

24th of April 2025

Scottish Fresh Water Group Meeting

RivyEvi

Creating healthy and resilient river systems across Scotland:
prioritising research and development gaps for river
woodlands

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River woodlands in Scotland

Riparian vegetation: a vital elements of healthy and biodiverse rivers.

Scotland Riparian vegetation condition: *(SEPA's 2015/16 morphological surveys of river channels and riparian bank vegetation)*

56% is in poor condition.

11% is in moderate condition.

13% is in good condition.

Increased restoration effort for River woodlands

Project background

Riverwoods evidence review (Ogilvy et al., 2022)

- providing a broad indication of the most up-to-date scientific evidence.
- classify the strength of the evidence based on the quality of studies.

This evidence report identified a number of research and development gaps for river woodland implementation which should be assessed for prioritisation.

River woodland Benefit	Strength of evidence for functions of river woodlands			
	Very strong	Strong	Moderate	Weak
Clean water	Stabilising riverbanks	Controlling nitrogen pollution Controlling phosphorus pollution Controlling excessive algae & periphyton Capturing sediment pollution Capturing pesticides		Capturing pathogens
Conserve Biodiversity & Ecosystems	Supporting aquatic processes	Supporting other species Supporting river hydro-morphological processes and diversity	Providing habitat connectivity & supporting genetic diversity	
Climate action: water stress & drought adaptation		Modifying local climate conditions: shading and cooling air	Modifying local climate conditions: hydraulic lifting	Maintaining water yields & low flows
Climate action: Flood risk alleviation			Slowing the flow Reducing coarse sediment delivery and siltation of channels	
Climate action: Carbon			Carbon sequestration & carbon storage	
Clean air		Capturing air pollutants		
Sustaining soils		Reducing soil loss		Improving soil health
Good human health		Exposure to river woodlands Cooling air		
Wild fish and angling		Regulating local climate through shading	Providing food for fish	Improving habitat for fish with large woody material
Sustain food production		Supporting pollination Providing shelter & shade for livestock	Providing fodder for livestock	
Clean energy Biomass		Provision of biomass for energy		



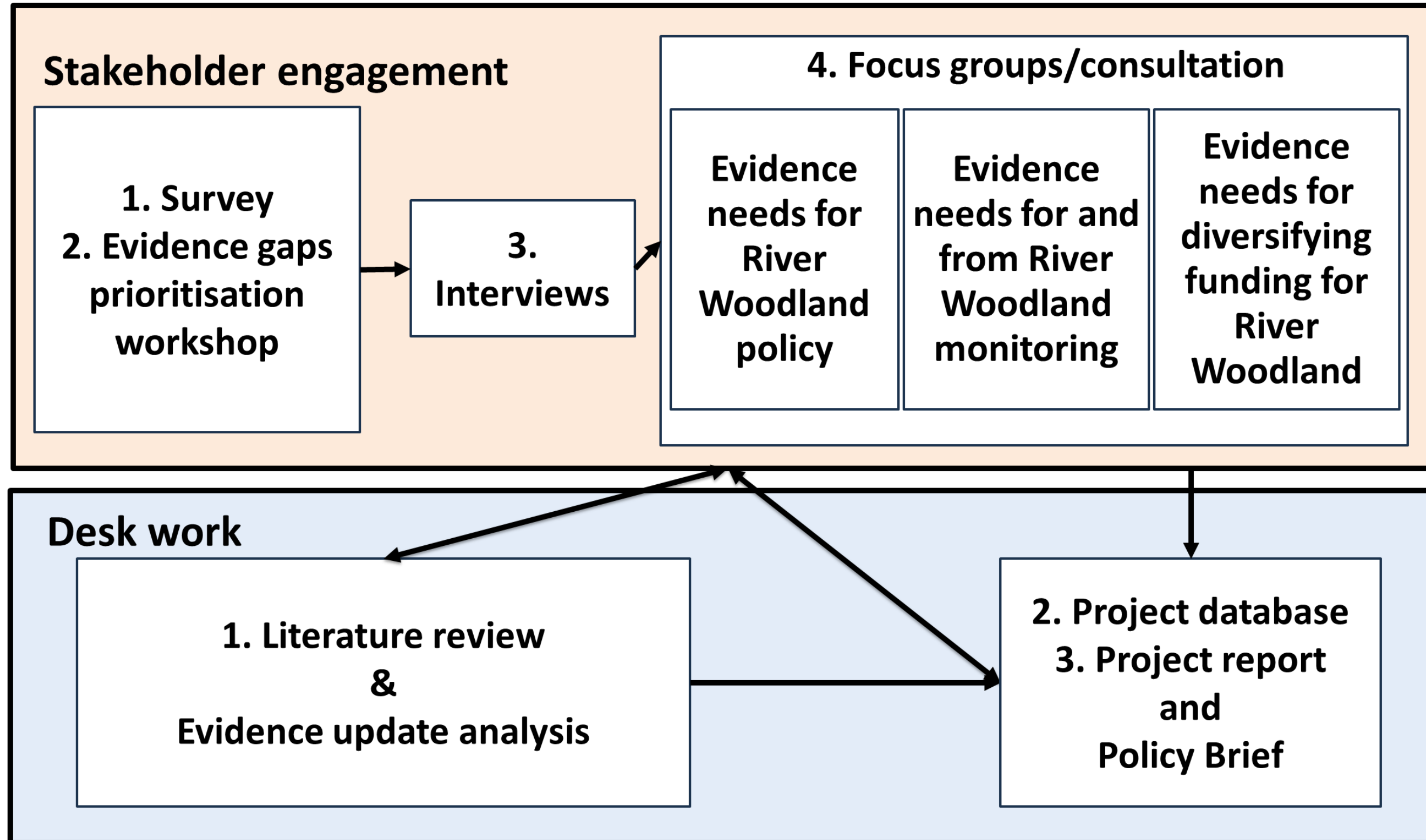


RivyEvi Project aims

Creating healthy and resilient river systems across Scotland: prioritising research and development gap opportunities for river woodlands

- 1) Identify further gaps in the evidence for the multiple benefits provided by river woodlands.**
- 2) Prioritise evidence gaps taking business, policy and projects needs into considerations.**
- 3) Identify opportunities to address these gaps in order to enable investment in new and extended river woodlands.**

Our approach



Publication May
2025 on
[CREW WEBSITE](#)



Participation across activities

	Academia	Private sector	Public sector	Third sector	Total
Directly invited individuals	50	57	97	91	>300
Total individuals engaged*	24	23	36	32	115
Survey	19	9	20	18	66
Workshop	3	3	8	1	15
Interviews	2	6	3	2	13
Policy focus group	0	2	13	8	23
Monitoring focus group	3	2	1	3	9
Diversifying funding consultation	0	3	4	1	8
Other (e.g. email, meetings)	0	3	1	2	6

* Some stakeholders engaged with multiple phases of the research

Participation across activities

	Academia	Private Sector	Public	Third Sector	Total
Directly invited individuals	50				
Total individuals engaged*	24				
Survey	19				
Workshop	3				
Interviews	2				
Policy focus group	0				
Monitoring focus group	3				
Diversifying funding consultation	0				
Other (e.g. email, meetings)	0	3	1	2	6

A wide range of stakeholders & A wide range of topics

- Various expertise
- Various levels of awareness of the different evidence areas and associated literature
- Various perception of importance depending on individual priorities and institutional priorities

* Some stakeholders engaged with multiple phases of the research

Evidence needs as part of the barriers to river woodland restoration

Findings across engagement:

Evidence needs is not a major barrier:

More evidence might help address some of those barriers while other barriers need different interventions

MAIN BARRIERS:

- **Funding, incentives, and resources:** challenges of securing adequate funding, staff, and skills to support RW initiatives.
- **Grazing impacts:** Managing pressures from deer and beavers emerged as a critical ecological barrier.
- **Landowner involvement and social acceptance:** Encouraging landowner participation and fostering community support were recognised as essential for successful RW projects.
- **Practical and policy complexities:** need for clearer policies, including clearly identified areas for RW restoration and coverage targets. Shared ownership of riverbanks, further complicate woodland creation.
- **Collaboration and knowledge sharing:** Greater integration and knowledge and evidence sharing across sectors

The RivyEvi gaps prioritisation

Clean Water & Air

- 1 Headwater status
- 2 Stabilising riverbanks
- 3 Nutrient pollution
- 4 Algal growth
- 5 Pesticide pollution
- 6 Pollution swapping
- 7 Sediment pollution
- 8 Pathogen mitigation
- 17 Air pollution

Drought Mitigation & Adaptation

- 9 Maintaining flows
- 10 Soil moisture
- 11 Tree drought resilience

Soil Health

- 18 Soil health
- 19 Soil loss

Health, Wellbeing, Cultural Heritage & Community

- 27 Mental & physical health
- 28 Cooling air
- 29 NHS economy
- 30 Drinking water
- 40 Local heritage
- 41 Community Perceptions
- 42 Community benefits

Flood Risk Alleviation

- 12 Slowing the flow (RW)
- 13 Reducing sediment (Leaky barriers)
- 14 Slowing the flow (Leaky barriers)

Carbon Storage

- 15 Carbon storage
- 16 GHG emissions

Biodiversity & Ecosystems

- 20 Aquatic processes
- 21 Habitat connectivity & diversity
- 22 Tree structures & species composition
- 23 Herbivore interactions
- 24 Habitat of key species
- 25 Morphological effects
- 26 Species and nutrients

Food & Biomass

- 33 Livestock
- 34 Fodder
- 35 Crop pollination
- 36 Coppice
- 37 Biomass markets

Monitoring

- 38 New technology
- 39 Robustness

Finance

- 43 Incentives & mechanisms
- 31 Food for fish
- 32 Shading
- 44 Invasive species
- 45 Habitat fragmentation
- 46 Plant pathogens
- 47 Human interactions

The RivyEvi gaps prioritisation

Snap Surveys

STEP 1 The RivyEvi survey provided:

- Additional gaps (37 to 47)
- Information on wider priorities and stakeholder concerns
- An initial individual ranking of the gaps with a large range of priority topics: biodiversity, drought, flood, clean water and soils.

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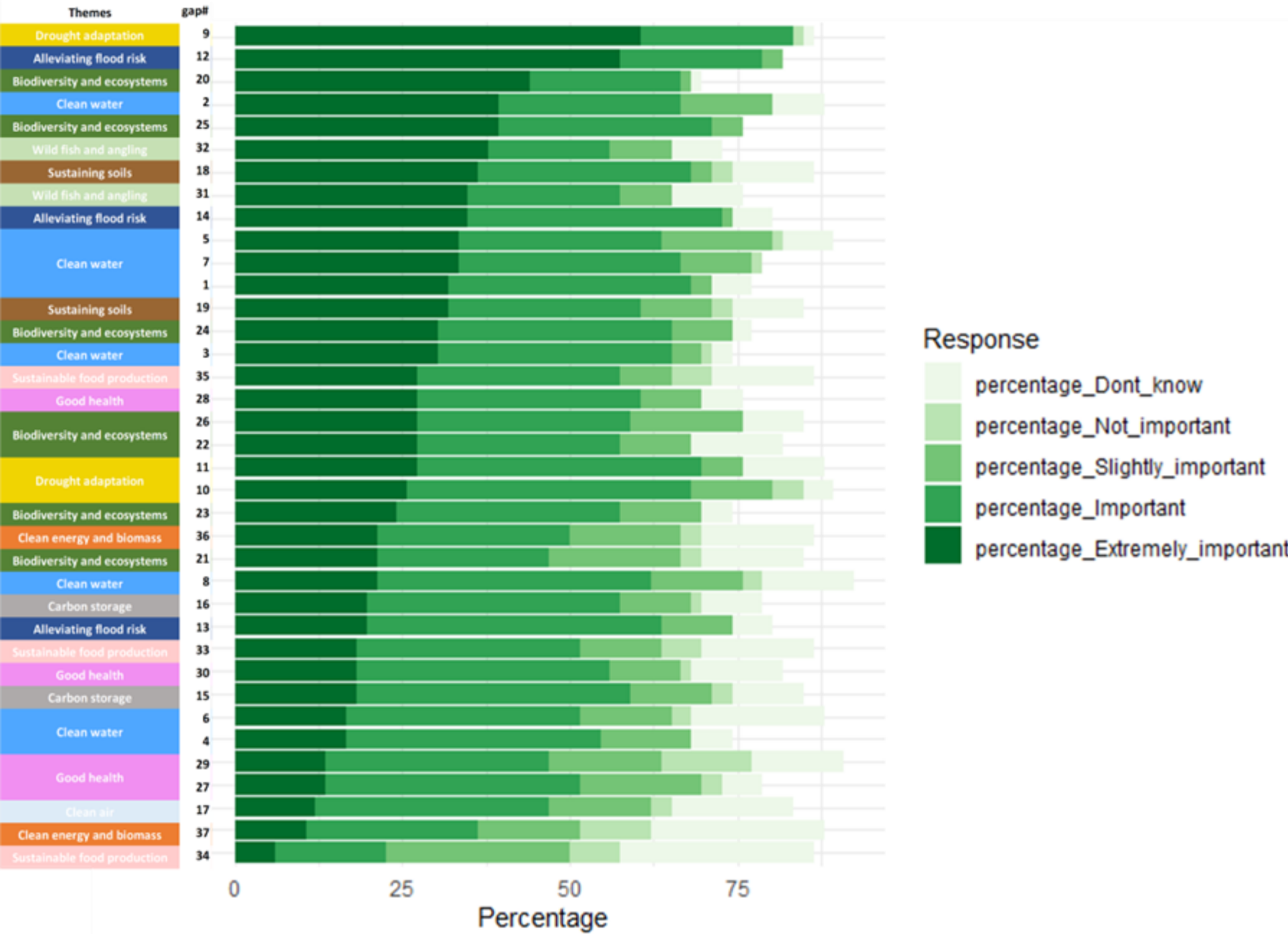
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STEP 2
The RivyEvi workshop provided:

- A second round of ranking of the gaps based on stakeholder discussions.
- The 4 top gaps were the same as the survey:

9	Drought adaptation	River woodlands' contribution to maintaining river flows, especially during dry periods.
12	Alleviating flood risk	The effect of river woodland type, age, placement and scale on mitigating downstream flood risk.
20	Biodiversity and ecosystems	The effect of the expansion of river woodlands on biodiversity.
2	Clean water	The way river woodland types and placement contribute to stabilising river banks and mitigating other sediment sources to streams.

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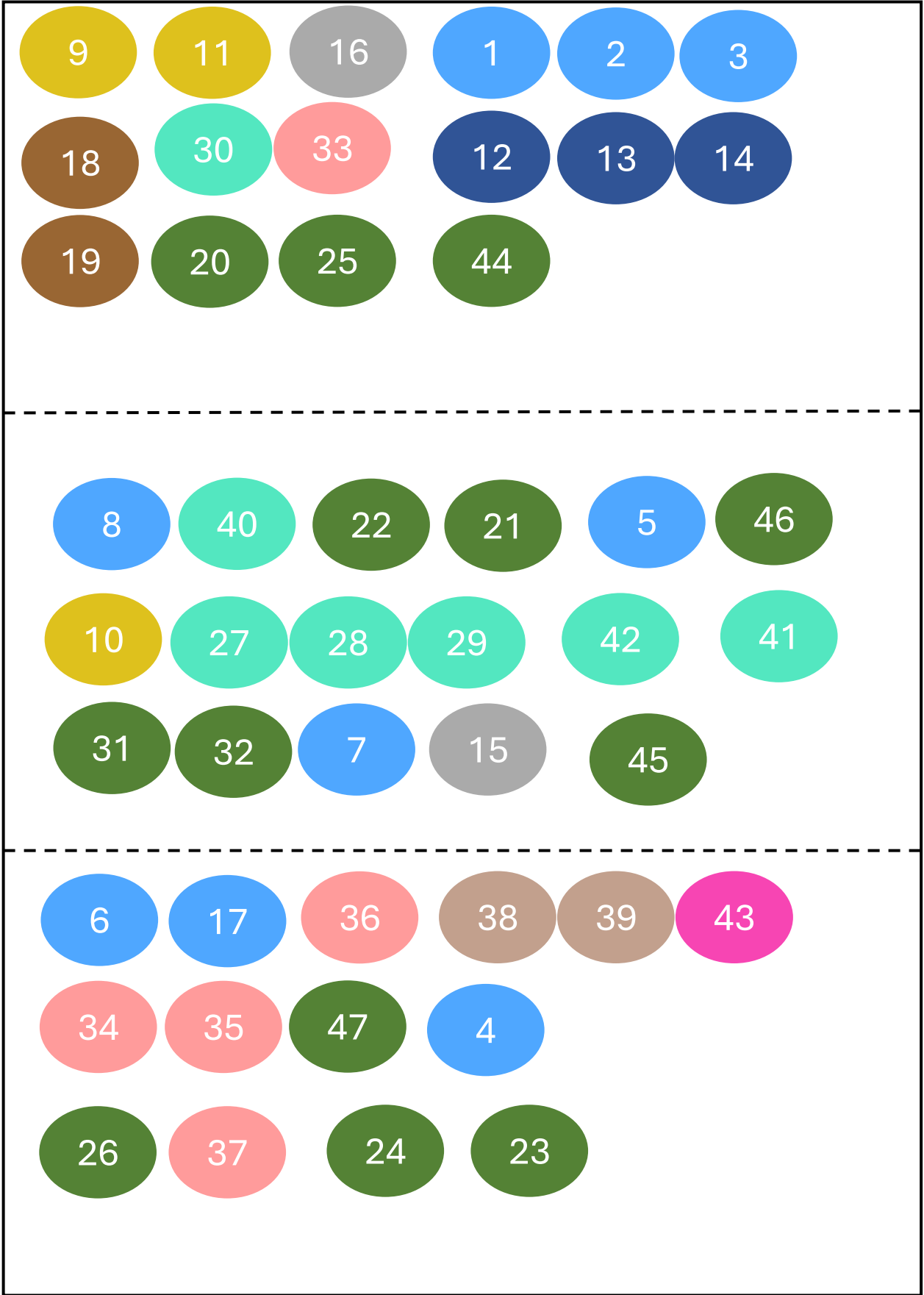
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STEP 2
The RivyEvi workshop provided:

- A second round of ranking of the gaps based on stakeholder discussions.
- The 4 top gaps were the same as the survey:
- Three priority clusters combining the results of the survey and workshop.
- Priority topics and stakeholders for further engagement

Stakeholder Priorities



The RivyEvi gaps prioritisation

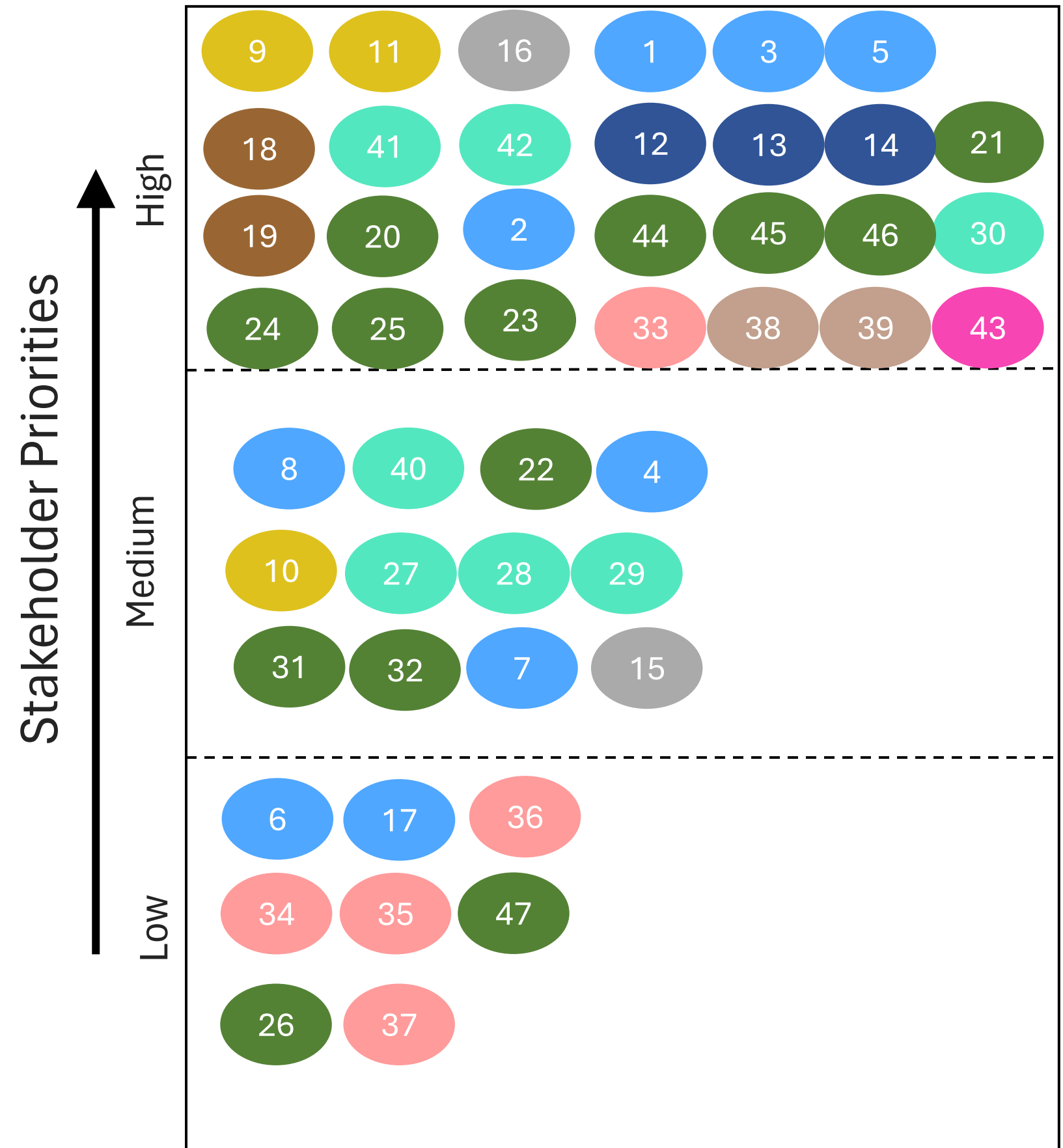
Step 3: Interviews and focus groups

Qualitative engagement: Stakeholder priorities topics without gap statements (inductive approach)

Evidence and tools for optimising tree placement

- Demonstration of overall benefits and a trade-offs: Flood risks and mitigation & Biodiversity
- **Baseline/localised data:** Collecting robust baseline data on water quality, biodiversity to inform tree placement and enable efficient monitoring.
- **Need for monitoring strategies:** Designing monitoring approaches that effectively capture multiple benefits and trade-offs.

* Further detail in our project report appendices on policy, diversifying funding and monitoring



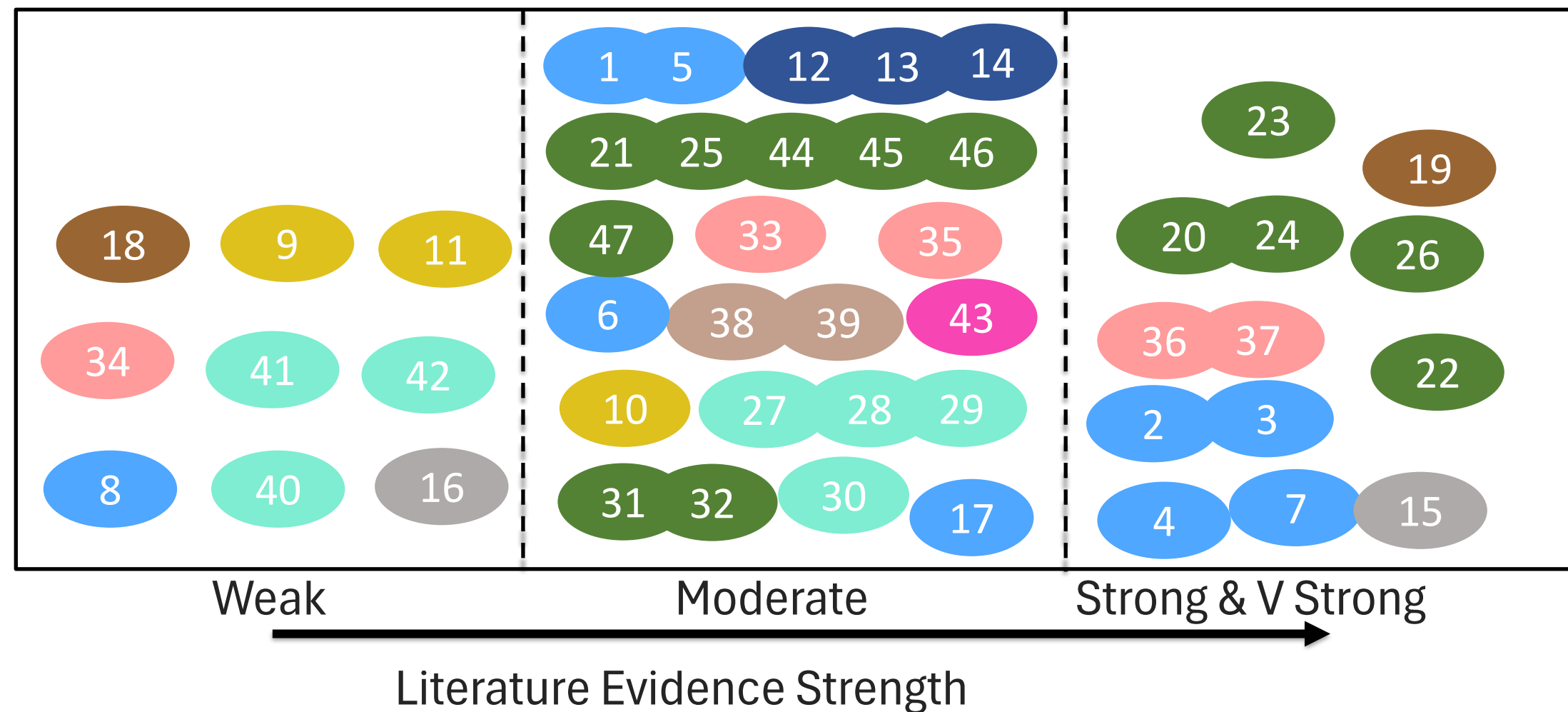
Priority clusters were adjusted →

The RivyEvi gaps prioritisation

Step 4

The updated literature review enabled an update to the strength classification

- Some gaps areas had new literature some didn't
- For some gaps, certain sub-topic emerged specifically through the stakeholder engagement and had little existing evidence which triggered a downgrade.

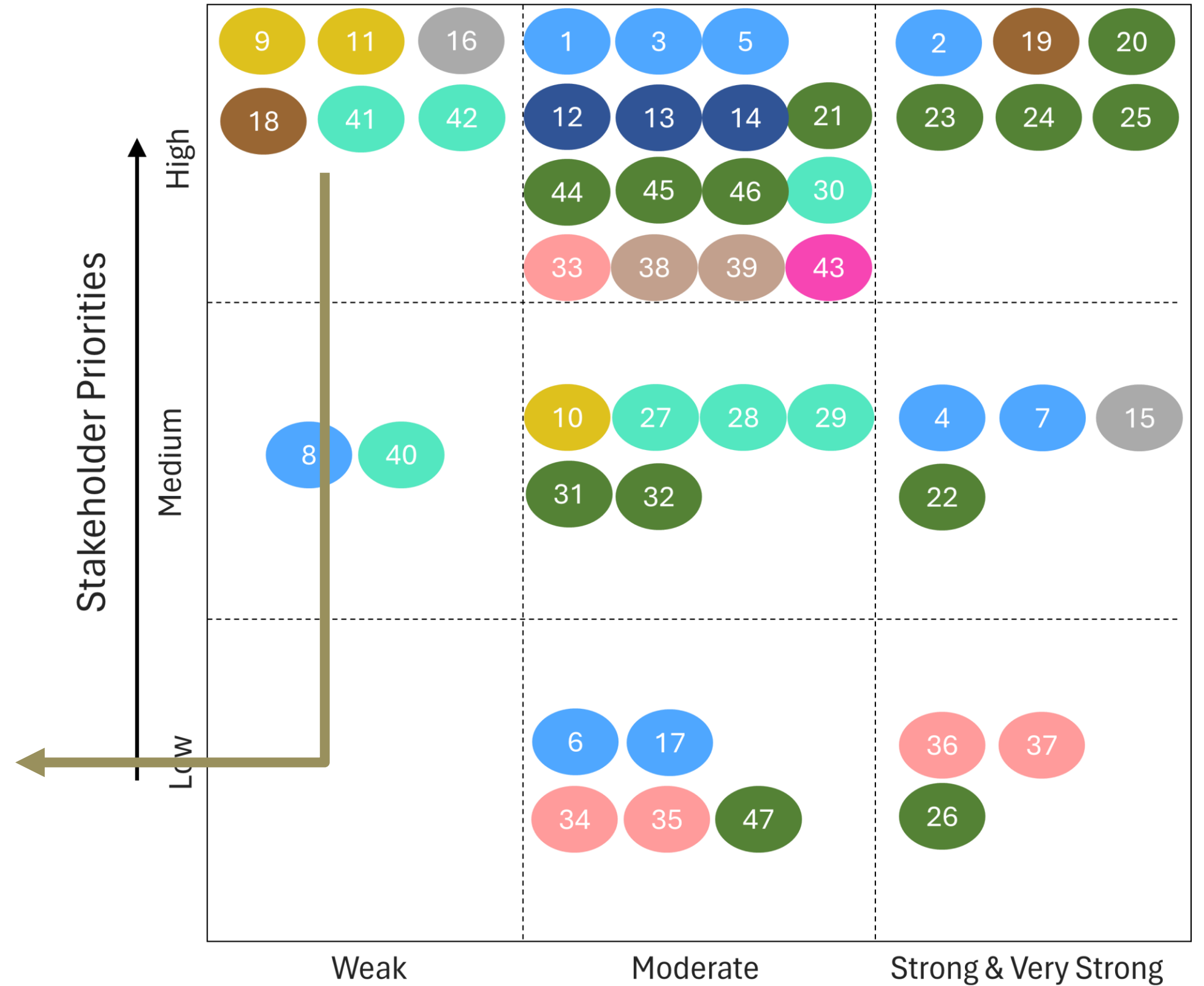


The RivyEvi gaps prioritisation

Step 5

Matrix prioritisation:
Stakeholder priorities against
formal levels of evidence

9 - 11	Drought adaptation	River woodlands' contribution to maintaining river flows, especially during dry periods. Understanding which river woodland tree species can best adapt to drought periods in Scotland.
16	Carbon	The effect of river woodland restoration and creation on greenhouse gas emissions.
41-42	Community and heritage	The understanding of community preferences, social and political perceptions of river woodland restoration
18	Soil health	The effect of river woodlands on soil health and structure, biodiversity, fungi and microbes, soil carbon storage and nutrient cycling.

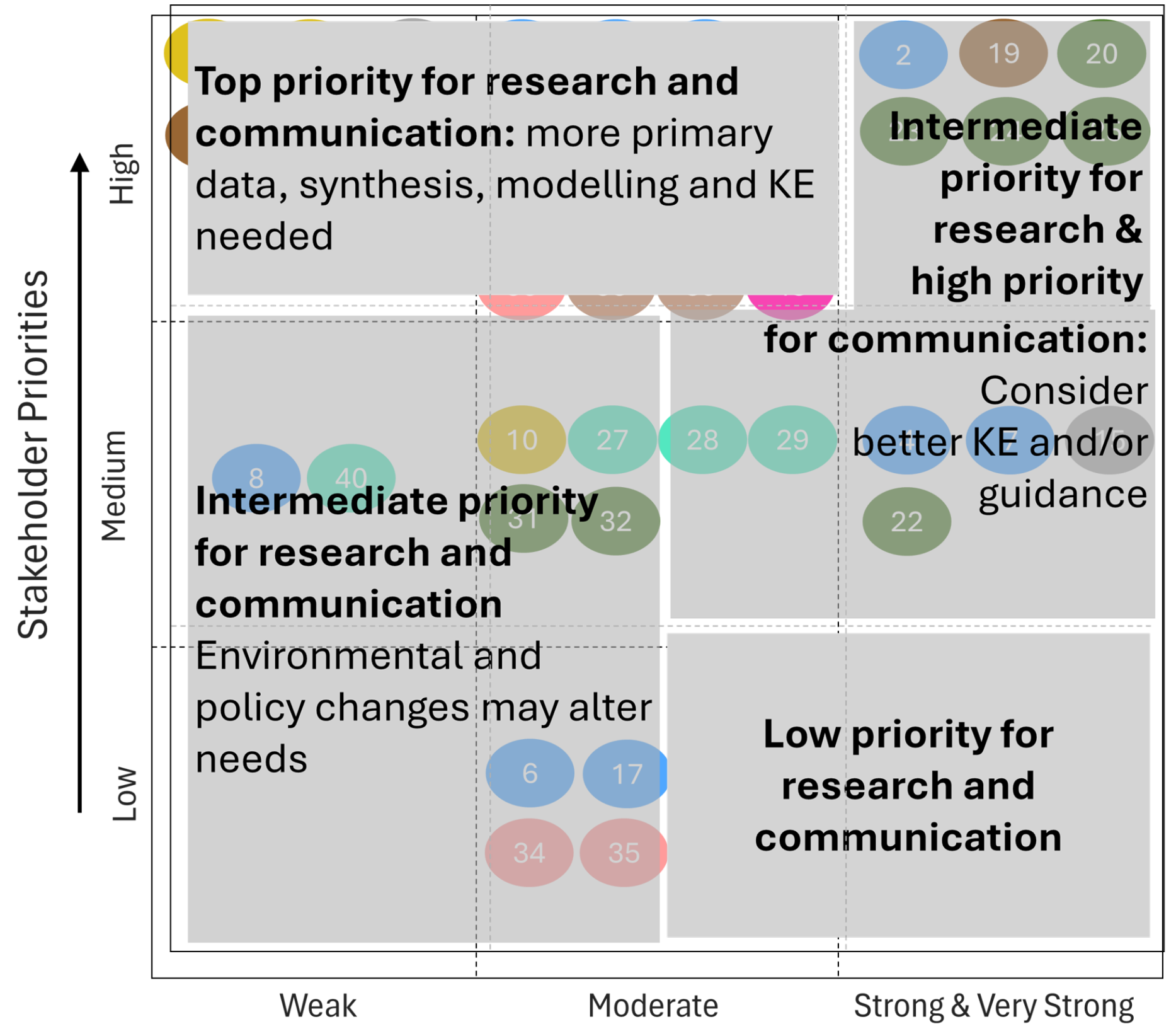


The RivyEvi gaps prioritisation

Step 5

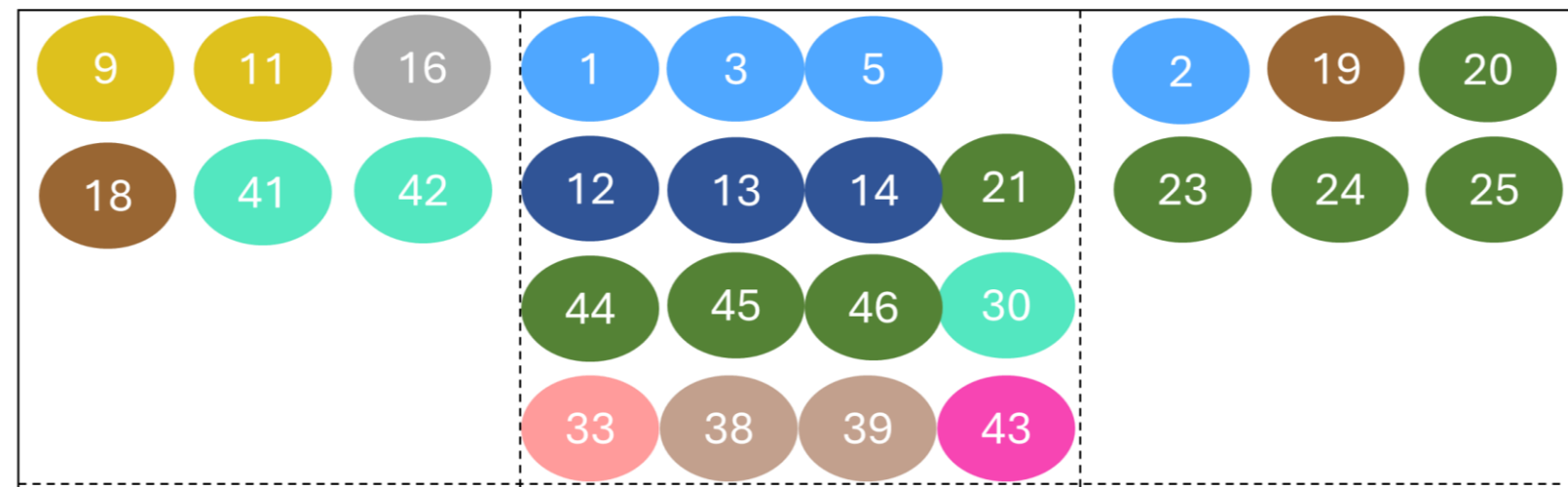
Matrix prioritisation:
Stakeholder priorities against
formal levels of evidence

Highlighting pathways to
address the evidence needs



Key take away points on priority evidence needs

Top priorities



Primary research + integration of evidence + knowledge exchanges

-> tools to inform policy and practice to maximise benefits and reduce unintended outcomes

- Stakeholders support river woodland restoration but face **barriers** (such as limited funding, lack of collaboration, and inconsistent data)
- **Sector specific priorities and wider priorities to consider**
- **Strong scientific evidence** supports benefits for clean water, soil health, biodiversity, but there is a need for better knowledge-sharing and guidance.
- **Primary research needs:** RW placement for water management, drought, carbon, and public attitudes.
- Stakeholders prefer an **integrated approach** that combines evidence across multiple effects, rather than isolated benefits.
- Need for improved management, tree placement, and should be supported by long-term monitoring.

Recommendation topics

(with dedicated reports)

- **Improve Policies for River woodlands** – Align River Woodlands targets with national policies (e.g., biodiversity, climate resilience, and water management) to ensure long-term support and funding.
- **Expand Funding Options** – Develop financial models like carbon markets and green investment strategies to attract private sector support.
- **Strengthen Research & Tools** – Improve monitoring methods, develop tools to optimise RW placement, and support interdisciplinary studies on RW management.
- **Enhance Monitoring Efforts** – Establish long-term monitoring programs using advanced techniques like citizen science, environmental DNA (eDNA), and water sensors.
- **Encourage Collaboration & Knowledge Sharing** – Create national guidance resources, improve coordination across sectors, and promote RW benefits through initiatives like Riverwoods.

Detailed recommendations will be available in our project report

Expected Publication May 2025 on [CREW WEBSITE](#)





THANK YOU

References: Ogilvy, Tanya, Nicola Melville, Roberto Martinez Contributing, Roberto Martinez, Marc Stutter, Iain Sime, Mark Wilkinson, James Morison, Sam Broadmeadow, and Liz O'brien. 2022. "Riverwoods for Scotland Report on Scientific Evidence."

Authors: J. Geris, F. Wartmann, K. Marshall, K. Waylen, S. Cooksley, M. Wilkinson, K. Adams, M. Stutter

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