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Peatland Tipping Points

Peatland Tipping Points

Investigating how changes in climate and how we manage land might lead to abrupt changes, or "tipping points", in the benefits that peatlands provide to UK society, to inform management and policy to enhance the resilience of natural systems to future change.

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- Tipping point triggers: How might changes in climate, land use and management trigger regime shifts in blanket peatlands to degraded or alternative states? What biophysical and social factors influence whether these shifts then trigger tipping points in the provision of ecosystem services over space and time?

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- **Tipping point values:** What are the likely ecological, economic, social and cultural impacts of reaching tipping points in the provision of different ecosystem services in blanket peatlands?

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- **Adaptive management:** How might restoration move blanket peatlands from current degraded states to desirable new stable states that can prevent tipping points being reached and adaptively sustain the provision of ecosystem services from peatlands under future climate change?

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2 types of tipping point

- Tipping points between different peatland "steady states" (e.g. from blanket bog to dry heath or bare and eroding peat), triggered by changes in land use/management (e.g. drainage, grazing or burning) in combination with climate change and other drivers

- Tipping points in the provision of ecosystem services arising from these regime shifts.
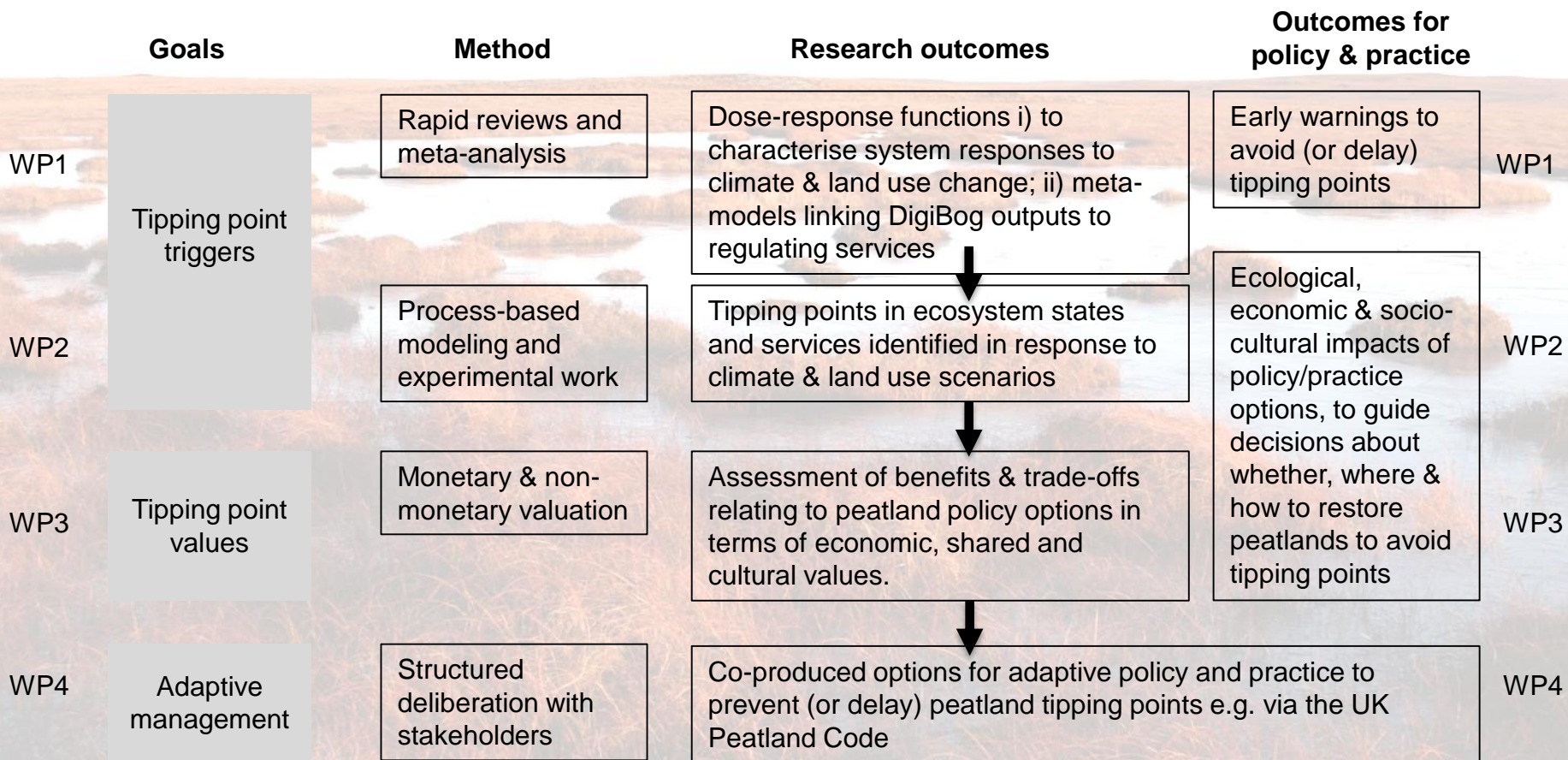
Work Plan

- Rapid reviews and meta-analysis of secondary data in WP1 will be used to develop dose-response functions that can inform how ecological and hydrological processes are treated in a model of peatland development, DigiBog (WP1)

- DigiBog will be used to simulate the impact of predicted climate regimes and land use (arising from different policy scenarios) on peatland carbon balance and peatland hydrological regimes (WP2)

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Work Plan

- Metamodels from WP1 and outputs from DigiBog will be used to derive changes in biodiversity (by modelling a keystone cranefly species *Tipula paludosa*) and a range of ecosystem services under different climatic and policy scenarios (WP2)

- This will enable monetary and non-monetary valuation of ecosystem services derived from DigiBog (WP3)

- Provide evidence that can inform adaptive policy and management (WP4)

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Goals	Method	Research outcomes	Outcomes for policy & practice
WP1 — Tipping point triggers	Rapid reviews and meta-analysis	Dose-response functions i) to characterise system responses to climate & land use change; ii) meta-models linking DigiBog outputs to regulating services	Early warnings to avoid (or delay) tipping points — WP1
WP2 — Tipping point triggers	Process-based modeling and experimental work	Tipping points in ecosystem states and services identified in response to climate & land use scenarios	Ecological, economic & socio-cultural impacts of policy/practice options, to guide decisions about whether, where & how to restore peatlands to avoid tipping points — WP2 / WP3
WP3 — Tipping point values	Monetary & non-monetary valuation	Assessment of benefits & trade-offs relating to peatland policy options in terms of economic, shared and cultural values.	
WP4 — Adaptive management	Structured deliberation with stakeholders	Co-produced options for adaptive policy and practice to prevent (or delay) peatland tipping points e.g. via the UK Peatland Code	WP4

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What difference will we make?

We are working closely with stakeholders to identify options for policy and practice that can cost-effectively protect the natural environment and rural communities in these areas after the UK leaves the European Union.

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Who are we?

The team brings together leading experts from universities and research institutes from across the UK with the British Trust for Ornithology and the International Union for the Conservation of Nature's (IUCN) UK Peatland Programme.