

Category 2
Centre for Water Law, Policy & Science
under the aegis of UNESCO

*Promoting Development Through
Good Water Governance*

Professor John Rowan

International Symposium of Category 2 Centres under the auspices of UNESCO
14-17 May 2024, Kuala Lumpur, Malaysia



Centre for Water Law, Policy & Science (CWLPS)



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Centre
Under the auspices
of UNESCO



Centre for Water Law,
Policy and Science
University of Dundee

Category 2 Centre *under aegis of UNESCO IHP* founded 2005

Arose from critical mass/excellence in **water (natural resource) law**

Objectives:

- Develop approaches to **IWRM & water governance**
- Develop **education & training** addressing SDGs & capacity-building
- Convene **interdisciplinary scientific symposia**
- Integrate **water law, policy & science** tackling global water problems
- Provide **expert input** as required by UNESCO
- **Collaborate** proactively with other IHP water centres worldwide
- **Partnering** across UK water research & education sector



Management Group

| | |
|---------------------|--------------------------------|
| Mr Andrew Allan | International water law |
| Ms Julie Begg | Admin & public engagement |
| Dr Iain Brown | Climate change risk assessment |
| Prof Sue Dawson | Hazards & resilience |
| Prof Sarah Hendry | Water regulation & governance |
| Dr Nandan Mukherjee | Climate change, loss & damage |
| Mr George Njoroge | Postgraduate researcher |
| Dr Jamal Ougahi | Global water data science |
| Prof John Rowan | Water & sediment dynamics |
| Prof Jeff Blackford | Environmental change |

Associates

- 30 Associates (HSSL, SSE, DEN & DJCAD)
- 11 Emeritus/Honorary Professors
- 14 Graduate Associates

International Governing Board

| | |
|----------------------|---------------------------------|
| Dr Rahmah Elfithri | UNESCO IHP, Paris |
| Jon Rathjen | Scottish Government |
| Prof Harry Dixon | UK National Hydrology Committee |
| Prof Toshio Koike | UNESCO ICHARM, Japan |
| Dr Christina Leb | World Bank, New York |
| Dr Katharine Vincent | IDS Director, South Africa |
| Prof Jeff Blackford | Convener & Dean of SHSSL |
| Prof Sue Dawson | Research Lead, EES |
| Prof Sarah Hendry | Head of Dundee Law School |
| Prof John Rowan | Director |

Grants 2023

SG Hydro Nation
CREW
Leverhulme
UKRI
EU MERLIN

Outputs 2023

> 50 papers
3 Reports
IHP IX – 5.2

Conferences

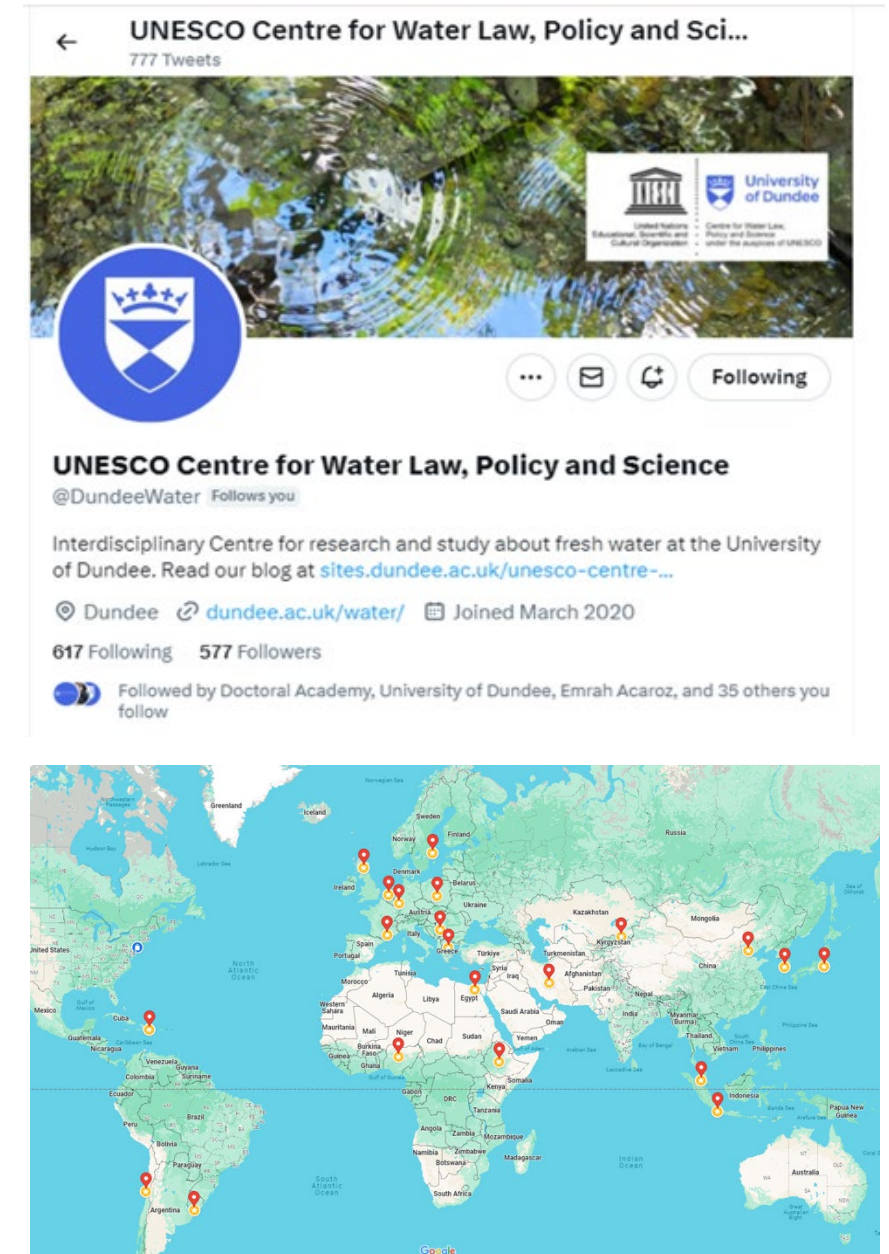
UN 2023
UNESCO 2023
OECD 2023
COP28

IHP-IX

Cat2 Centres
Outputs IHP-IX
Ecohydrology
HELP Flagship

Ongoing Activities

- **Contributions to IHP-IX Strategy** *Science for a Water Secure World*
 - Leading **Output 5.2 governance**, invited into **CWG1** and **CWG3**
 - Invited to lead re-launch **UNESCO HELP Flagship Initiative**
- **Networking** UNESCO water family – Cat2 Centres & Chairs
- International **Conferences** – e.g., UN Water, COP28, OECD
- Multiple **research projects and consultancies**
- **Doctoral Supervision** c. 20 water-related PhD candidates
 - New** Leverhulme Doctoral Programme in **Regenerative Innovation Regnr8i**
- **Education** – Annual Symposium, Monthly seminars, MSc *Sustainability & Water Security...*
- **Public Engagement** – Web, Blogs & Twitter www.dundee.ac.uk/water



IHP-IX Implementation – Priority Area 5

Priority Area 5: Water Governance based on science for mitigation, adaptation and resilience

→ Chair: **Argentina**

→ Vice-Chairs: **Senegal; Syria**

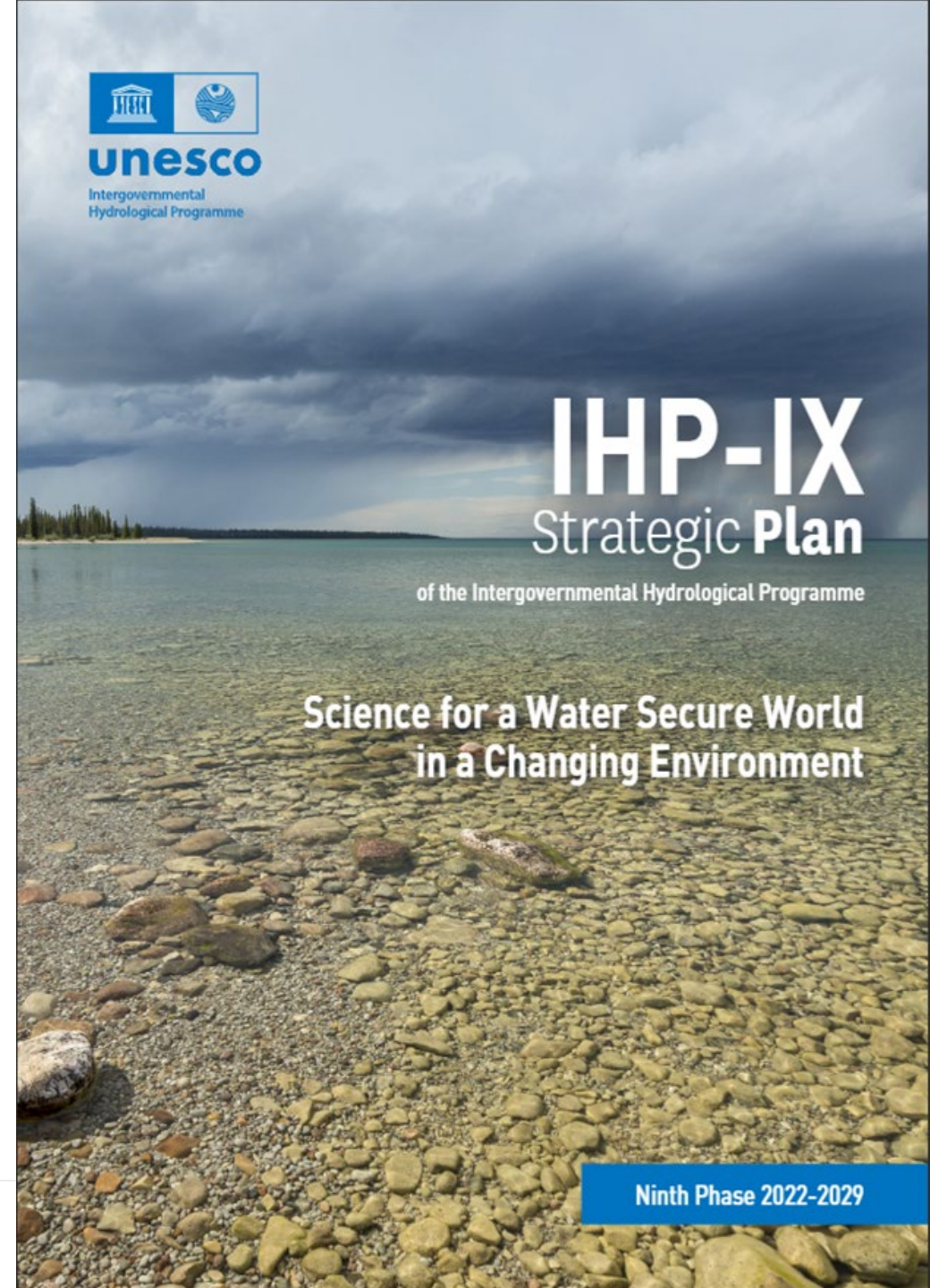
→ IHP Team: **Groundwater Sustainability & Water Cooperation**

Output 5.2

Integration of sound science in water governance instruments improved reflecting adaptation to climate change and IWRM, integrating surface and groundwater for their uptake by decision makers.

Lead: **UK CWLPS - Mr Andrew Allan** Chairperson

Contributors: **46 individuals** *Member States, Cat2 Centres & Water Chairs*





Promoting International Networks and Capacity-Building

Recent and Current Research Projects

| Project Title | Funding | Dates |
|---|------------------|---------|
| Leverhulme Doctoral Programme for Regenerative Innovation - Global | Leverhulme Trust | 2024-32 |
| Disaster-Resilient Net Zero Homes: Demonstration Platform - Bangladesh | GRP | 2016-24 |
| Water Data Science – Development of AI Approaches - Pakistan | UoD | 2023-26 |
| Eddleston (Tweed) – Natural Flood Management Demonstrator - Scotland | Scot Govt. | 2019-24 |
| Integrated Frameworks for Sustainable Management of Natural Resources - Wales | Welsh Govt. | 2023-24 |
| Blue-Green Infrastructure for Sustainable Urban Place-making - Europe | EU Horizon | 2023-26 |
| Risk Assessment for Emergent Pollutants in Drinking Water - Scotland | CREW | 2023-24 |
| Oral Health Risks Associated with Fluoride in Groundwater - Malawi | GCRF | 2020-22 |
| River Health Project, Ramganga - India | Scot Govt. | 2017-21 |
| GROW: Citizen science for sustainable food, soil & water management - Global | EU H2020 | 2017-21 |
| Water, Sanitation & Hygiene into Public Policy & Practice - Nigeria & Malawi | EU H2020 | 2018-21 |
| Upscaling Catchment Processes for Sustainable Water Management - India | NERC | 2016-21 |
| Global Assessment of Environmental Change the World's Largest Lakes - Global | NERC | 2015-20 |

Disaster-Resilient Net Zero Homes - Bangladesh



United Nations
Educational, Scientific and
Cultural Organization



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Resilience Solution



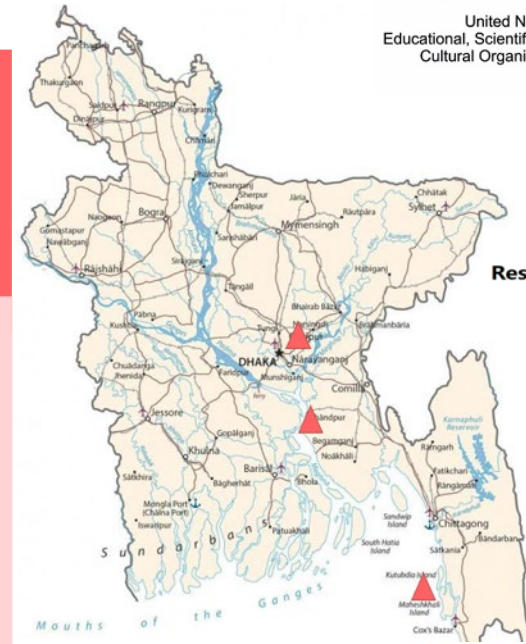
Inspiring Excellence



GLOBAL
RESILIENCE
PARTNERSHIP



Scottish Government
Riaghaltas na h-Alba



Phase I
2017 – 2019
(Global Resilience Partnership)

Flood resilient
home prototype
for **riverine**
islands and
coastal zones

- *UN Risk Award 2019*
- *THE 2019 (commended)*



Phase II
2019 – 2021
(Munich Re Foundation)

Upscaling and
design of **disaster**
resilient school
for the **coastal**
offshore islands

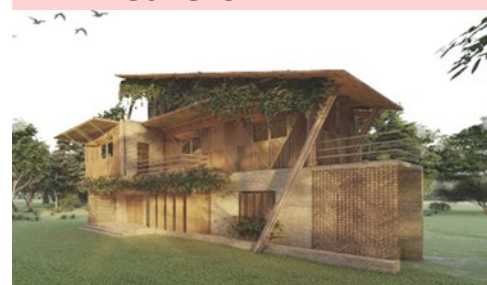
- *Community-scale*
- *Co-design*
- *Capacity-building*



Phase III
2021 – to date
(Scottish Government/UNESCO)

Capacity
Development
Initiative (CDI) –
demonstration
platform Dhaka

- *Multi-hazard*
- *Nature-based*
- *Livelihood-inclusive*
- *Net zero*



Disaster-Resilient Net Zero Home – showcased as Capacity Development Initiative UN 2023 Water Conference



UN
2023 WATER
CONFERENCE

NEW YORK
22-24
MARCH
2023





GLOBAL NETWORK OF UNESCO ECOHYDROLOGY DEMONSTRATION SITES

The current composition of UNESCO Ecohydrology Demonstration Sites consist of 30 Demonstration Sites in 20 countries around the world.

| Africa 3 | Asia - Oceania 10 | Europe 10 | Latin America and the Caribbean 7 |
|------------|---------------------|-------------|-------------------------------------|
| 2 Ethiopia | 2 Australia | 1 Croatia | 1 Argentina |
| 1 Kenya | 5 China | 1 France | 1 Bahamas |
| | 1 Indonesia | 1 Germany | 2 Ecuador |
| | 1 Malaysia | 1 Italy | 2 Colombia |
| | 1 Philippines | 3 Poland | 1 Costa Rica |
| | | 1 Spain | |
| | | 1 Sweden | |

Designated sites

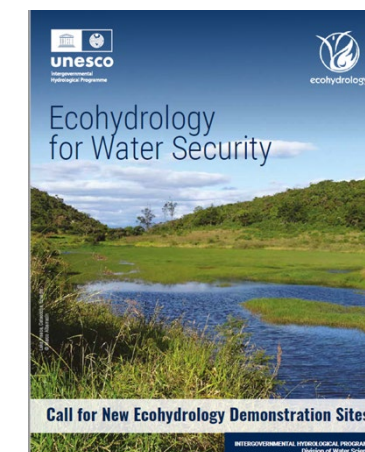
-  Biosphere Reserves (4)
-  Natural World Heritage Sites (2)

Flagship initiatives

-  HELP River Basins (7)

8 New Ecohydrology Demonstration Sites:

- Radom City, Poland
- Val Di Cornia, Italy
- Eddleston Water, UK**
- Quebrada Parque, Chile
- Santo Antonio River, Brazil
- NUST Wetland, Pakistan
- Ghar El Melh Lagoon, Tunisia
- Western Area Peninsula National Park, Sierra Leone

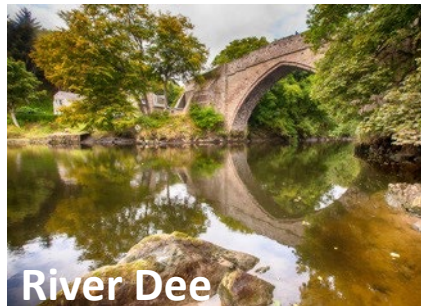


IHP HELP Basins in Scotland - Rivers Dee, Don & Tweed

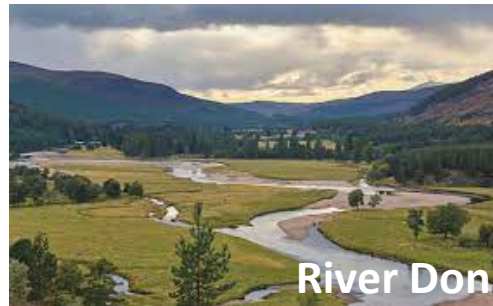
Ecohydrology Demonstration Platform - Eddleston Water (Tweed)



River Tweed



River Dee



River Don

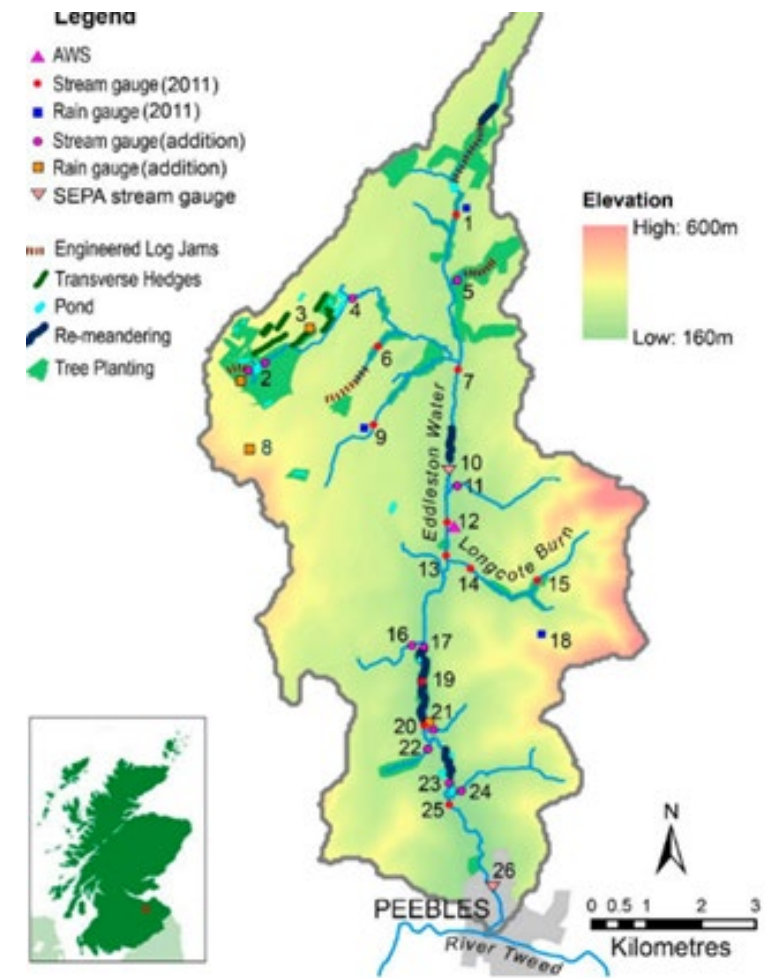


Eddleston Water

Eddleston Water (UNESCO Ecohydrology Demonstration)

River Tweed (IHP HELP Basin) – *Translating research into policy*

- **Eddleston Water Project** began with multi-agency collaboration
- **Policy driver** was Flood Risk Management (Scotland) Act 2009
- Aims to **reduce flood risk** and restore the ecohydrology for the social, economic & cultural benefit of local communities and wildlife
- Over 15 years developed a **world class hydrometric network** in parallel with *ecological, social survey, economic & wider stakeholder engagement*
- Multiple ***nature-based interventions*** tested for Natural Flood Management
 - Channel re-meandering, leaky dams, retention ponds, upslope and valley-bottom afforestation – with ecosystem service mapping and latterly economic evaluation of performance
- Led by **Tweed Forum** the Eddleston Water is a national exemplar of landowner, researchers, regulator and wider policy community collaboration
- **Eddleston awarded UNESCO Ecohydrology Demonstration Site in 2023**



Partnership Approach

Phase I: Scoping study - 2009/10

Phase II: Base line monitoring & planning 2010 - 2012

Phase III: Implementation & Monitoring 2013 - 2015.....



The Land owners and Community



Environment Agency

Scottish Natural Heritage

Tweed Foundation

Forest Research

Cbec Ltd

How a UK river serves as a natural lab for flood defence research

A river near Edinburgh, UK, has served for more than a decade as a natural laboratory for studying flood defences, providing benefits such as improved water quality worth millions of pounds

By Jason Arunn Murugesu

27 May 2023



RECOGNISED RECENTLY BY UNESCO AS AN ECOHYDROLOGY DEMONSTRATION SITE, SCOTLAND'S EDDLESTON WATER STUDY IS PROVIDING EMPIRICAL EVIDENCE OF THE EFFECTIVENESS OF NATURAL FLOOD MANAGEMENT.

VALUING NATURAL FLOOD MANAGEMENT



A key challenge for widespread acceptance and uptake of natural flood management (NFM) measures is the lack of empirical data to demonstrate their impact, making it difficult to assess the costs and benefits of their use at a catchment scale. It began with a Scoping study

in 2010, the Scottish Government's Eddleston Water project is a unique long-term study providing evidence of the effectiveness of an NFM approach, based on detailed hydrological, geomorphological and ecological monitoring.

Catchment-wide delivery

Working closely with 21 landowners, we implemented a wide range of NFM measures from the headwaters to the floodplain. Measures introduced across the 69km² catchment included extensive tree planting in the headwaters and riparian zone (330k native trees); placing engineered log-structures to act as high-flow restrictors (115); creating temporary flood storage ponds (38); and reamending historically straightened river channels (3.5km) on the floodplain.

Slowing the flow

Underpinned by one of the densest hydrological networks in UK, empirical data shows the following:

- Aquatic invertebrates rapidly regain numbers and diversity post-restoration, reflecting increases in habitat variety and extent in the channel.
- Flood storage ponds provide significant biodiversity enhancements.

Key lessons

Our ability to carry out the project is built on Tweed Forum's ability to act as a 'trusted intermediary' working with farmers/foresters to agree the locations of different NFM measures, and to resource funding from multiple public and private sources to make this an attractive proposition.

Monitoring success is based on long-term, quality-assured, detailed integrated measurement, further supported by combined hydraulic-hydrological catchment modelling.

Cost-effectiveness

Cost-benefit analysis shows NFM is highly effective and great value for money, producing £950k net present value (NPV) from flood damages avoided downstream, and an additional £4.2million NPV from biodiversity, carbon management, water quality, recreation and other benefits. Importantly, these benefits are recognised by the local community and are increasing.

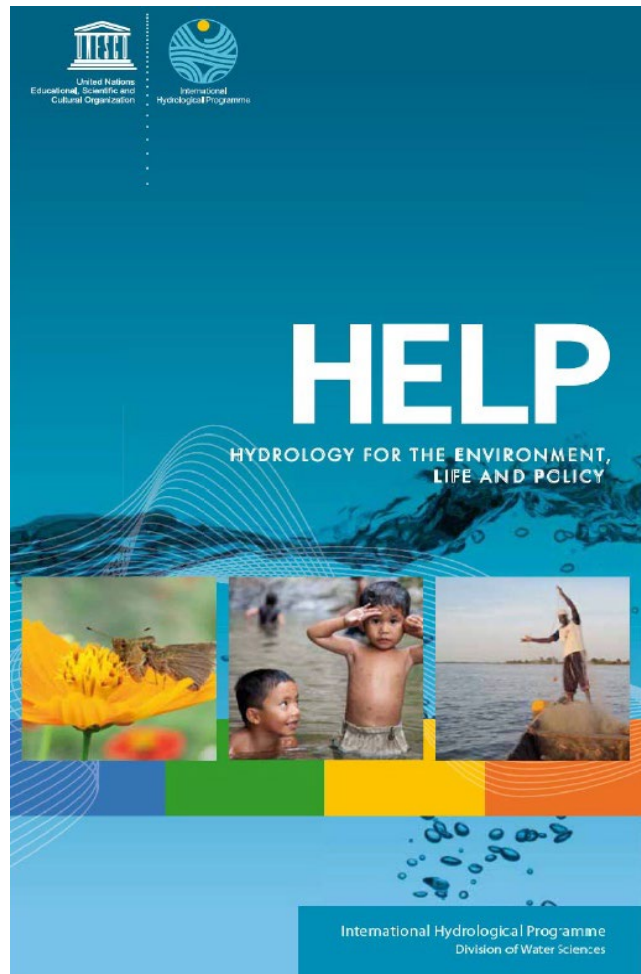
Prof Chris Spray, Eddleston Water Science Manager, Tweed Forum & University of Dundee. C.J.Spray@dundee.ac.uk

Team: Tweed Forum (Project Manager), Scottish Borders Council, Scottish Natural Heritage, Scottish Environment Protection Agency, Scottish Borders Countryside Services. **Project Steering Group:** Scottish Land & National Farmers Union, Scottish Environmental Foundation and the Environment Agency.

key stats
69km² water catchment.
115 engineered log structures.
38 flood storage ponds.
3.5km channel reamended.
>330k native trees planted.
£2.9m budget plus partner and
land manager contributions.
Produced more than £5million
NPV of benefits.
£950k NPV of flood damages
avoided.



Global HELP Initiative and Network



Established in 1999, **HELP (Hydrology for the Environment, Life & Policy)** is a cross-cutting programme establishing a global network of basins connecting hydrology and the needs of society.

It is a problem- and demand-driven initiative that addresses five key policy issues:

Water & climate
Water & food
Water quality & human health
Water & environment
Water & conflict

Global HELP Network was:

- **91 Basins spread over 67 countries**
- **600+ Organisations & 1000+ individuals**
- **UNESCO wish to revitalize HELP**
- **Dundee CWLPS invited to host Secretariat function partnering with RC-IRM (Nigeria)**
- **Re-Invigorating HELP (2.0) Kick-off - WWF 2024**



UNESCO-IHP HELP “Re-Invigorating the Hydrology for the Environment, Life and Policy (HELP) River Basin Network for Water Security”

Tuesday 21 May 2024 | From 9.00 a.m. to 10 a.m.
10th World Water Forum | World Water Council Pavilion

This event is jointly organised by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the UNESCO Category 2 Centre of Water Law, Policy & Science (CWLPS) based at University of Dundee, United Kingdom, and the Regional Centre on Integrated River Basin Management (RC-IRBM) under the auspices of UNESCO, Kaduna, Nigeria.



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UNESCO- IHP IX (2022-2029) Science for a Water Secure World in a Changing Environment

HELP Basins Provide Network of User-Driven Integrated Catchment Management Studies

From the technical perspective, the broad objectives are to strengthen field-orientated, experimental hydrology using the drainage basin as the unit of analysis. Water related physical (hydrological, climatological, and ecological) and non-physical (technical, sociological, economical, administrative and legal) observations are made in the catchments to address the most critical policy and management issues



From an operational perspective, the programme should be fully user-driven and considers policy needs for climate-resilient ecologically sustainable development. Science, policy and management groups are actively involved in the setting of the policy- and research agenda and in the review of policy and management practices to ensure that the scientific findings will benefit societal needs

Improving Governance in IHP-IX Strategy

- Water cycles (science) well understood, addressing water insecurities and inequalities requires a **political economy approach** to frame **effective governance** (**Outcome 5.2**)
- **CWG1** foregrounds the interdependency of sustainability issues across the *Water-Food-Energy (& Environment) Nexus*
- Virtue in advancing **regenerative water management** through nature-based solutions meeting local water needs, improving water quality & promoting ecosystem health **CWG3**
- **Focus on socio-ecological outcomes**, needs options appraisal, multi-criteria decision-making recognizing trade-offs e.g. regarding climate change mitigation & adaption
- Embrace IHP IX's *Theory of Change Approach* allied to **Productive Imagining for gender & youth inclusion**

Stepping towards Improved Water Governance

- Foster **stakeholder participation**
- Promote **transparency & accountability**
- Strengthen **institutional frameworks**
- Foster **collaboration & partnerships**
- Promote **innovation & knowledge sharing**
- Invest in **water infrastructure**



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Warmly acknowledge support of Scotland's Hydro Nation Agenda