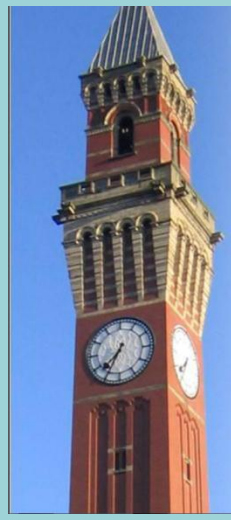

12th British Hydrological Society
National Symposium

BHS 2014

Challenging hydrological theory and practice

Natural, designer or novel river ecosystems in a changing world?

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NATURAL ENVIRONMENT RESEARCH COUNCIL

NERC SCIENCE OF THE ENVIRONMENT

European Commission

2012 Blueprint to Safeguard Europe's Water Resources

Pressure on river ecosystems

- No 1 pressure = dams, land drainage; flood embankments

- No 2 pressure = over-abstraction of water → identification of "**ecological flow**"

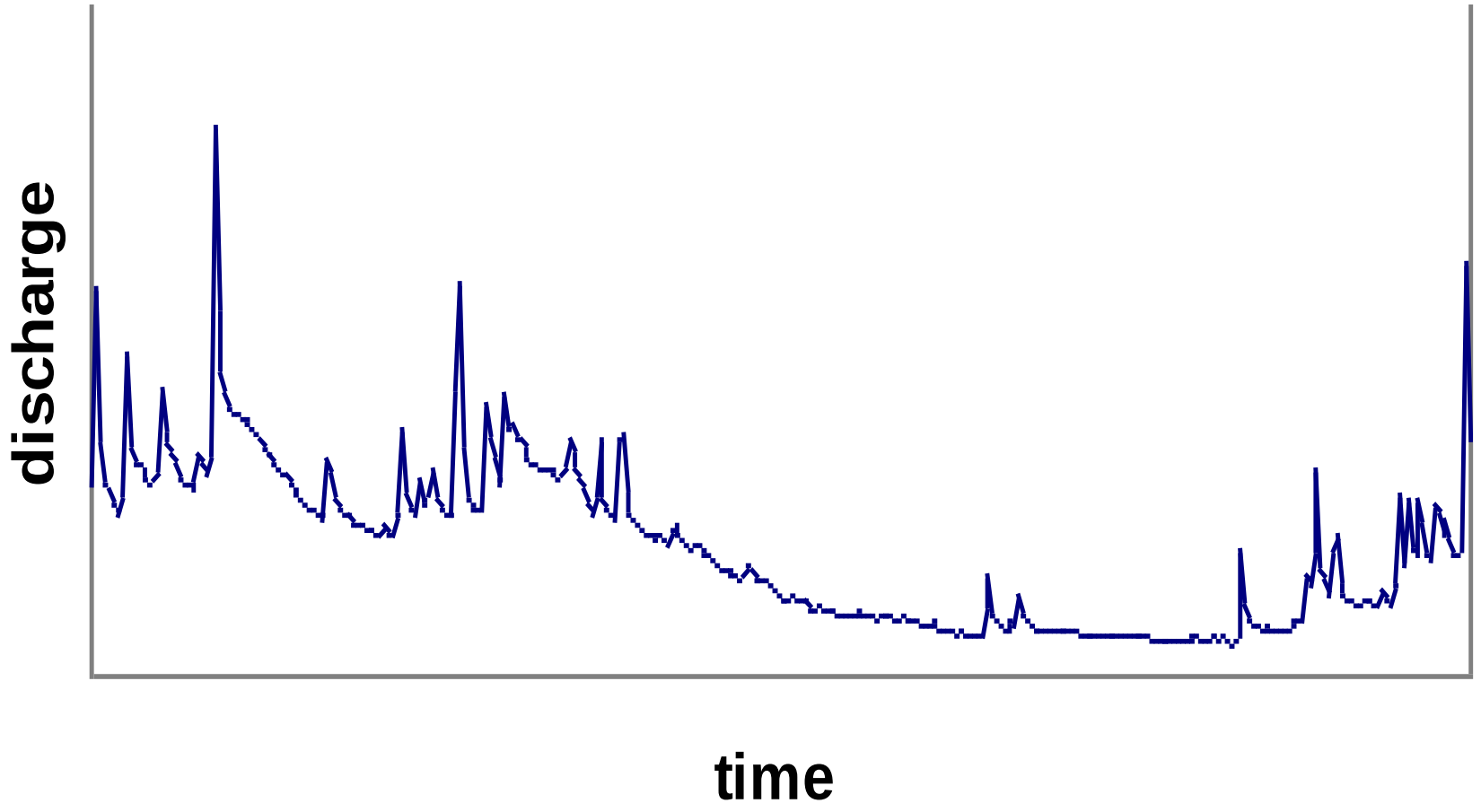
How much water does a river need?

- No single answer
- Over 250 methods
- But many vary similar approaches
- 2 basic types

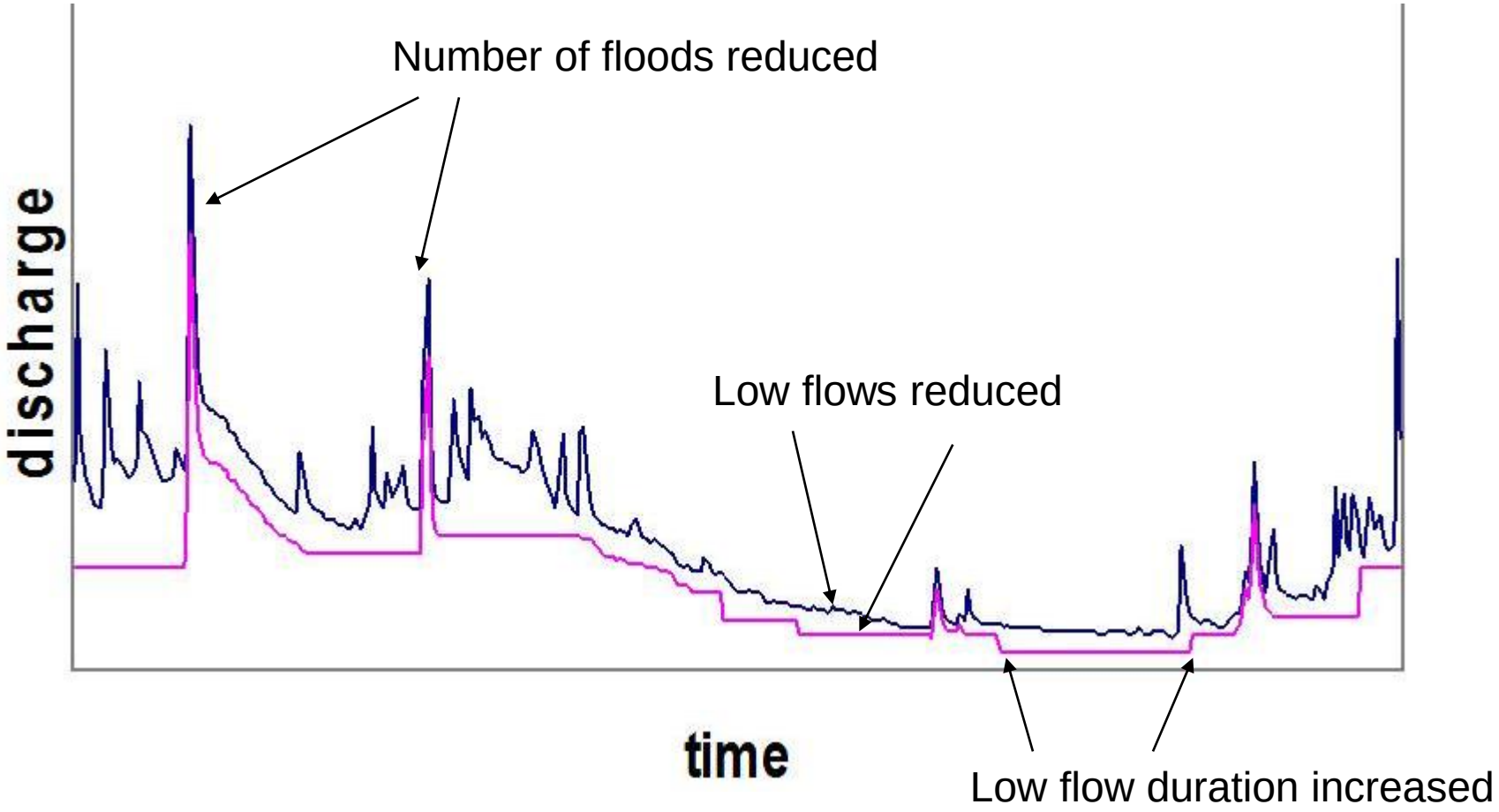
(1) alteration from natural

(2) designer

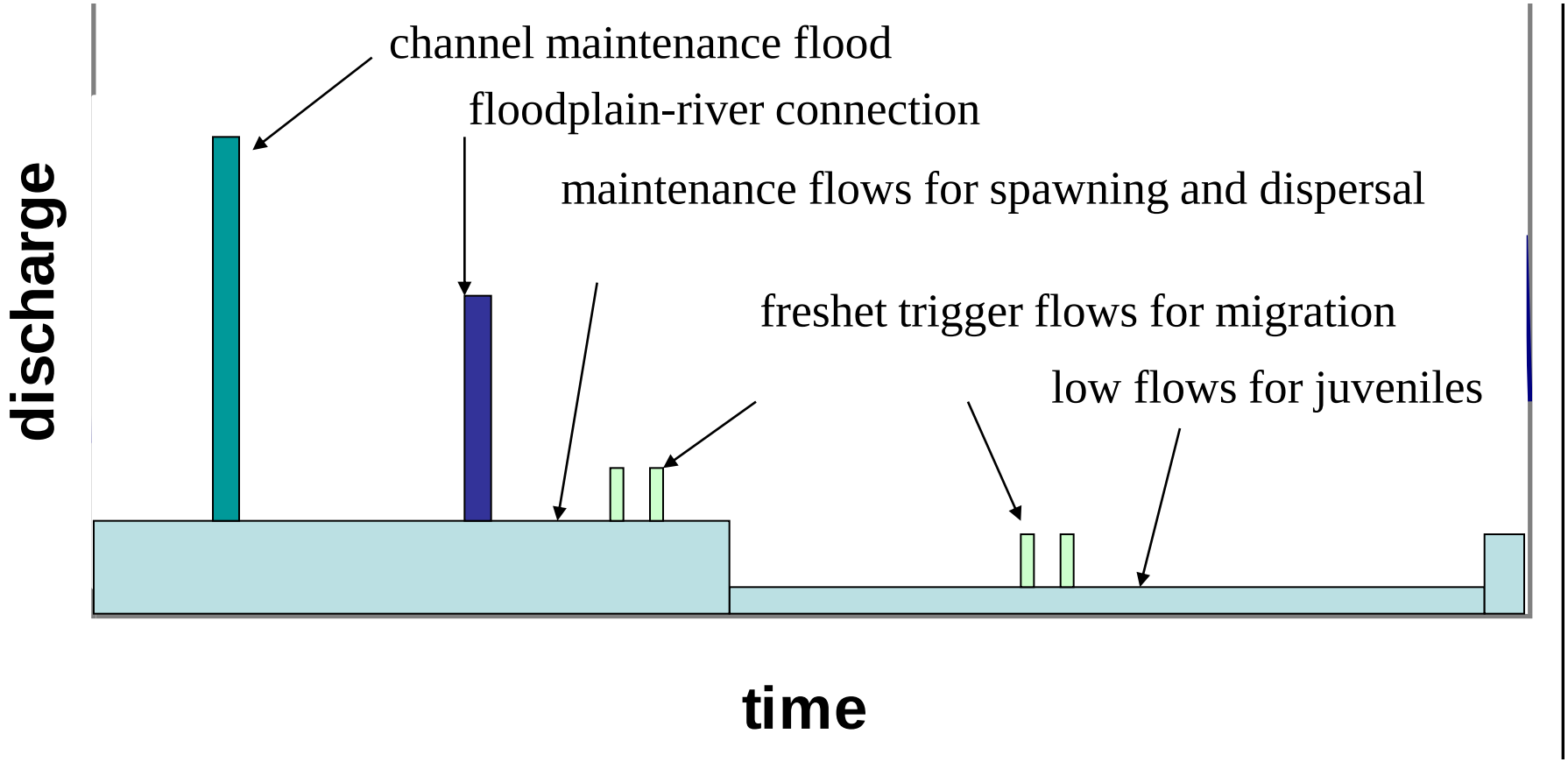
Natural flow paradigm



Compare differences with natural baseline



Designer flow paradigm



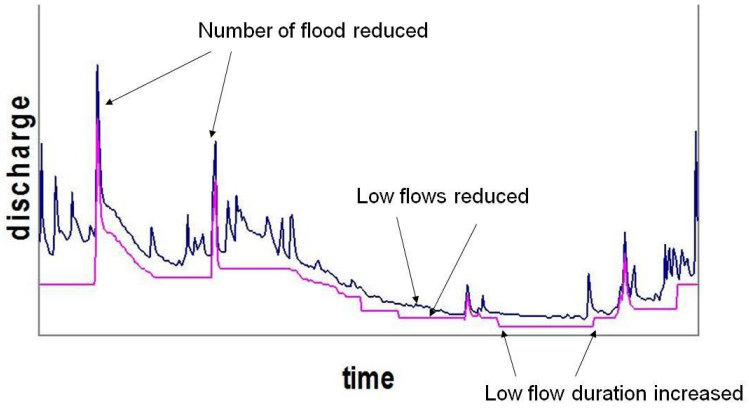
Which paradigm?

Natural flow paradigm

WFD Good Ecological Status

Minor alteration from natural baseline

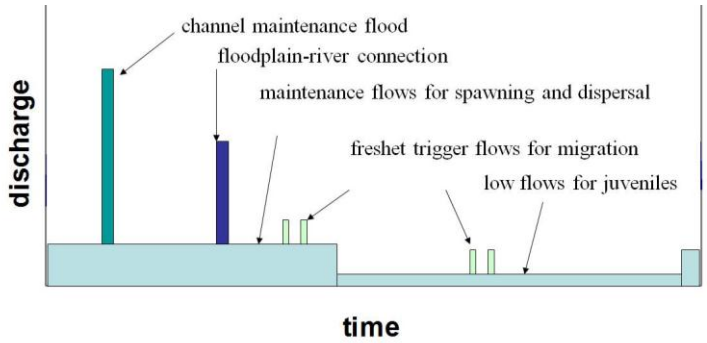
River abstraction



Designer flow paradigm

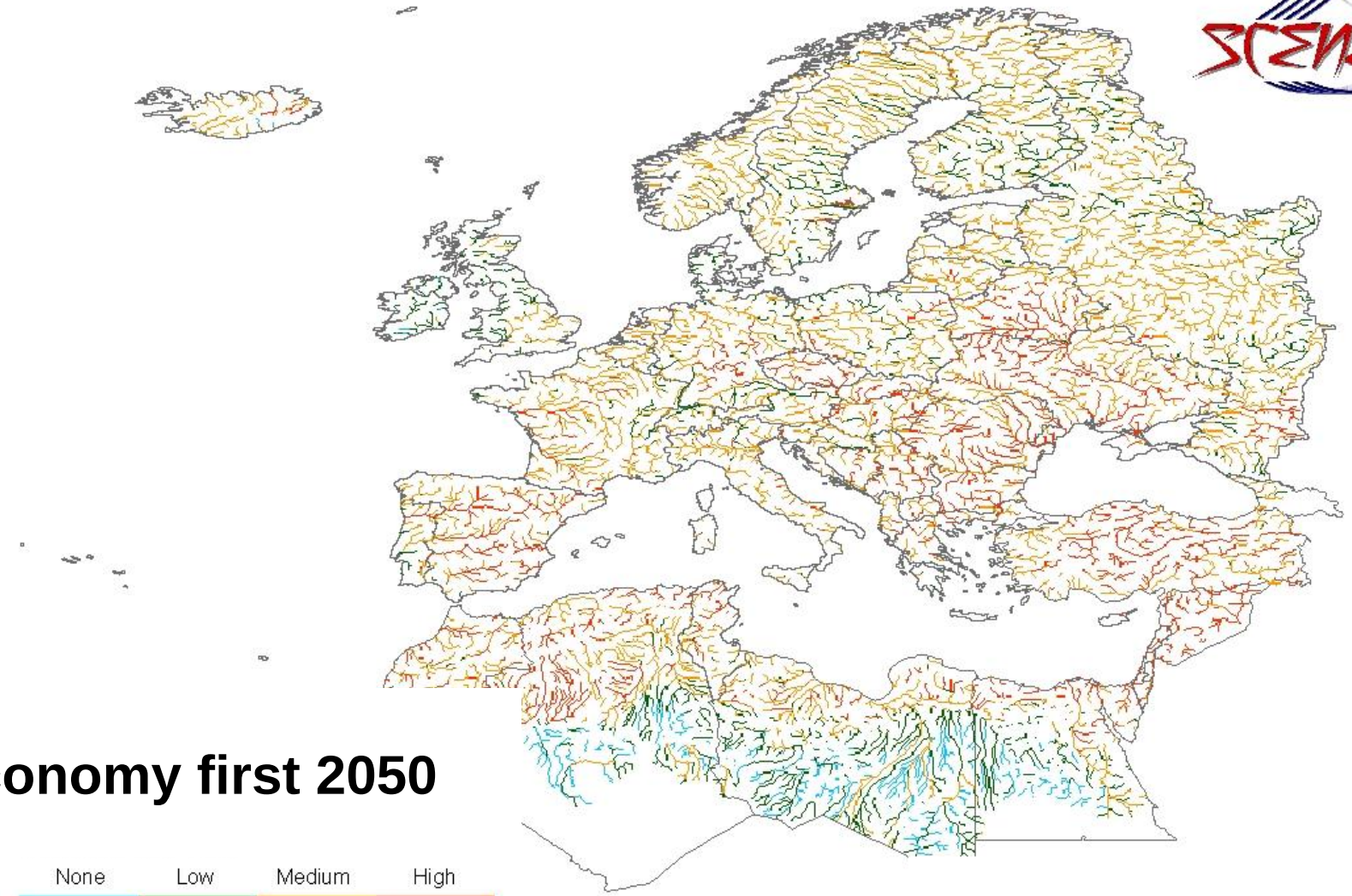
WFD Good Ecological Potential

Dam releases to achieve ‘selected’ ecosystem services



What is feasible in the future?

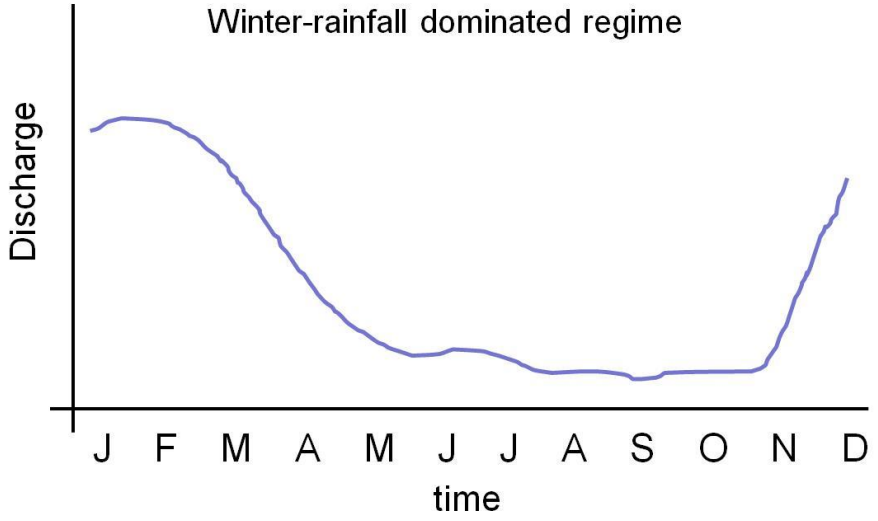
Risk of future ecological change from hydrological alteration

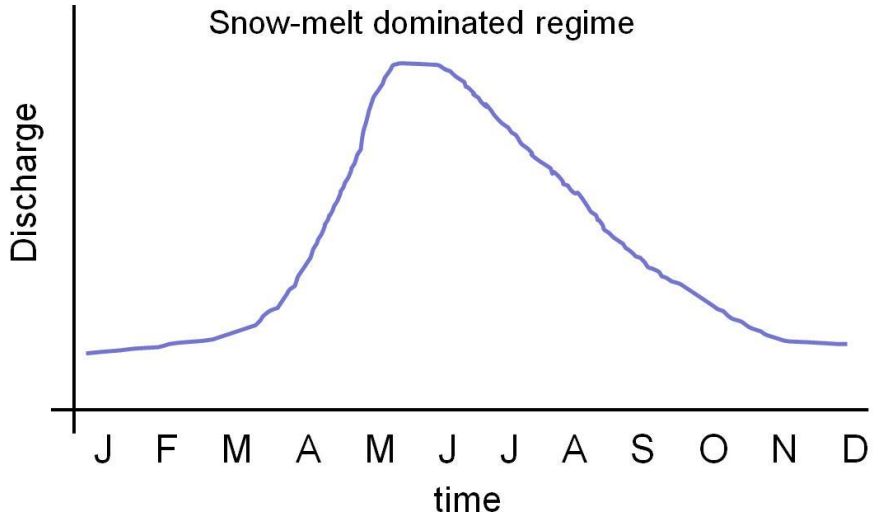


Economy first 2050

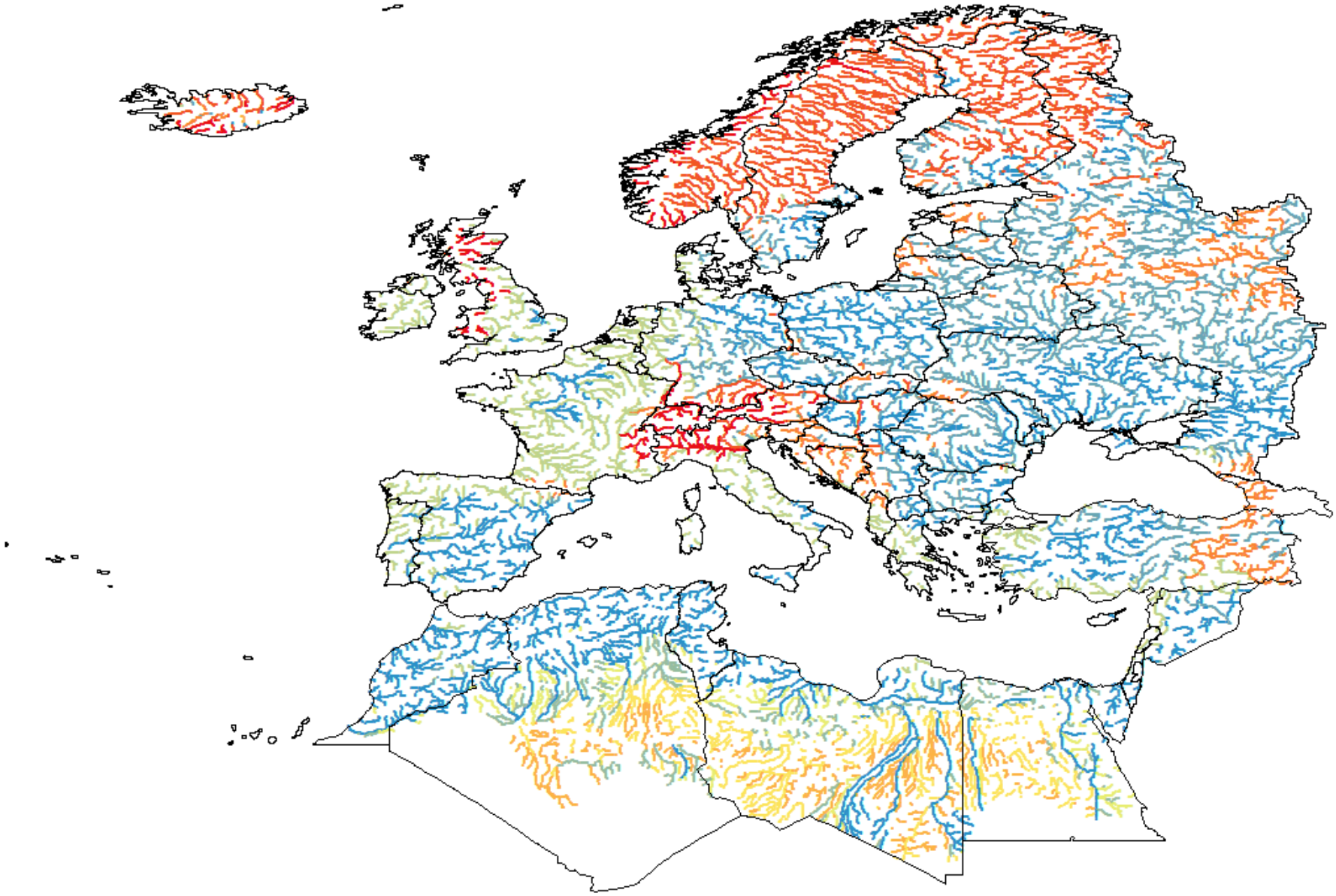
Classification of European eco-hydrological regimes

- Europe has diverse flow regimes
- Classification into 10 types (for current climate)

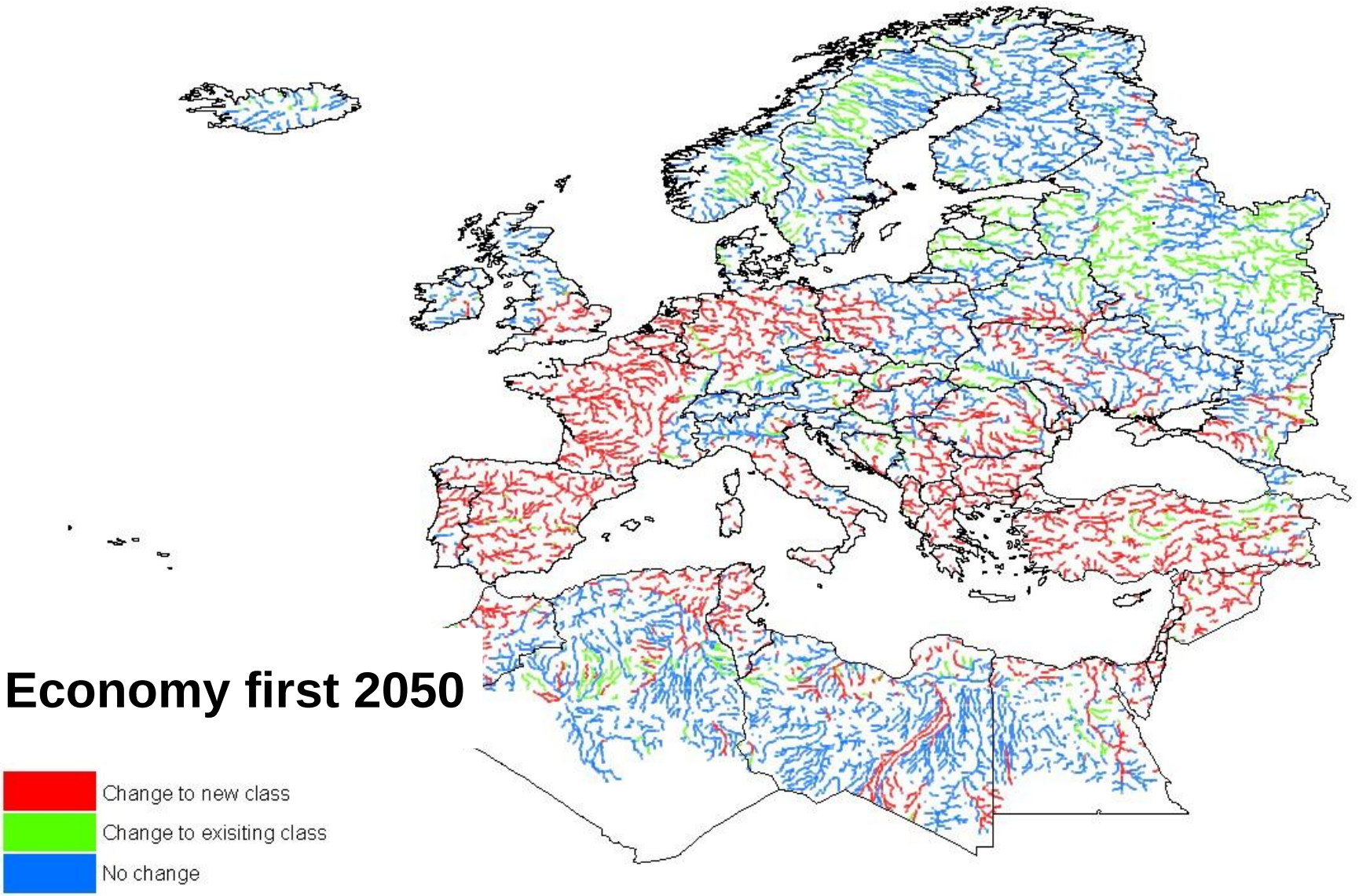




Baseline eco-flow regime classes



Novel river eco-flow regimes



Conclusions

- Desire to maintain and restore natural river ecosystems
- Where flow regimes are altered, designer eco-flows are proposed
- As climate changes and population grows, designer may be the only feasible target
- Novel river ecosystems are likely to emerge