

2024

Water Climate Discussion RADICAL CHANGE



Report from the discussion
held on 7 November 2024

Edited by:
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Laura Currie

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Welcome

The Water Climate Discussion

creates a space to come together and help the water sector build its leading role in addressing the climate crisis.

This series is the result of collaboration between water institutions who recognise climate change as an existential threat.

This report is based on the [recorded Radical Change 2044 Pre-mortem discussion](#) which was held live on Thursday, 7 November 2024. Our host, Martin Currie, was joined by Stephen Kennedy, Nigel Rumvura, Piers Clark, Mark Smith, Ana Mijic, Daniela Bemfica, Simon Spooner, Tom Williams, Amanda Lake, Laura Rovira Alsina and the interaction of online participants.

The Moderators



Stephen Kennedy
Head of Digital
and Innovation,
MWH Treatment



Ana Mijic
Professor of
Water Systems Integration,
Imperial College



Daniela Bemfica
Director of Strategic
Programmes,
IWA



Simon Spooner
Associate Director,
Atkins



Martin Currie
Founder,
Aqueum, andeye
& AMYBO



Tom Williams
CEO, Enebio Ltd



Amanda Lake
Head of Carbon and
Circular Economy
– Water Europe, Jacobs



Piers Clark
Founder and Chairman,
Isle Group



Laura Rovira Alsina
Post-doctoral researcher,
University of Girona
(UdG)



Mark Smith
Director (Water Sector),
RSK



Agenda

- 1 Welcome and Introduction
- 2 Climate News Update 2044
Retrospective
- 3 Overview of Brainstorming Process
- 4 Presentation of Six Radical Change
Proposals
- 5 Breakout Workshops
- 6 Group Feedback and Take-Home
Messages
- 7 Next Steps



"Water rationing measures introduced by the Government in August will remain in place, with household water usage restricted to 60% and these limits are expected to remain through the winter."

Mark Smith, 2044

"In Shrewsbury, the Severn has again breached its flood barriers, leaving parts of the town centre uninhabitable and underwater. The historic waterfront is facing extensive damage and several businesses are forced to close as water levels have exceeded 6 metres."

Mark Smith, 2044

1. Welcome and Introduction

Martin Currie opened the meeting by welcoming participants and outlining the agenda. He provided a historical overview of the Water Climate Discussion series:

- 2021:** Initiated to unify the water sector's voice ahead of COP26 in Glasgow.
- 2022:** Focused on positive tipping points—small ideas that become transformative when widely adopted.
- 2023:** Emphasised personal action pledges.
- 2024:** Launched a campaign on LinkedIn for radical change proposals, generating significant debate and collaboration.

2. Climate News Update 2044

Mark Smith delivered a sobering climate news update from the 2044 London News Desk:

- **Global Warming:** Reached 2.2°C above pre-industrial levels.
- **Water Shortages:** Severe shortages in London, with reservoir levels at 17% capacity.
- **Flooding:** Western England and Wales experiencing severe floods.
- **Global Impact:** Similar crises in Madrid, Athens, New York City, Jakarta and Dhaka.
- **Urgency:** Highlighted the critical need for accelerated climate adaptation measures.

"Very sobering news. Today, I'm sure, in our minds we're all thinking about, if only we'd done this, if only we'd made that change. And this workshop and the pre-mortem process really uses that power of hindsight that we often have."

Stephen Kennedy, 2044





Food production responsible for 26-34% of global greenhouse gas emissions.

4. Presentation of Six Radical Change Proposals

4.1 Food and Water

Moderators: Martin Currie (presenting), Amanda Lake and Laura Rovira Alsina

- **Proposal:** Transform food systems by promoting sustainable proteins and reducing reliance on livestock farming.
- **Impact:**
 - Addresses 26–34% of global greenhouse gas emissions from food production.
 - Reduces water demand and pollution.
 - Mitigates deforestation and biodiversity loss.

4.2 Sponge Cities

Moderators: Daniela Bemfica (presenting) and Mark Smith

- **Proposal:** Implement urban designs that absorb and reuse rainwater to mitigate flooding.
- **Benefits:**
 - Enhances flood management.
 - Improves water quality and supply.
 - Regulates urban temperatures.
 - Boosts biodiversity and public well-being.

4.3 Reverse Water Cycles

Moderators: Simon Spooner (presenting) and Professor Ana Mijic

- **Proposal:** Re-engineer water systems to take water from downstream sources and supply it upstream.
- **Goals:**
 - Restore and invigorate river ecosystems.
 - Enhance water availability.
 - Utilise renewable energy for water management.

3. Overview of Brainstorming Process

Steve Kennedy explained the workshop methodology:

- **Objective:** A pre-mortem - identify reasons why radical changes proposed in 2024 were not implemented by 2044.
- **Process:**
 - Discuss and list barriers.
 - Prioritise issues based on impact and probability.
 - Develop mitigation strategies and assign proposed owners.
- **Outcome:** Each group would present a two-minute summary of their findings.

4.4 Waterless Sewerage

Moderator: Piers Clark

- **Proposal:** Eliminate water-dependent sewage systems in favour of localised bioresource facilities.
- **Advantages:**
 - Reduces energy consumption in wastewater treatment.
 - Prevents blending of faecal matter with water.
 - Promotes composting and resource recovery.

4.5 Household Water Management Measures

Moderator: Steve Kennedy

- **Proposal:** Implement water efficiency measures at the household level.
- **Strategies:**
 - Remove impermeable surfaces.
 - Disconnect drains from sewage systems.
 - Introduce A-rated utility requirements.
 - Install separate systems for potable and non-potable water.

4.6 Polluter Pays Plus

Moderator: Tom Williams

- **Proposal:** Enforce the "Polluter Pays Plus" principle to hold all polluters accountable.
- **Mechanisms:**
 - Real-time monitoring of pollutants.
 - Trading zones for pollution credits.
 - Improved catchment management.
 - Legal accountability for all sectors, including agriculture and industry.

"The key thing in the UK is that there are 25 million houses, with 1 million sold every year. It would take us 25 years at least, if we change these each time a house is sold, to replumb our housing stock."

Stephen Kennedy

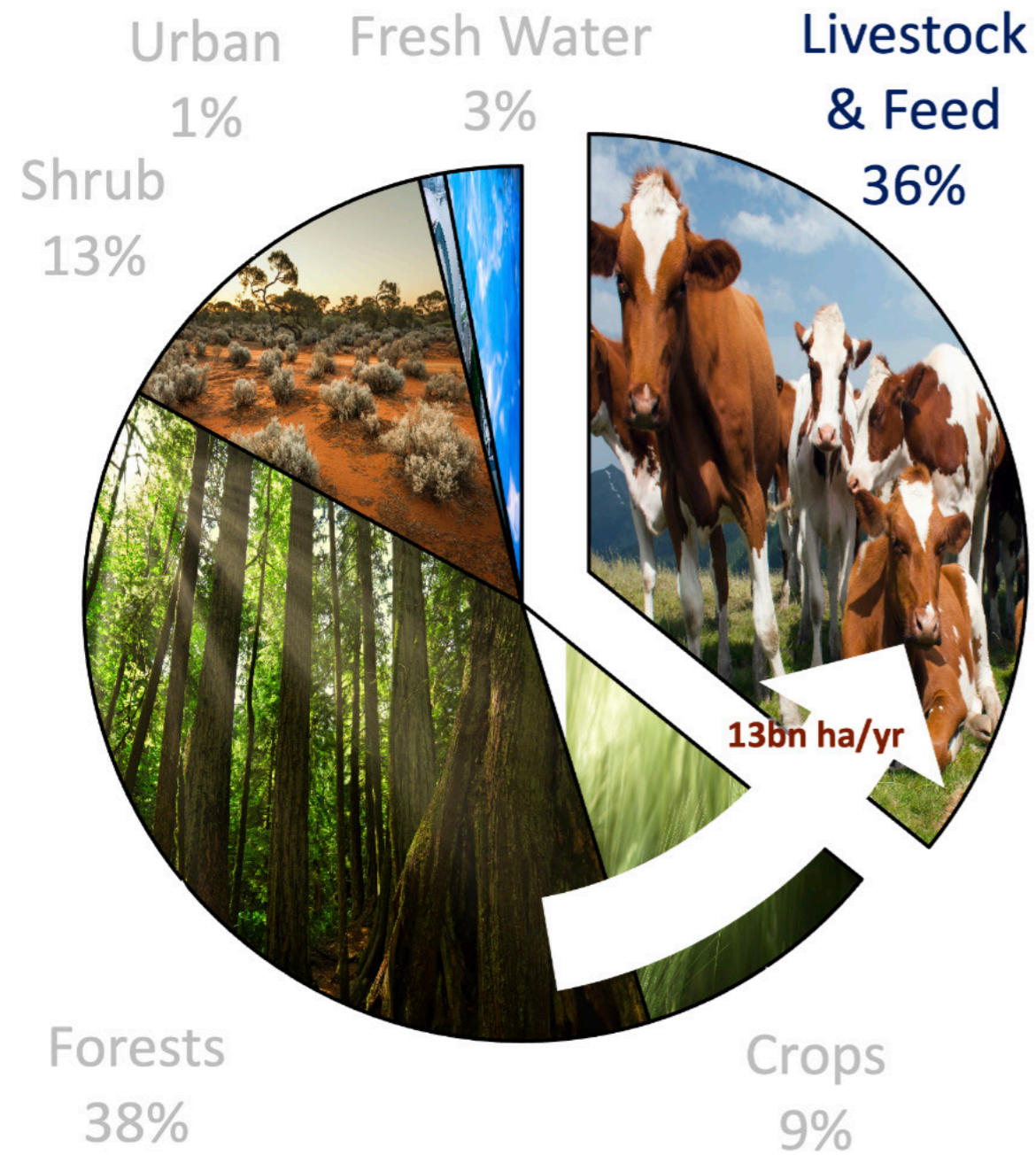
5. Breakout Workshops

Participants joined breakout rooms corresponding to each proposal to:

- **Discuss Barriers:** Identify reasons for non-implementation by 2044.
- **Prioritise Issues:** Vote on the most critical barriers.
- **Develop Action Plans:** Propose mitigation strategies and assign owners.



Flooding



Source: [FAO.org/3/ar591e/ar591e.pdf](https://www.fao.org/3/ar591e/ar591e.pdf)
 Source: ourworldindata.org/global-land-for-agriculture

"Livestock also takes over a third of the planet's habitable land with massive impacts on water and biodiversity."

Martin Currie

6. Group Feedback and Take-Home Messages

6.1 Food and Water - Fixing Food

"Water companies could help support and encourage influencers to tell us what to do without really telling us what to do."

Amanda Lake

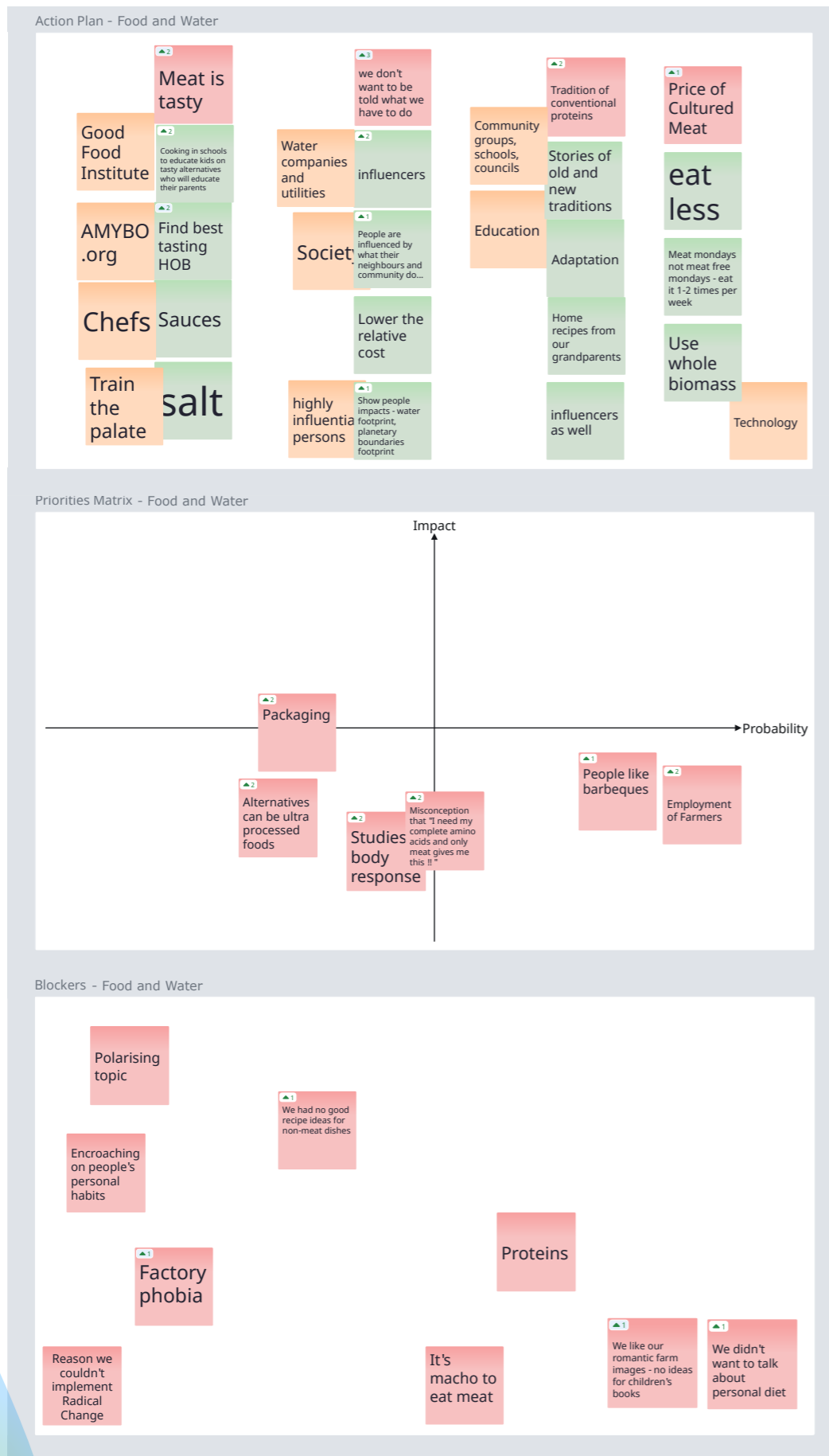
The Food and Water group discussed how changing eating habits could drastically impact both the climate and water systems.

A key challenge identified was that meat is culturally ingrained and highly desired, requiring extensive education to help shift palates towards alternatives. The potential of Hydrogen Oxidising Bacteria (HOB) was highlighted, which needs 90% less water and 95% less land than livestock, making it a powerful alternative.

The discussion emphasised engaging influencers to drive change without seeming authoritarian, making use of whole biomass to improve the efficiency of alternative protein production, and leveraging both storytelling and educational programs to foster new food traditions.

"We need to use whole biomass, not just grow the expensive bits of things, to create more sustainable proteins that can be used in innovative ways."

Amanda Lake



Barriers:

- **Taste Preferences:** Meat is culturally preferred.
- **Resistance to Change:** People dislike being told what to do.
- **Cultural Traditions:** Meat consumption is deeply ingrained.
- **Cost of Alternatives:** Sustainable cultured meats are expensive.

Action Plans:

- **Educate Palates:** Promote cooking classes and culinary education in schools. Produce the best tasting sustainable sauces and healthy flavorants.
- **Find the best tasting HOB:** Hydrogen-oxidising bacteria (HOB) are naturally occurring bacteria. They are ~70% protein with a complete amino acid profile. They only require renewable energy, carbon dioxide and trace minerals and can be grown in bioreactors taking an extremely small footprint. Help UdG and AMYBO.org in their search for the best tasting strains and optimal means of cultivation.
- **Engage Influencers:** Use social media and public figures to advocate for change. Engage with more creative ways of educating people, but get the word out about the impacts of food on the climate, but especially on water footprint, etc.
- **Lower Costs:** Increase investment in alternative protein technologies to reduce prices. As long as they believe they are as nutritious and taste as good, the majority of people will naturally select lower cost options.
- **Promote New Traditions:** Share stories and recipes that emphasise plant-based diets. Switch from Meat-free Mondays to Meat Mondays.
- **Eat Less:** Most of us eat too much anyway. Eating less is better for our health and the environment.
- **Use Whole Biomass:** Rather than expensive cultured meats that require significant processing, or plants and animals where only part of the product is eaten, use whole biomass proteins where the entire organism is food, for example Spirulina and HOB.

Proposed Owners: Chefs, influencers, technology developers, educational institutions, GFI, AMYBO, the water sector.

"Hydrogen oxidising bacteria require 90% less water, over 95% less land, and produce over 90% less pollution than livestock."

Martin Currie

Left: Whiteboard from Food and Water break out group. Potential Blockers to progress were brainstormed (bottom); highest voted ideas were moved to the Priorities Matrix (middle) and ideas in the high impact, high probability quadrant were moved to the Action Plan (top).



Green building.

6.2 Sponge Cities

"The concept of Sponge Cities is still very foreign to many. We need to not only implement but also help people understand the immense benefits, even if the costs initially seem higher."

Daniela Bemfica

The Sponge Cities group focused on transforming urban areas to enhance climate resilience through increased infiltration and improved water quality.

Implementing sponge cities in already densely populated urban areas poses a major challenge, requiring new legislation and complex retrofitting. Concerns also emerged around higher maintenance costs and the required mindset shift from traditional urban maintenance to managing green spaces.

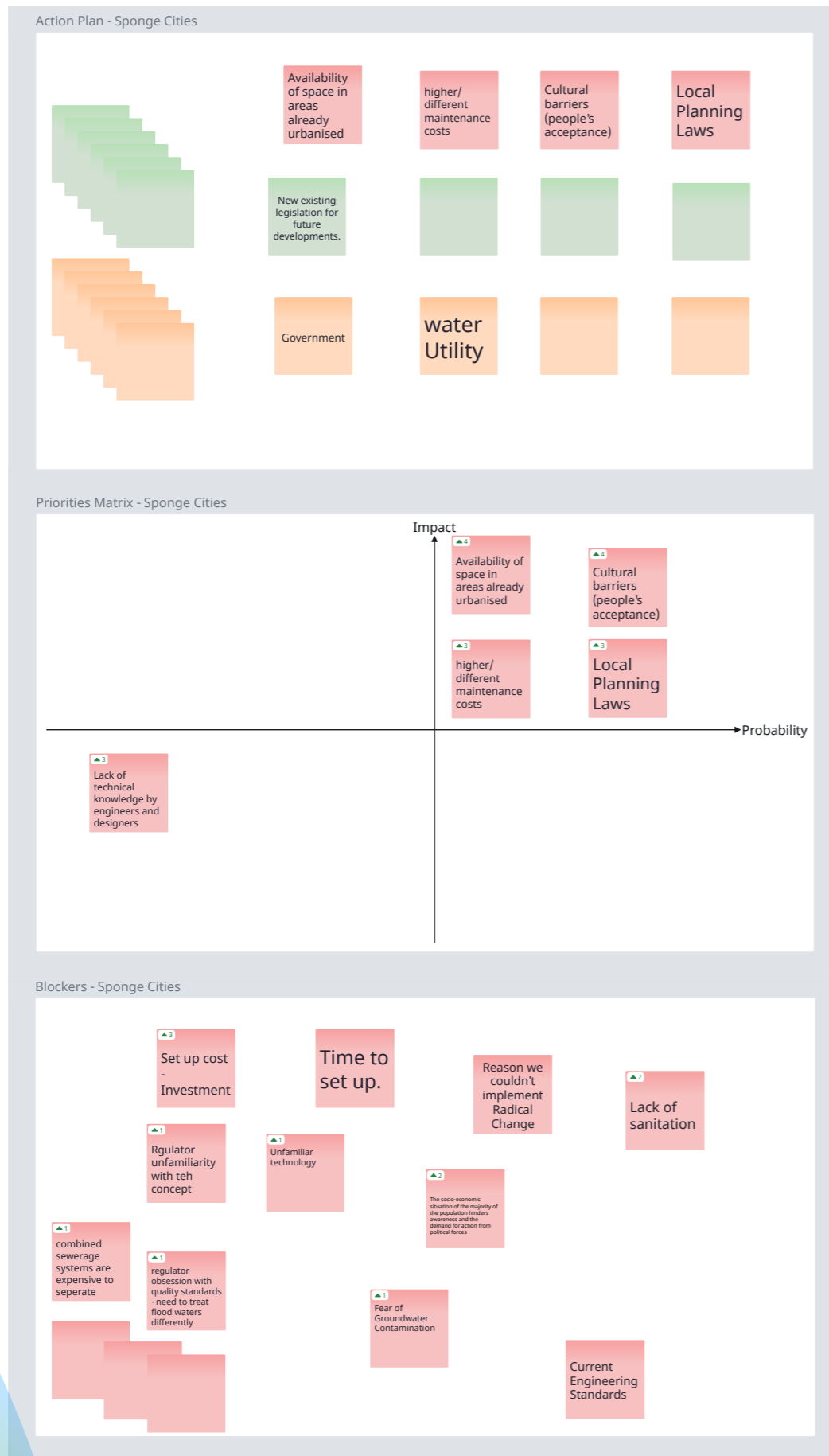
Advocacy campaigns were suggested as essential to help residents understand and appreciate the benefits of nature-based water management solutions. Participants also highlighted technical obstacles like mosquito proliferation in warmer climates, which would require targeted solutions.

"Urban environments can no longer afford to ignore green infrastructure. The benefits of managing flood risks and enhancing urban life far outweigh the obstacles."

Mark Smith

"We need advocacy and campaigns to make people understand how useful it is and actually start enjoying being back near water."

Daniela Bemfica



Barriers:

- **Urban Space Limitations:** Difficult to implement in already urbanised areas.
- **Maintenance Costs:** Higher and different from traditional infrastructure.
- **Cultural Acceptance:** Public unfamiliarity with the concept.

Action Plans:

- **Legislation:** Enact policies requiring green infrastructure in new and existing developments.
- **Operational Changes:** Train utility staff in new maintenance practices. Mindset shifts from hard engineering to more nature-based solutions.
- **Public Advocacy:** Launch campaigns to educate and engage the community.

Proposed Owners: Government, water utilities, municipalities.



Example of a Rain Garden

"Local planning is crucial to making these kinds of changes, especially in densely urbanised cities like London or São Paulo."

Daniela Bemfica

Left: Whiteboard from Sponge Cities break out group. Potential Blockers to progress were brainstormed (bottom); highest voted ideas were moved to the Priorities Matrix (middle) and ideas in the high impact, high probability quadrant were moved to the Action Plan (top).



Example of a Downstream River

6.3 Reverse Water Cycles

"There is no such thing as a shortage of water, just a shortage of energy, infrastructure and organisation."

Simon Spooner

The Reverse Water Cycles group tackled the idea of fundamentally changing our approach to water management by drawing water from downstream rather than upstream. This shift would leverage renewable energy for better control over water flows while enhancing river health.

Key challenges include high infrastructure and energy costs, along with ensuring the benefits are properly understood by both policymakers and the public. The group emphasised that implementing digital twin tools and technical support could guide this change, helping assess the risks and benefits while identifying opportunities for collaboration.

The core belief shared was that the current water crisis is less about scarcity and more about mismanagement and lack of organisation.

Barriers:

- **Public Perception:** Aversion to using recycled wastewater.
- **Cost and Energy:** High initial investment and energy requirements.
- **Technical Knowledge:** Lack of expertise in implementing new systems.

Action Plans:

- **Public Education:** Inform about safety and benefits of recycled water.
- **Cost-Benefit Analyses:** Highlight long-term savings and environmental benefits.
- **Technical Support:** Provide training and develop digital tools for implementation.

Proposed Owners: Water companies, government agencies, technical experts.

"We've depleted our rivers, taken water from upstream, dumped waste downstream, and now have an impoverished water system."

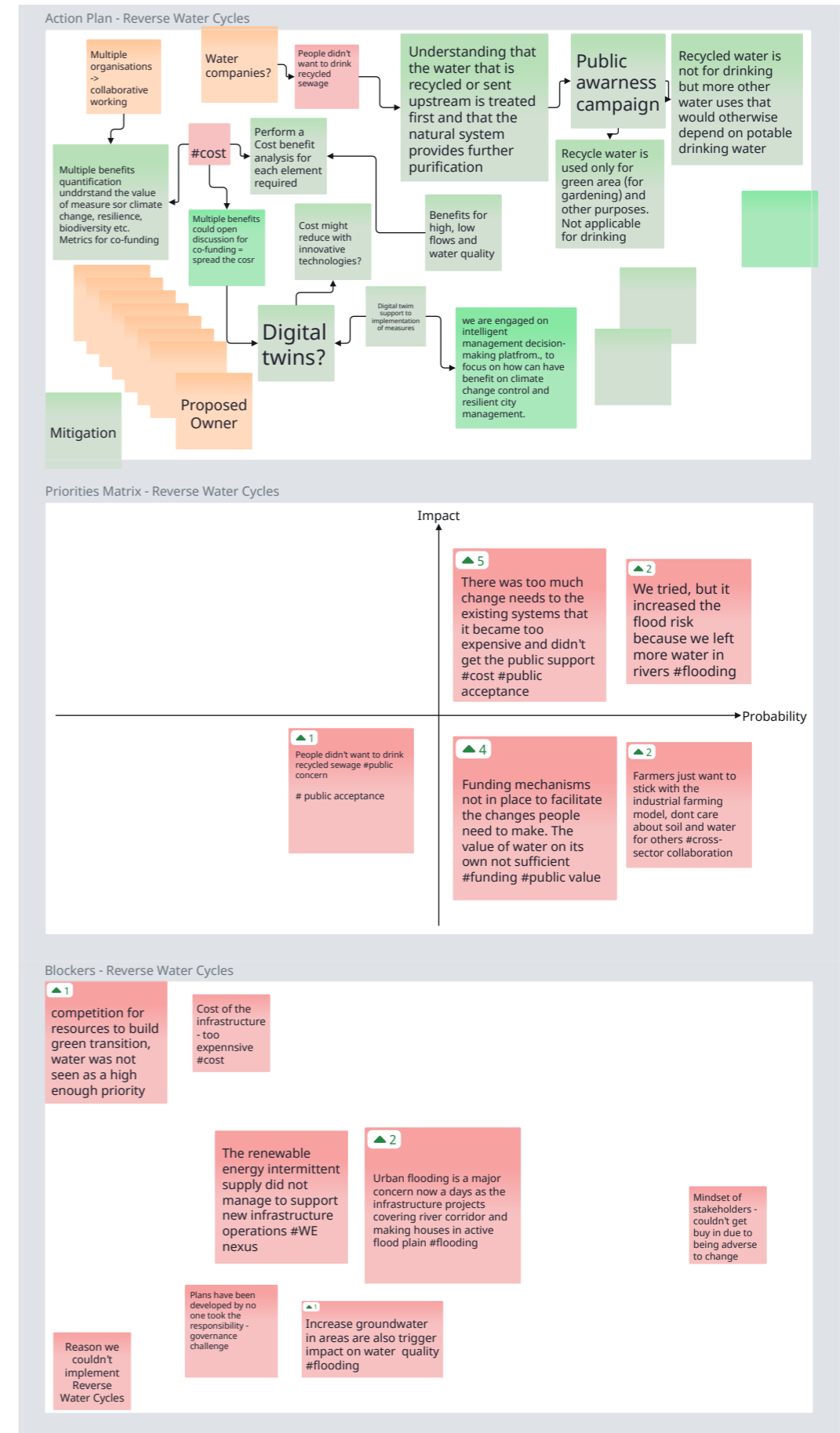
Simon Spooner

"We need digital twin tools that can help us understand the multiple benefits and set structures for better governance."

Simon Spooner



Right: Whiteboard from Reverse Water Cycles break out group. Potential Blockers to progress were brainstormed (bottom); highest voted ideas were moved to the Priorities Matrix (middle) and ideas in the high impact, high probability quadrant were moved to the Action Plan (top).



6.4 Waterless Sewerage

"...localised, intense bioresource facilities could be the future—it's about separating water from waste at the source."

Piers Clark

The Waterless Sewage group explored the potential of removing water entirely from sewage systems, using localised bioresource solutions such as composting toilets.

Major obstacles identified included political reluctance and public aversion to handling their own waste due to a natural "ick factor." The lack of large-scale examples makes it harder for the public and officials to visualise success, pointing to the need for demonstration projects to show viability.

Despite the stigma, participants were convinced that localising treatment would reduce energy use in transporting waste and that strong political will, combined with strategic pilot programs, could overcome both financial and social barriers.



Idea of a Bioresource Recovery Facility



Composting Toilet

Barriers:

- **Political Will:** Lack of support from policymakers.
- **Cultural Aversion:** Public discomfort with handling human waste differently.
- **Lack of Examples:** Few large-scale implementations to demonstrate feasibility.

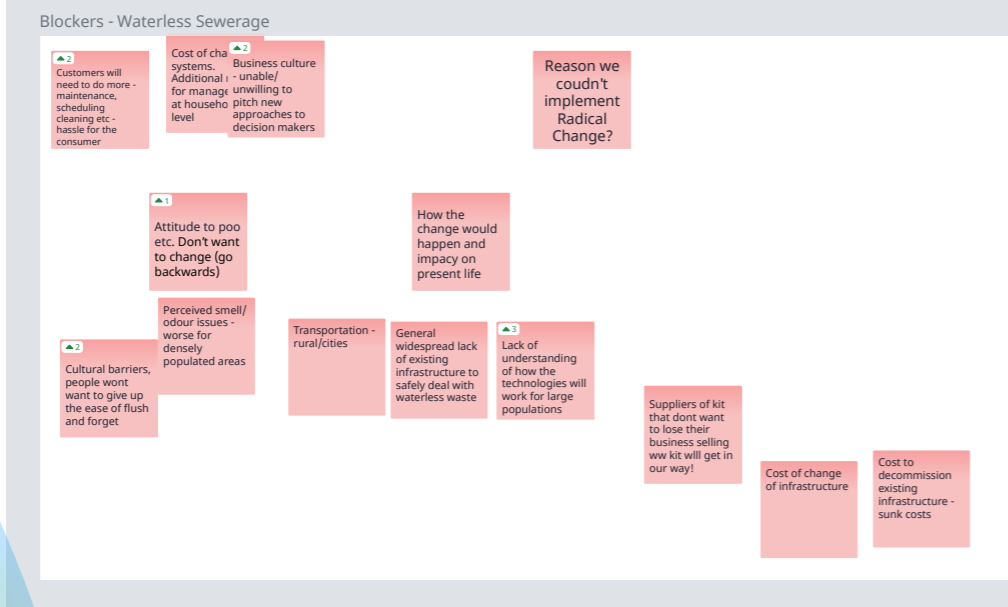
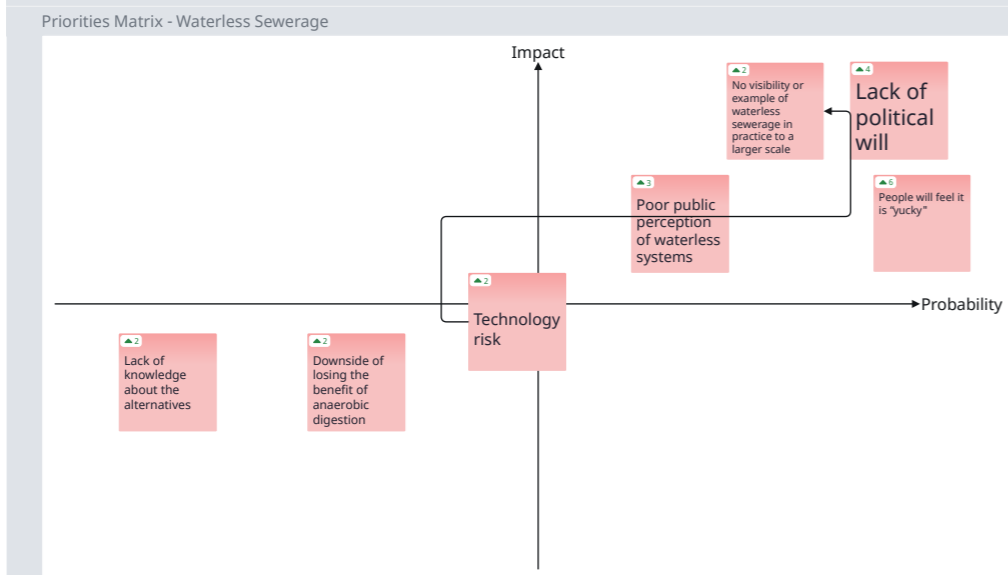
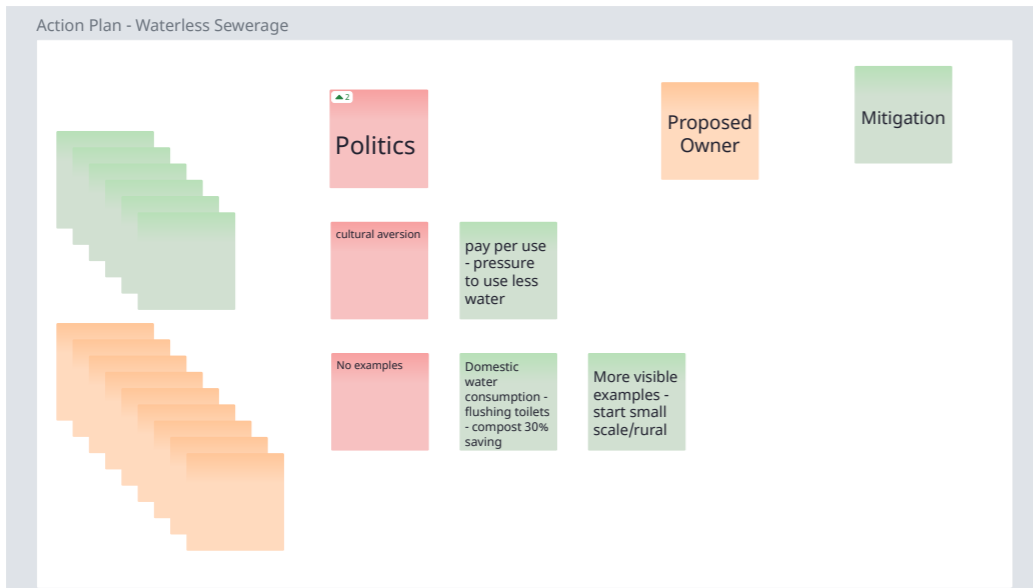
Action Plans:

- **Policy Advocacy:** Lobby for governmental support and funding.
- **Public Awareness:** Address the "ick factor" through education.
- **Pilot Projects:** Implement demonstration sites to showcase benefits.

Proposed Owners: Government, environmental agencies, technology providers.

"The biggest challenge is that there are no examples at scale. People need to see it to believe in it."

Martin Doyle



"People think it's yucky—there's an aversion to dealing with your own waste, and that's a huge cultural barrier."

Piers Clark



Bioresource Recovery

"The cost to decommission the existing infrastructure and implement new waterless systems is significant."

Piers Clark

Left: Whiteboard from Waterless Sewerage break out group. Potential Blockers to progress were brainstormed (bottom); highest voted ideas were moved to the Priorities Matrix (middle) and ideas in the high impact, high probability quadrant were moved to the Action Plan (top).



6.5 Household Water Management Measures

"We need education—teaching about climate change, water use and environmental impact from an early age, just like English or Maths."

Stephen Kennedy

The Household Water Management group focused on making residential water use more efficient, emphasising that change should start at home.

Key issues discussed were the challenges of transforming existing housing stock versus implementing changes in new builds, with a significant need for supportive policy and legislation. A standout proposal was to make environmental education a standard part of the school curriculum, so future generations grow up understanding the importance of water conservation.

Participants highlighted that interventions such as re-plumbing during home sales and disconnecting impermeable surfaces could yield significant water savings, but these are underutilised due to the lack of mandatory measures and public awareness.

"Each time a house is sold, it would be an opportunity to re-plumb or retrofit water efficiency measures, and yet it rarely happens."

Stephen Kennedy

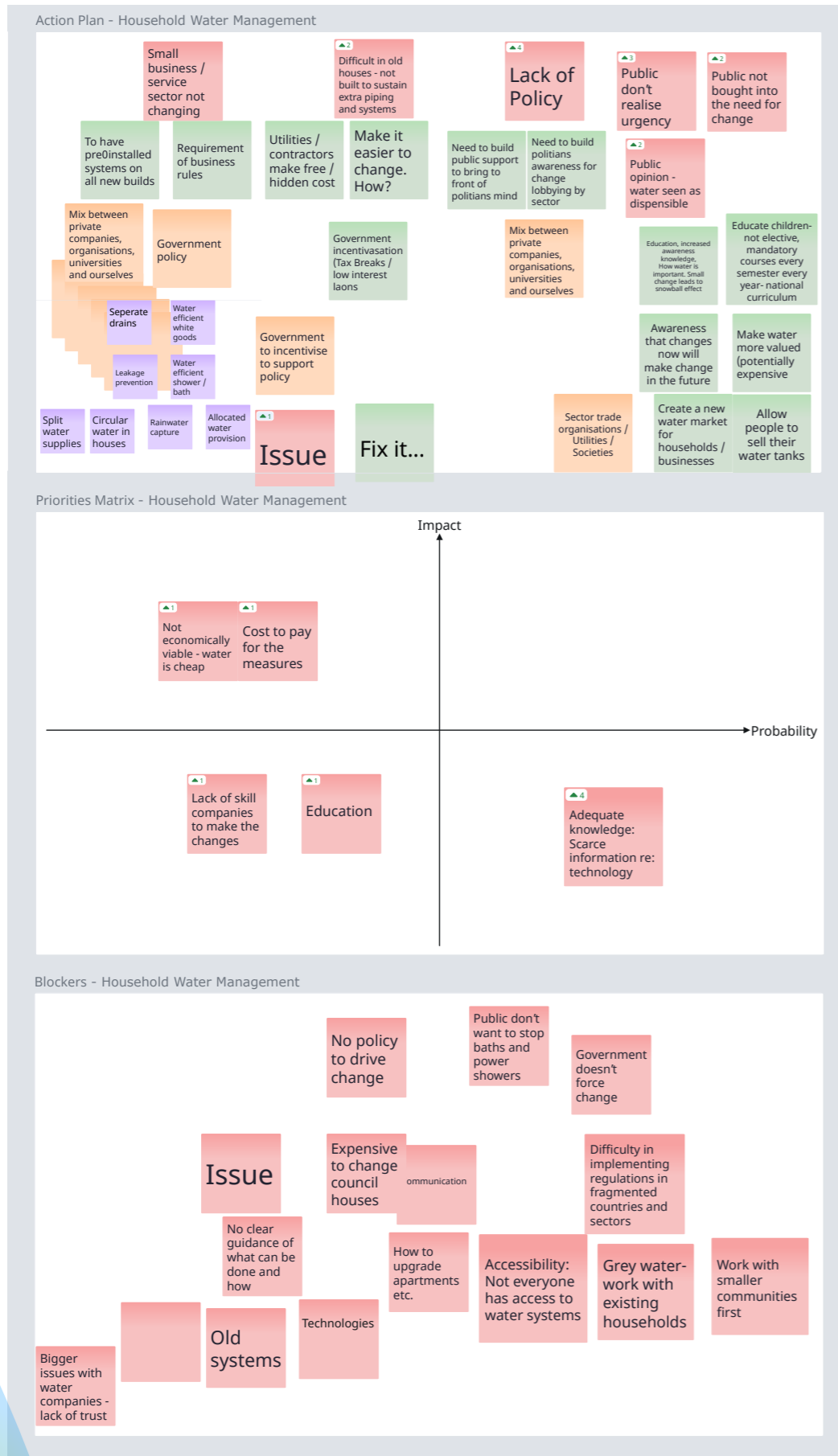
Barriers:

- **Public Awareness:** Lack of understanding of water scarcity issues and urgency.
- **Policy Gaps:** Insufficient legislation promoting water efficiency.
- **Infrastructure Challenges:** Difficulty in retrofitting existing homes.

Action Plans:

- **Education Campaigns:** Raise awareness about water conservation.
- **Legislative Changes:** Implement policies for water-efficient building standards in homes and businesses.
- **Curriculum Integration:** Include environmental education in schools.

Proposed Owners: Government, educational institutions, homeowners.



"Policy and legislation need to lead the way if we want to see these kinds of household water management changes implemented."

Stephen Kennedy



Rainwater Harvesting

"Disconnecting impermeable surfaces, using captured water on site and rethinking how households use water are non-radical plans that just aren't being implemented."

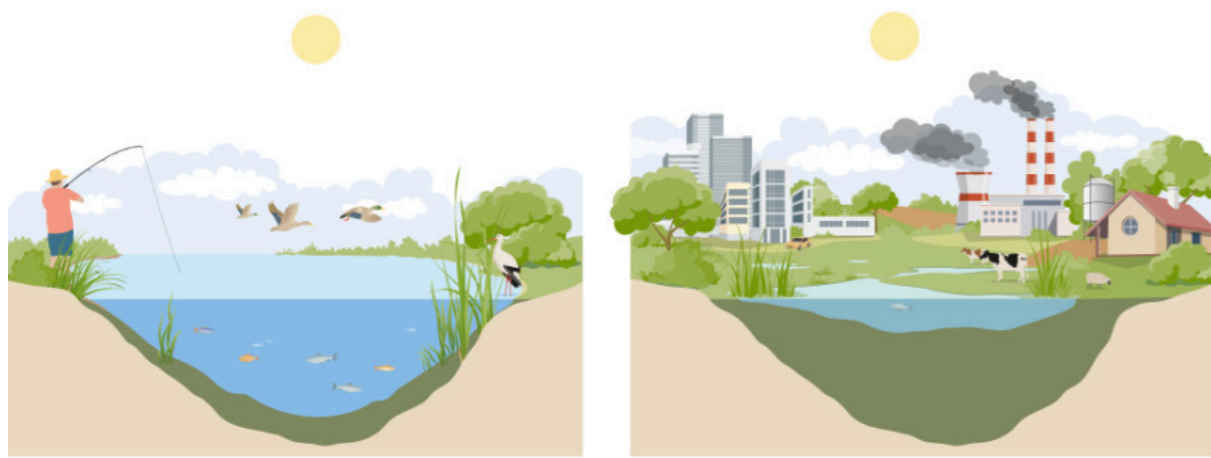
Stephen Kennedy



Rainwater Harvesting

Left: Whiteboard from Household Water Management break out group. Potential Blockers to progress were brainstormed (bottom); highest voted ideas were moved to the Priorities Matrix (middle) and ideas in the high impact, high probability quadrant were moved to the Action Plan (top).

EUTROPHICATION



Duration - millenniums

Duration - decades

Eutrophication Caused by Excess Nutrients Polluting the Water

6.6 Polluter Pays Plus

"Cross-sector partnerships and holding polluters accountable through real-time monitoring could fundamentally change our water management approach."

Tom Williams

The Polluter Pays Plus group discussed implementing a polluter accountability framework using real-time monitoring to track water pollution.

Participants noted that political factors and siloed financial interests across catchments are preventing real action, suggesting a need for cross-sector partnerships. The group proposed establishing regional water Tsars to oversee catchment management and ensure fair enforcement of policies.

Transparency was another critical element discussed—citizen assemblies and digital engagement could boost public awareness and support for pollution management efforts. Despite the challenges, the group was optimistic about the role of advanced monitoring technologies in holding polluters accountable and pushing for systematic change.



Algal Bloom Due to Eutrophication

Barriers:

- **Political Pushback:** Resistance from policymakers and stakeholders.
- **Financial Interests:** Conflicting interests among industries.
- **Public Opposition:** General reluctance to accept new regulations.

Action Plans:

- **Regional Water Authorities:** Establish bodies to oversee catchment management.
- **Cross-Sector Partnerships:** Encourage collaboration among industries.
- **Citizen Assemblies:** Increase public awareness and engage the public in decision-making processes.

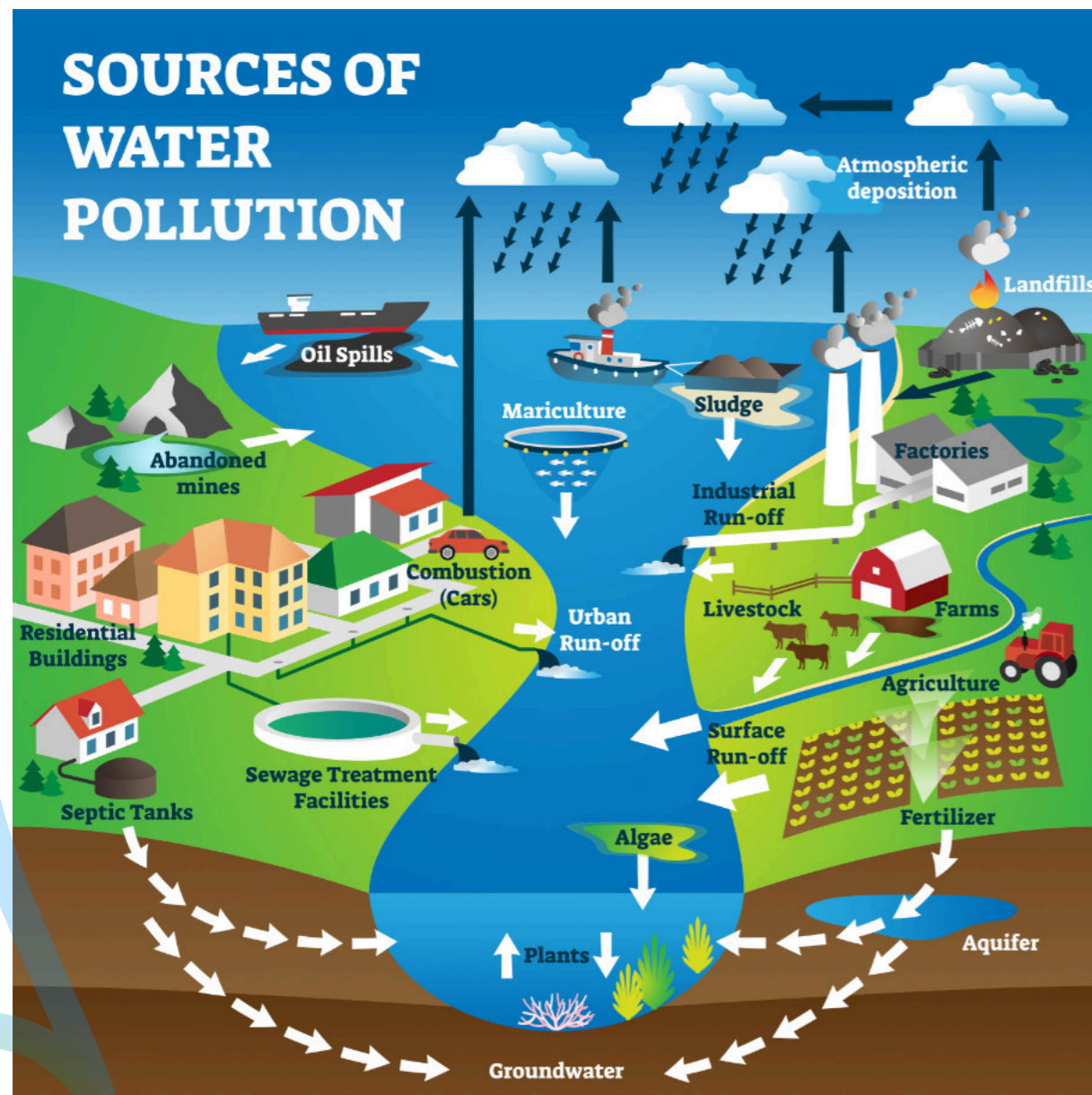
Proposed Owners: Government, regional authorities, community organisations.



Oil Spill Pollution

"It becomes very political—there will always be somebody financed to oppose change."

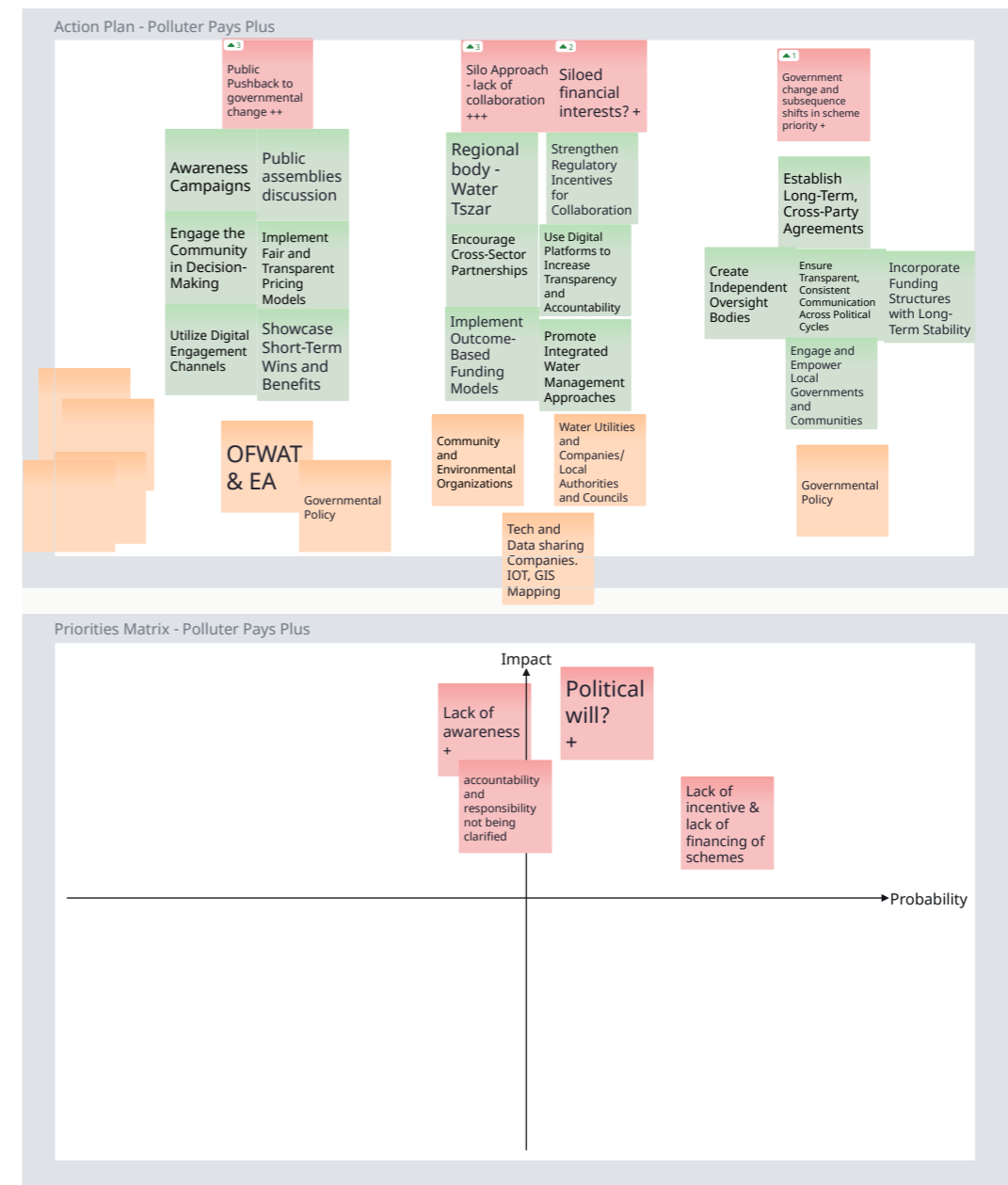
Tom Williams



Sources of Water Pollution Diagram

"A regional water Tsar could look at the interests of particular regions, like the wet west and dry southeast of the UK."

Tom Williams



Above: Whiteboard from Polluter Pays Plus break out group. Potential Blockers to progress were brainstormed and highest voted ideas were moved to the Priorities Matrix (bottom). Ideas in the high impact, high probability quadrant were moved to the Action Plan (top).

"Really interesting to me is that the barriers seem to be very similar in all the topics. And this is something to think about: are people generally opposed to any radical change? I think there is cost, there is public acceptance and there is responsibility. So for me, these 3 things came through very strongly. ... technical implementation didn't come through as a barrier."

Ana Mijic

"...particularly in the UK, around about 30% of domestic water consumption is actually used for flushing your toilet. So whilst there are many small steps that people can take which will save a percent here, a percent there, a 30% saving by swapping your toilets out is a very, very, very big and quick change."

Martin Doyle

7. Next Steps

Common Barriers Identified:

- **Cost:** Financial constraints and funding challenges.
- **Public Acceptance:** Cultural resistance and lack of awareness.
- **Responsibility:** Unclear ownership and accountability.

Recommendations:

- **Pilot Projects:** Implement demonstration initiatives to build evidence.
- **Policy Development:** Advocate for legislative support.
- **Education and Engagement:** Increase public awareness through education.

Action Items:

- **Report Compilation:** Volunteers to draft a comprehensive report based on discussions.
- **Continued Collaboration:** Participants encouraged to stay engaged and contribute to ongoing efforts.

Conclusion

The **2044 Water Climate Discussion Retrospective** highlighted the critical need for radical changes to address escalating climate challenges. Despite technological advancements and innovative proposals, significant barriers have impeded implementation. The meeting underscored the importance of collective action, policy reform, public engagement and education to overcome these obstacles. By revisiting these proposals and developing actionable strategies, stakeholders aim to mitigate the severe impacts of climate change and build a sustainable future.

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change the
world
together.