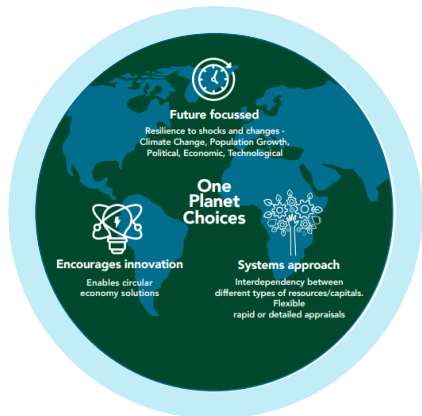


Policy, research and management recommendations for supporting collaborative, future-focussed decision-making in shared river catchment systems

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Background

Scotland's Hydro Nation ambition sets the standard for recognising the importance of water and its contributions towards sustainable development.

Despite the aim of the Hydro Nation to manage its water resources responsibly, and improvements in water conditions in the previous decade, 34% of Scotland's freshwaters do not achieve good ecological status conditions¹. Changes in the face of the climate crisis, population and land-use change further threaten the condition of Scotland's freshwaters, affirming the need for increased efforts to improve water conditions both now and in the future.

Many of the 34% of waterbodies yet to achieve good ecological status are impacted by complex water quality and water quantity issues, such as impacts of both diffuse and point source pollution, and competition for water abstraction from multiple users within shared systems. Collaborative, future-focussed decision-making methods that make best choices for environment, society and the economy are required to overcome complex water management issues.

Recommendations for policy, research and management to support the implementation of collaborative and future-focussed water management to achieve Scotland's Hydro Nation goals are provided in this brief.

Overview

1. A catchment partnership network for appropriate shared priority catchments should be supported by the Scottish Government to address collaboration, governance and incentivisation gaps.
2. Future collaborative research and decision-making methods should factor in guaranteed compensation for community and self-employed participants.
3. Innovative incentivisation methods should be investigated to encourage voluntary action.
4. Wider stakeholder values should be communicated to incentivise the adoption of management options and agri-environment schemes to improve water quality.
5. Investment in high-frequency data collection, such as sensor technology, is required to provide a greater understanding of water quality trends and increase awareness of future change and management practice impacts on water resources.
6. A central data hub should be developed in Scotland to inform researchers and academics of available data, and how to find and access data.
7. Research to understand stakeholder 'knowledge needs' should be supported by the Scottish Government to inform future strategic research programmes.

Context

One Planet Choices is a collaborative, future-focussed decision-making method developed by SEPA and Scottish Water. The method aims to overcome difficulties in making choices that balance environment, society and the economy. The method helps users make better decisions by:

- considering future climate, population and land use change impacts,
- taking a systems approach to encourage collaboration and prevent the decision of one party affecting other interest groups,
- encouraging innovation to support a circular economy and achieve net zero targets.

One Planet Choices was trialled in the Eden Catchment, Fife, Scotland where significant pressures on water quality and availability currently occur and are predicted to deteriorate without intervention in the future. The trial found that action by an individual organisation, or current regulatory powers, were not sufficient to achieve good ecological conditions. Instead, collaboration and innovation were required to achieve environmental, social and economic goals in the catchment.

Despite a successful trial, barriers to the implementation of collaborative and innovative measures exist. Based on research conducted to support the trial, experiences from trial participants and the reflections of decision-makers with experience of collaborative management; policy, research and management recommendations to support future-focussed decision-making methods, such as One Planet Choices, are provided in this brief.

Recommendations aim to support the transition from a trial stage to future implementation of collaborative adaptive management in shared catchments which currently do not achieve good ecological status. Recommendations made are aimed at supporting the Hydro Nation goal for Scotland to become a leader in water management and increase the number of waterbodies that achieve good ecological status now and in the future.

Recommendation 1:

A catchment partnership network for appropriate shared priority catchments should be supported by the Scottish Government to address collaboration, governance and incentivisation gaps.

The need for clear governance structures to support future-focussed decision-making processes was identified by stakeholders who participated in the One Planet Choices method trial.

When it comes to collaborative decision-making processes, it is difficult to guarantee that all sectors deliver on their agreed management actions without clear governance in place. In the context of the River Eden catchment and the One Planet Choices method, there is currently no mechanism that would hold all sectors accountable to deliver their required improvements and implementation of measures. Management action would be voluntary and need to go beyond current regulatory powers, as is the case with many of Scotland's priority catchments (**Box 1**).

Box 1: Priority Catchments

There are 57 diffuse pollution priority catchments in Scotland, identified due to their failure to meet EU Water Framework Directive standards for good status under current regulatory measures².

Findings from SEPA's One Planet Prosperity strategy³ highlight that voluntary measures that go-beyond compliance are required to achieve environmental, economic and social benefits.

Many of the priority catchments demonstrate the need for collaboration and strong governance to achieve goals, such as the River Eden catchment and the River Deveron catchment, , North East Scotland, which is impacted by diffuse and point source pollution, as well water scarcity issues due to the impacts of climate change and over abstraction from multiple sectors such as agricultural and industrial sectors.

Without binding agreement across all parties, there is a risk that one sector delivers significant investment to achieve shared goals, which is not matched by other sectors.

Accountability in delivering collaborative management actions raised discussion at workshops about ownership of the decision-making process. Absence of ownership could lead to siloed and disjointed implementation, if any at all. There needs to be a clear owner who can hold sectors accountable to their commitments and implement contractual agreements between parties to support collaboration.

Catchment partnerships can provide the governance structure required to support the implementation of measures across multiple sectors. Previous examples of catchment partnerships and sustainable growth agreements (Box 2) can provide the governance structure required to achieve collaborative management in catchments where water resources and contributions to water quality and quantity issues are shared across the multiple sectors.

Box 2: Catchment Partnership Examples

- *The Leven Programme Partnership⁴ – a Sustainable Growth Agreement between SEPA and the Leven Project to bring SEPA's One Planet Prosperity thinking into catchment scale partnership and collaborative working.*
- *A catchment partnership network has been achieved via the Catchment Based Approach (CaBA)⁵, over 100 catchments in England. The CaBA plays a key role in collaborative catchment management that delivers environmental benefits.*

Catchment partnerships have been promoted as a way of supporting holistic and collaborative catchment management as they can tackle persistent, complex issues (such as diffuse pollution), bring stakeholders together to achieve shared goals and supporting learning opportunities across different sectors.

It is therefore recommended that the Scottish Government supports the development of a catchment partnership network for priority catchments where collaborative decision-making is required to address water management issues. Current reporting on the condition of the nation's water environment conducted as part of the third cycle of River Basin Management Planning can inform the identification of priority catchments where

collaborative action is required to address water management issues.

SEPA as the environmental regulator and Scottish Water should not coordinate catchment partnerships as collaborative bottom-up approaches that bring local knowledge, expertise and information are viewed as being more appropriate and collaborative in nature⁶. Instead, community-based neutral leaders who understood local issues within the catchment should lead partnerships, while the One Planet Choices method can apply the steps and principles to support future-focussed, collaborative decision-making.

Funding should be made available for both initiating partnership working and implementing voluntary collaborative management measures.

Research should be conducted to map potential partners from the local community within identified priority catchments and investigate their willingness to participate in a catchment partnership model.

Recommendation 2:

Future collaborative research and decision-making methods should factor in guaranteed compensation for community and self-employed participants.

Collaborative decision-making processes are time and resource intensive for both researchers and community-level participants. For example, for farmers, household septic tank users and local businesses, participation can cost valuable time and potential income. Often funds to compensate local and self-employed participants are not considered in research design processes.

Future research and project funding should encourage long-term and detailed collaborative research and decision-making methods by factoring in guaranteed compensation for community and self-employed participants, either as funding for cash incentives or gift vouchers, or tangible deliverables that make the benefits of participation clear.

Recommendation 3:

Innovative incentivisation methods should be investigated to encourage voluntary action.

Voluntary investment in the management actions is required to achieve environmental, economic and social outcomes across multiple partners. Stakeholders highlighted there is currently low uptake in incentives to support voluntary action, such as the Agri-Environment Climate Scheme (AECS) due to landowners not seeing the benefit of changing practices to benefit water quality.

Time and admin costs associated with current incentivisation schemes, and the difficulties in monitoring compliance, can be a barrier to the adoption of voluntary measures, while competitive points-based scoring process can lead to unsuccessful applicants being put off applying in the future.

Innovative incentivisation mechanisms to increase voluntary adoption identified by stakeholders included catchment scale nutrient trading platforms, which have been applied in England to support 'nutrient neutrality' (Box 3). Nutrient trading platforms were suggested as a potential way for landowners to generate income by selling nature-based projects that reduce diffuse pollution and provide wider environmental benefits, to organisation such as water companies, property developers and local authorities who wish to purchase environmental credits.

Box 3: Nutrient Neutrality and Nutrient Trading Platforms

In England, 'nutrient neutrality' is a requirement set by Natural England to protect freshwater habitats under the Habitats Regulations 2017⁶. Natural England requires 42 Local Planning Authorities to only approve developments if they are certain they will not have adverse effects on protected sites.

Nutrient Trading Platforms being introduced to help achieve nutrient neutrality through a Wessex Water business called EnTrade which implement the Somerset Catchment Market, Solent Nutrient Market Pilot and the Bristol Avon Catchment Market schemes⁷.

Market platforms remove the time and admin for landowners by taking care of accreditation, verification and monitoring of credits.

For such trading schemes to work, sector nutrient limits must be set to achieve nutrient neutrality, which is currently not required in Scotland. Within the previous recommendation for a network of catchment partnerships within relevant priority catchments, feasibility studies of nutrient limits to achieve 'nutrient neutrality' across sectors by setting nutrient limits and the effectiveness of nutrient trading schemes could be evaluated.

Recommendation 4:

Wider stakeholder values should be communicated to incentivise the adoption of management options and agri-environment schemes to improve water quality.

Related to the low uptake in voluntary measures, stakeholders suggested that improvements in water quality and good ecological status do not directly benefit wider sectors. Stakeholders highlighted that future framing of issues should be made more inclusive to other sectors by removing terms such as "ecological status," when communicating decision-making goals to more relatable deliverables, such as improving soil health.

Communication of wider benefits is best achieved through peer-networks. In the agricultural sector, monitor and research farms and the Farm Advisory Service are platforms that provide opportunity for the farming community to share their experiences of alternative management options to improve both the farm business and environmental outcomes.

Having real examples of adopted management practices that aim to improve, for example soil structure and nutrient content to reduce input costs, is a more relatable framing compared to achieving good ecological status.

Funding and support to farmers should be extended for monitoring and research farms and advisory services within priority catchments to support the network of catchment

partnerships and the adoption of voluntary measures.

Recommendation 5:

Investment in high-frequency data collection, such as sensor technology, is required to provide a greater understanding of water quality trends and increase awareness of future change and management practice impacts on water resources.

Good quality baseline data plays an important role in measuring current environmental problems. Quality data can support increased understanding of pressure sources of water quality and quantity issues, support the development of future change impact projections and help evaluate the effectiveness of management options.

Data collection at low frequency provides an incomplete picture of environmental conditions, such as water quality and water flows, to support environmental regulators and decision-makers when monitoring or assessing the state of the environment. Limitations in data collection frequency has led to the use of instruments such as sensors which can measure real-time in-stream water quality and quantity⁸ (Box 4).

Box 4: Real-time data collection in the Great Barrier Reef catchments

Water levels and/or water quality is monitored using 11 real-time stations as part of the Great Barrier Reef Catchment Loads Monitoring Program⁹.

Within the program, researchers co-designed a web-based app with farmers which provided real-time in-stream nitrate concentrations and rainfall data to highlight diffuse nitrate losses at the farm level. Not only can the real-time data information highlight contributions to water quality issues, but findings can also provide insight into nutrient application inefficiencies to promote behaviour change, which was applied as part of the research by uploading real-time data onto an app that farmers could access to view real-time rainfall and nitrate loads.

Investment in real-time data information, such as part-investment by the Scottish Government in the Forth Environmental Resilience Array (Forth-ERA) project¹⁰, should be extended to

priority catchments. Real-time data would provide information on the source of water quality issues. Higher spatial and temporal resolution data can provide insight into nutrient application inefficiencies to promote behaviour change and improve model predictions about extreme events such as flooding and drought due to the impacts of climatic change.

Recommendation 6:

A central data hub should be developed in Scotland to inform researchers and academics of available data, and how to find and access data.

Obtaining data from public sector bodies is disjointed, as there is no clear process for viewing or accessing to data was clear.

In the Eden Trial of One Planet Choices for example, data was obtained by emailing specific individuals within different departments of SEPA and Scottish Water, which led to inconsistencies in both access to data and request response times. It was often not explicit what data was collected and available, therefore knowledge of data availability was dependant on the knowledge and contacts of the project team.

A recommendation to support future collaborative research is to develop a central data hub to allow research partners to know what data is available, information about the nature of the metadata, a clear process of how to obtain and use the data. Data hubs, such as Digimap¹¹ and the UKCEH Environmental Information Data Centre¹² are examples of hubs, where information on data available and the process for obtaining data is fast and effective.

Real-time data collected as part of Recommendation 5 could also be included in a central data hub to support stakeholders with decision-making, for example farmers to assist with the timing of fertiliser applications or abstraction for irrigation.

Recommendation 7:

Research to understand stakeholder 'knowledge needs' should be supported by the Scottish Government to inform future strategic research programmes.

Involving stakeholders in problem identification is an important first step in collaborative approaches. Understanding the 'needs' and 'wants' of the water sector can be used to set research and funding themes for hubs such as Scotland's Centre of Expertise for Waters (CREW), which is funded by the 5-year strategic research programme.

Co-constructing and identifying relevant research themes with water sector stakeholders, can help inform water-related policymakers and managers to help achieve a resilient Hydro Nation agenda. The recommendation for understanding stakeholder knowledge needs is provided in more detail in a published paper in Environmental Science and Policy¹⁴.

Closing remarks

If Scotland is to live up to its Hydro Nation ambitions, it is recommended that a catchment partnership network be considered across appropriate priority catchments as part of the policy agenda. Funding should be provided to support the initiation of the catchment partnership network, with opportunity for research and development for innovative incentivisation schemes such as nutrient trading and the increased use of research farms to support peer networks and support the adoption of existing incentives.

Scotland as a Hydro Nation should also aim to be a leader in environmental quality monitoring by expanding innovative real-time environmental quality data collection that is accessible to support future-focussed partnership working.

It is important to highlight that the brief focuses on voluntary action and does not consider the extension of regulatory powers, for example, the tightening of point sources and diffuse pollution standards. Voluntary action was the focus of the study in-line with the drive by SEPA for sectors to go beyond compliance within the One Planet Prosperity agenda.

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