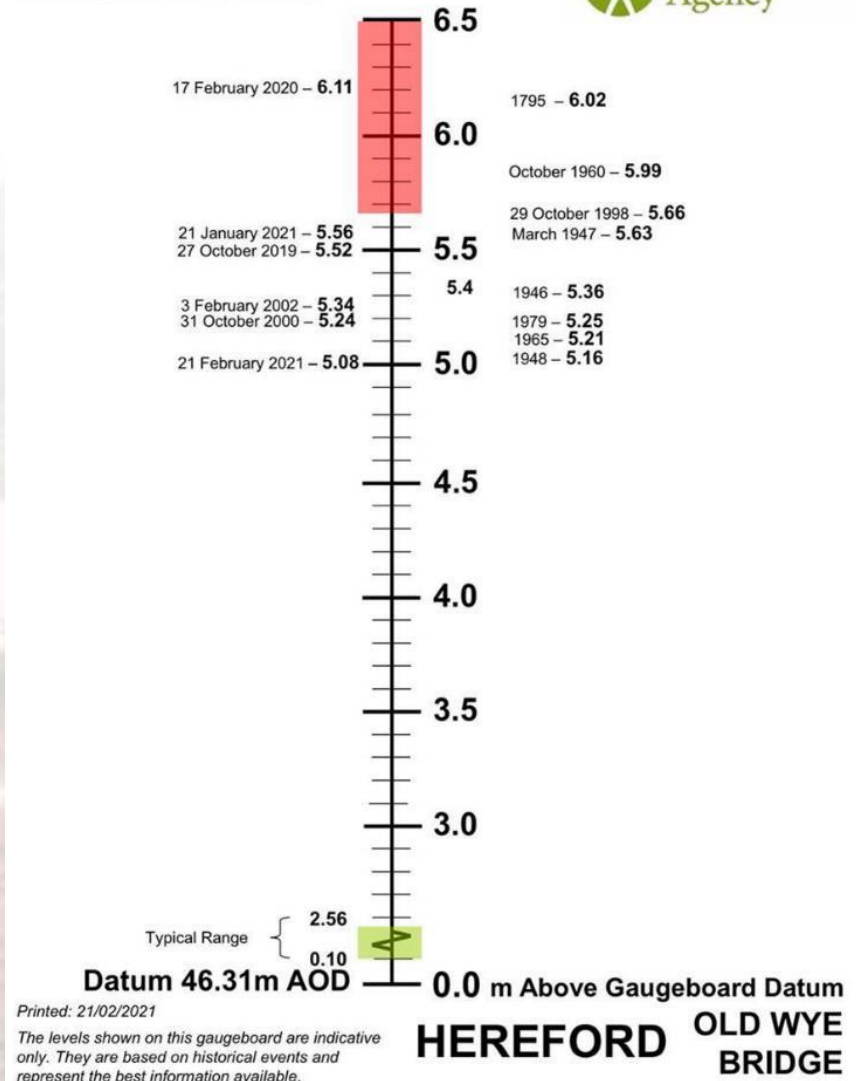
Previously we needed C.120mm rain in Upper catchment in a day to generate a 5m flood

Feb 21 flood was from 72mm

Rainfall return period was 1 year.

The riverbanks are changing to a new 'normal'.

GAUGEBOARD DATA SIGNIFICANT LEVELS



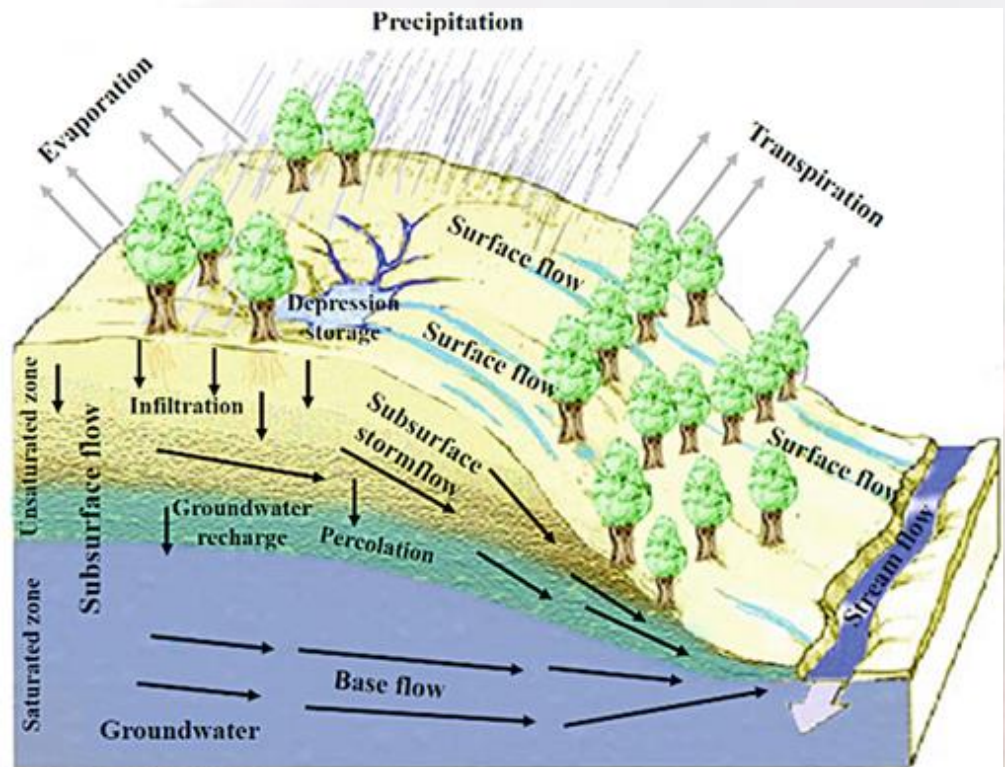
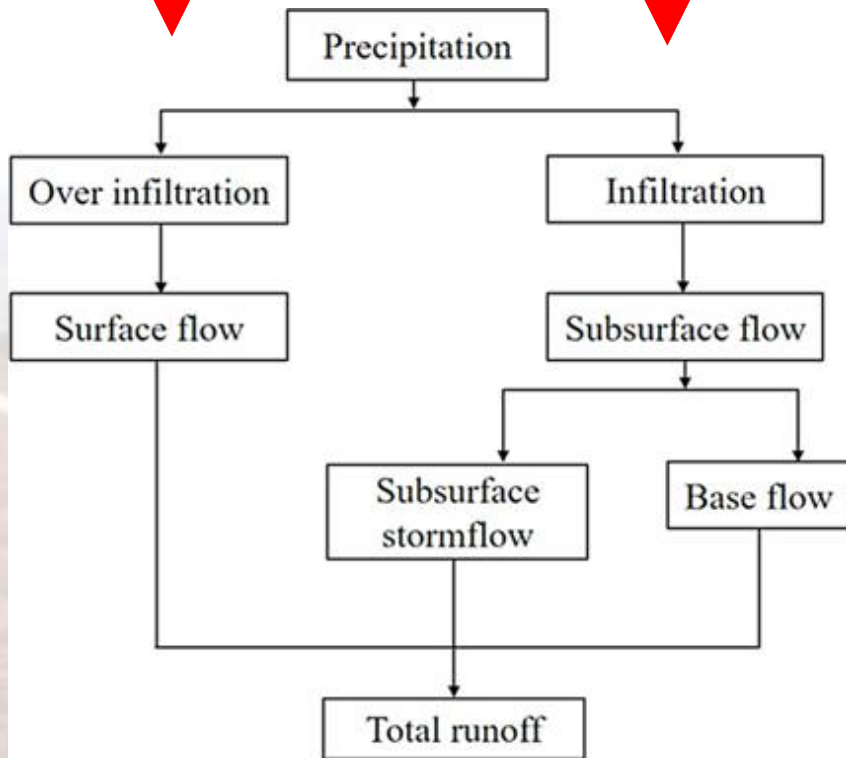
Pathway 1

Accelerates discharge
narrows the
hydrograph,
Exacerbates Flooding



Or..Pathway 2

Attenuates discharge
extends the
hydrograph, **Reduces Flooding**



It is all about stores, filling and releasing at different rates

Places to hold/check water in the landscape.

- The soil
- The regolith: the rocky bit at the bottom of the soil profile
- Groundwater
- Wet woods
- Upland channels
- Reservoirs
- Floodplains

	Area in Km2	Water Storage in mm	Total storage MI
Reservoirs	18	0-4,000	0-72,000
Soils	1782	250	445,500
Regolith	1782	10	178,200
Channels	8.5	150	25,500
Floodplains	106	600	63,600

C.80% of the Usk's short term rainfall storage is in the soil

Infiltration in practice

Feb 25th 2021; 4 days after flood peak. Wetland still discharging rain that fell on the fields above on the 19/20th



Near-by (this rain was in the flood peak)



Natural flood Management

- So far we have dodged an extreme rainfall event on the Usk
- Eg: Boscastle July 2004 (or Cumbria 2005,2015)
- 147mm in 6hrs (75mm in 2hrs)
- Flood exacerbated by previous winters sheep grazing (Smith et al 2008)

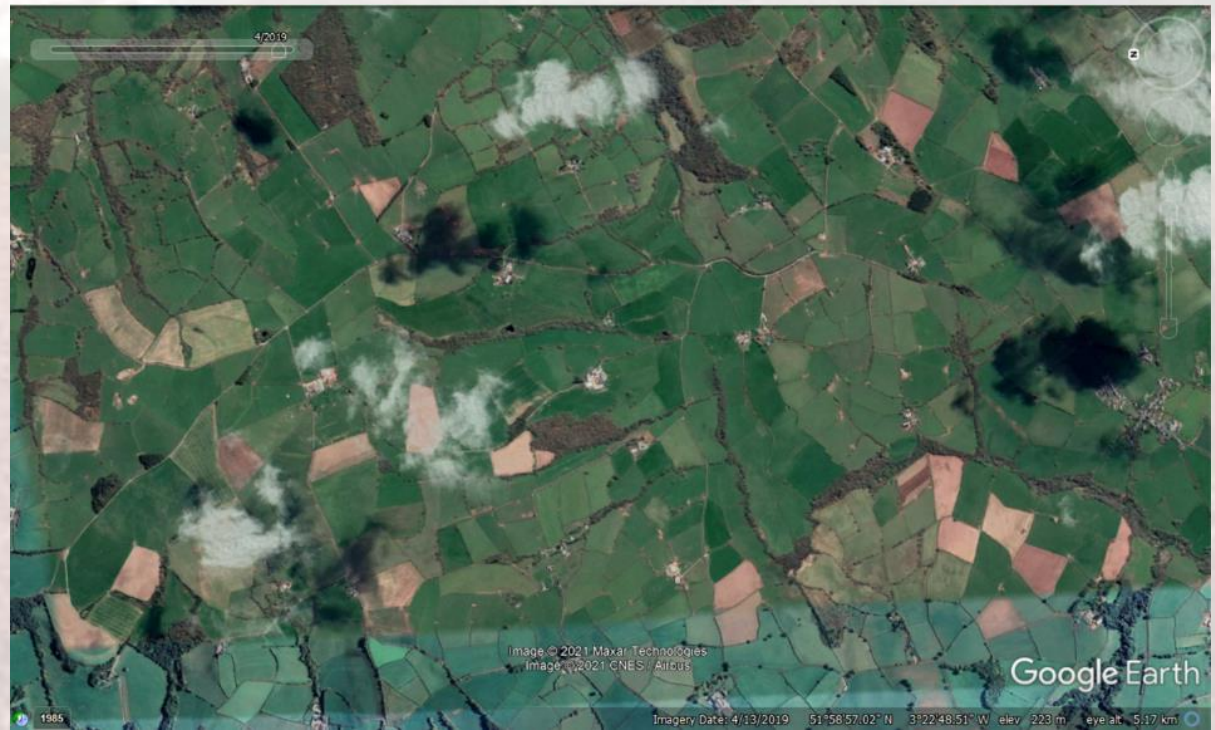


“The natural storage capacity of the soil can be easily lost due to soil compaction resulting from the way land is managed.” Richard Smith



Stubble turnips increase infiltration while the crop is growing but render soils impermeable as and after they are grazed off.

In the Upper Usk stubble turnips have proliferated supported by farming connect advice and Welsh government grants. They are an arable option for grassland farmers in Glas tir).



Flood management

- Big floods are caused by water running off the catchment too fast.
- Heavy rainfall (Rainfall return for recent floods have not been exceptional)
- Water not infiltrating into soil, free draining sloping brown earth soils should be able to take 200mm/day (Storm Dennis was 10-15mm/hr at its peak)
- Water flowing down defined pathways into rivers.

What do we do?

Put in B.M.T.D. and:

- Build new flood defences, make assets and houses more resilient and wait for an even bigger flood (eg Carlise 2005, 2015)

Or...

- Work with landowners, policy makers, stakeholders and natural capital markets at a catchment scale and solve the problem at source by attenuating the flow of water from our catchment into the main stem of the river.



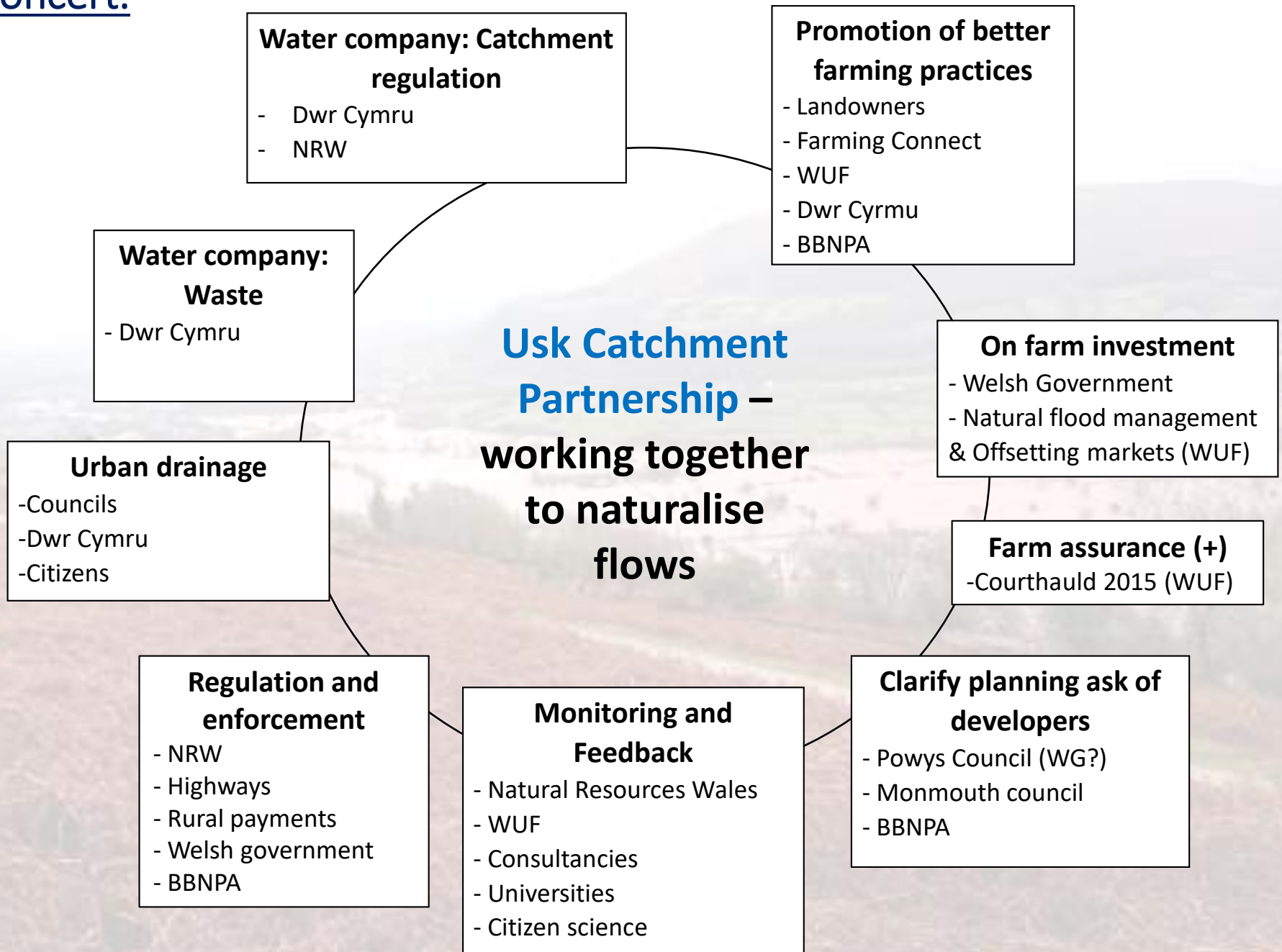
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Where are we?

- 1) Awareness and understanding of problem ✓
- 2) Ground up initiatives ✓
- 3) Multi-partner development ✓
- 4) Policy change
- 5) Support for landowners (natural capital markets)
- 6) Targeted action on the ground using mapping programmes and local knowledge

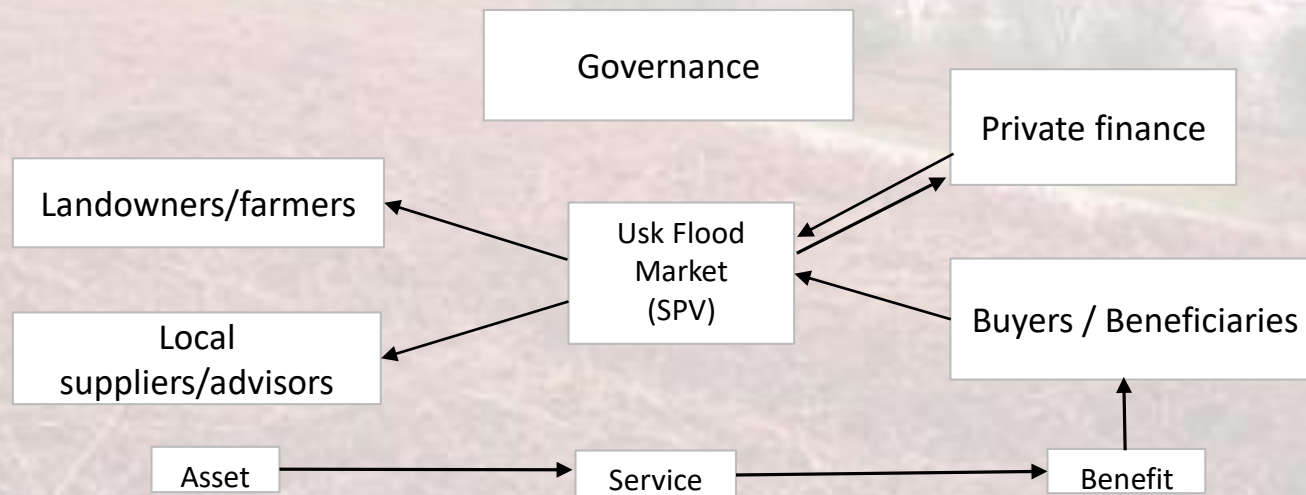
- Usk Rivers
- Usk Stillwaters
- Usk Catchment

Solving 'wicked' problems: Agreeing who does what and working in concert.



WUF's way forward

- Copy the Rivers Trust/Tridios bank river Wyre model.
- Identify the stakeholders who are bearing the cost. (Eg: Highways, Water companies, Insurers, NRW, Councils.....)
- Find the solutions in the landscape through mapping and local knowledge.
- Use private finance to establish market that will allow stakeholders to invest.
- Deliver change on the ground
- Reward farmers who allow water to infiltrate into soils with 10-20year deals
- Within three years aim for 40% + of Upper Usk to be managed in this way
- NB. it is the top metre of the flood that causes the damage



Hope! A maize stubble in the Usk which can absorb 100mm+ of rain over 12 hrs as the soil aware farmer under-sowed the maize, the summer before with support from Muller and Tesco's



Diolch yn wrando: Any Questions?



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An alder carr woodland in The Bettws doing its job



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