



A framework for assessing the potential impact of climate change on groundwater resources in Ireland

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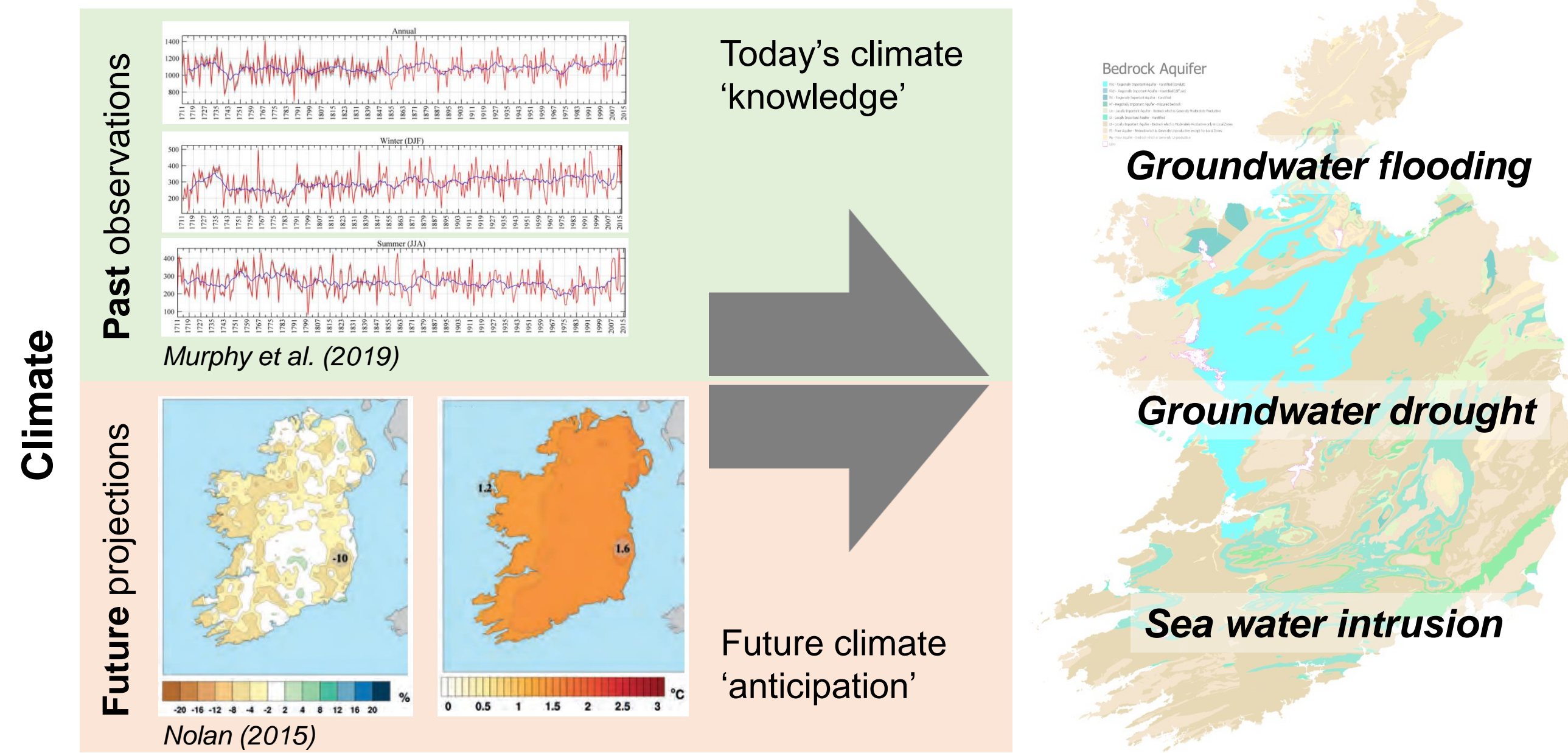
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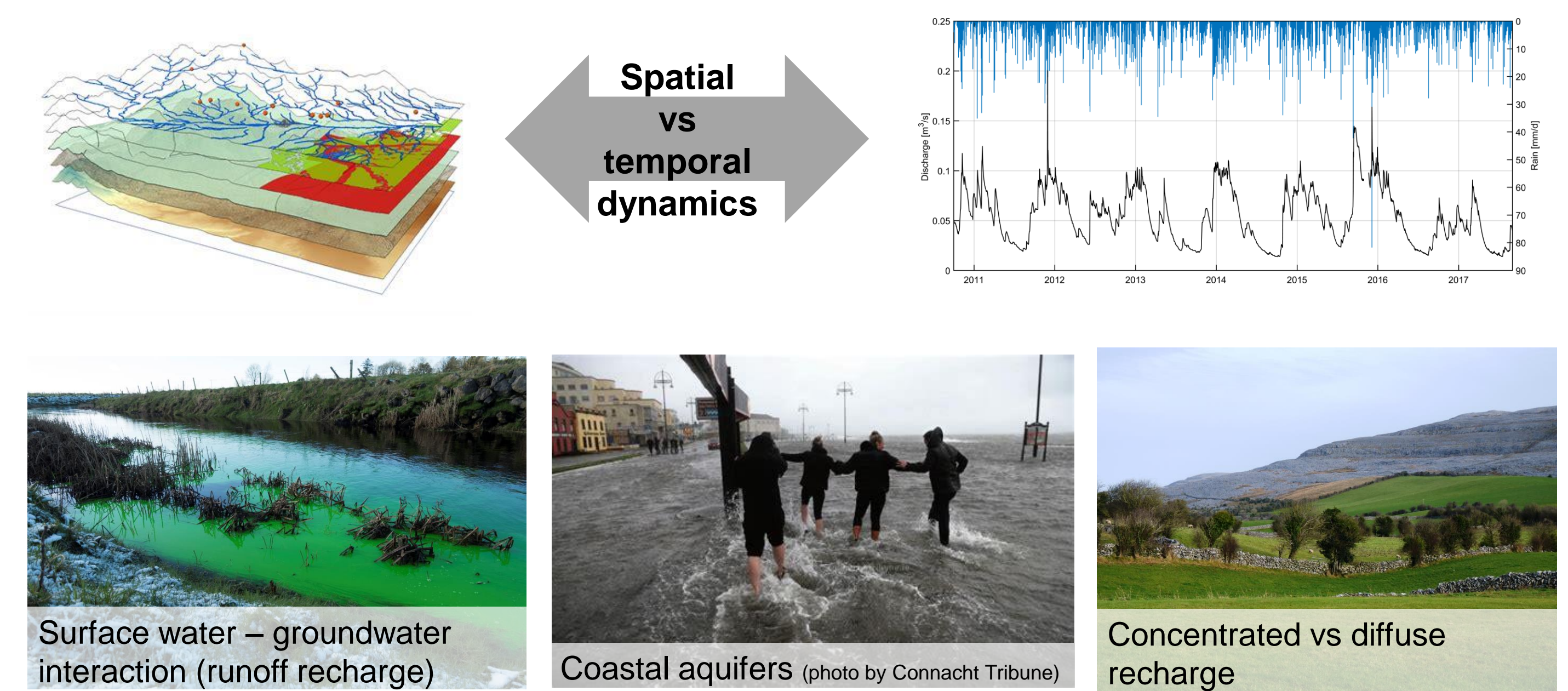
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① Project Rationale: How does future climate impact groundwater?



② Challenge: Impact varies in space and across time scales



③ Multi-Criteria Decision Matrix: Spatio-temporal impact assessment

3.1. Linking time-scale climate (change) dynamic (A.1) with aquifer types (A.2)

A.1. Time-scale dynamic of projected climate dynamics			A.2. Separation of aquifer types	
Climate processes	Time scales	Frequency/intensity/duration	Aquifer types	
Rainfall (→recharge)	Events	Increase Decrease	<i>Fissured</i>	<i>Karst</i>
Runoff (→recharge in karst)	Seasonality		-Poorly productive	-Conduit
Air temperature	≥Annuality		-Locally productive	-Diffuse
Sea (→level/flood)			-Productive	<i>Sand & gravel</i>

3.2. Evaluate the potential relative climate change impact (B.1) (→ aquifer susceptibility to specific climate dynamic)

Exposure + Sensitivity = Potential Impact

B.1. Assess the relative Potential Impact			
Exposure (Recharge coeff.)	Score	Sensitivity (Expert opinion)	Score
Very high (≥85)	5	Very high	5
High (60-80)	4	High	4
Medium (42.5-60)	3	Medium	3
Low (≤22.5-42.5)	2	Low	2
Very Low (≤15)	1	Very Low	1

+ = Impact Score

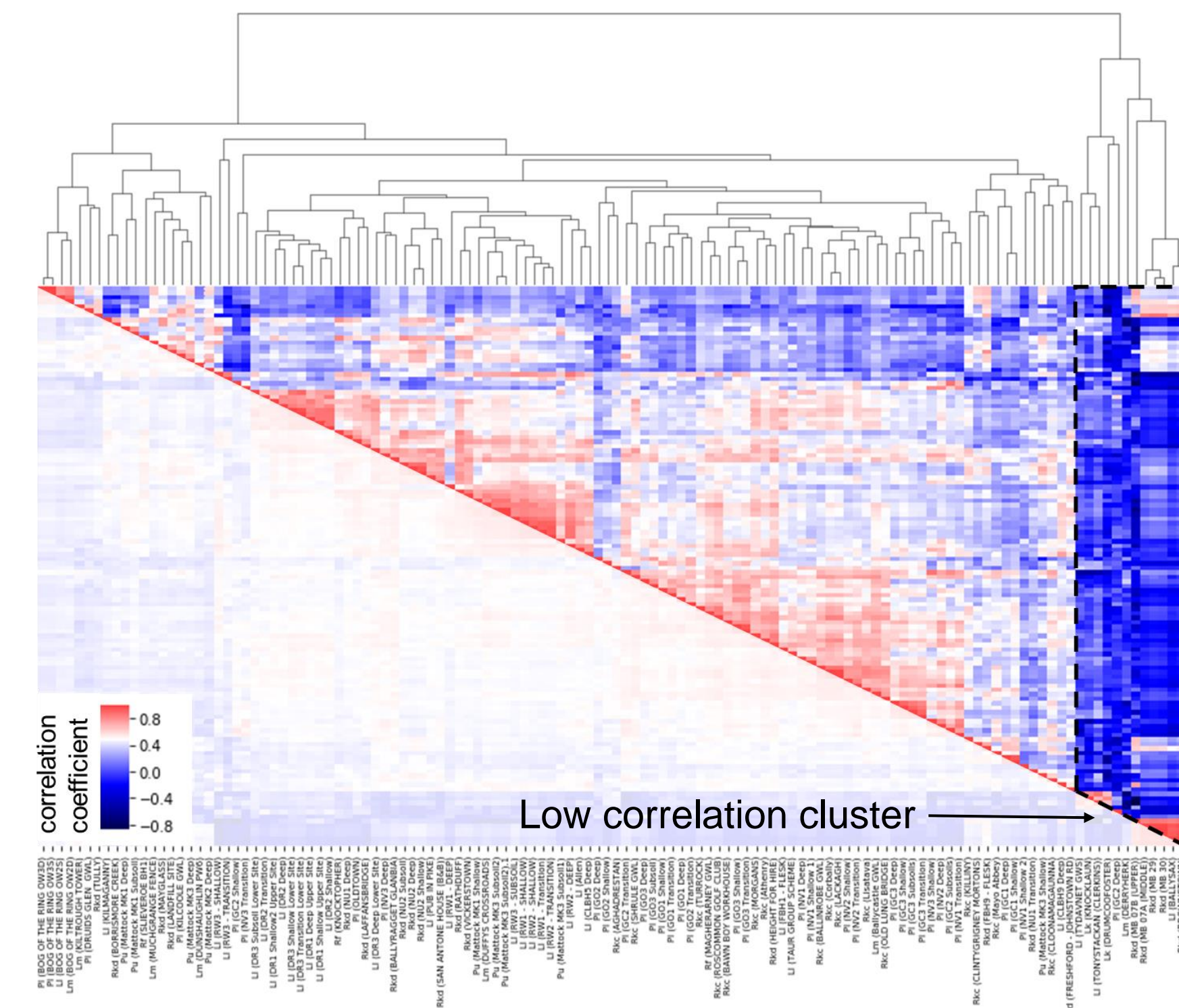
Impact	Score
Very high	9-10
High	7-8
Medium	5-6
Low	3-4
Very Low	2

④ Validation: Compare the estimated impact with the observed hydrology using e.g. the Standardised Groundwater Index (SGI) (Bloomfield et al. 2013)

Assessment of **groundwater drought**.

Correlation matrix and dendrogram of **SGI time series of aquifer types** across Ireland to identify clusters: which aquifers show comparable **responses to climate stress?**

Identification of additional variables that drive groundwater drought, for example, **topography** in relation to streams.



References:

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