

## Water for all project update for Lunan Catchment Management Group, March 2019.



1. A research paper has been accepted, subject to revision, for Journal of Environmental Management. Abstract below.
2. A paper on governance options is ready for submission. Abstract below.
3. A hydraulic hydrology student Remi Trenkmann from ENGEES, Strasborg, is undertaking a 6 month internship at JHI to carry out dynamic model calibration/validation/scenario analysis for the Upper Lunan Water. **He will give a progress report on this work at the Lunan CMG.**
4. The project was presented at the Scotland's Biennial Land Use and the Environment Conference XII I Edinburgh in November 2018.  
[https://www.sruc.ac.uk/downloads/download/1457/theme\\_2\\_presentations\\_how\\_can\\_land\\_managers\\_be\\_encouraged\\_and\\_helped\\_to\\_deliver\\_those\\_public\\_goods\\_effectively](https://www.sruc.ac.uk/downloads/download/1457/theme_2_presentations_how_can_land_managers_be_encouraged_and_helped_to_deliver_those_public_goods_effectively)
5. The project was also presented at the 3rd Regional IWA Diffuse Pollution Conference in Thailand in November 2018.
6. Plans for the coming year's SG funded work include:  
Communication with Agencies and other stakeholders in the Lunan Water and nationally.  
Construction of a hypothetical water management framework for the Lunan Water based on experience and modelling.  
Building on the Lunan Water experience and methods, explore alternative governance strategies across selected catchments (eg. Lunan, Leven, , Tweed, Moriston, Dee), including examples of those with internal drainage boards (Pow of Inchaffray, Carse of Gowrie, Lossie River, Scottish Canals) to deliver active management. A similar approach to that implemented in the Lunan catchment, (in depth qualitative interviews/quantitative questionnaire to investigate willingness to pay for improved water management strategies and governance), will be implemented. Using a similar approach will allow for a comparative analysis and to draw lessons for water management to deliver multiple benefits.

Water for all: towards an integrated approach to wetland conservation and flood risk reduction in a lowland catchment in Scotland. Andrew Vinten\*, Laure Kuhfuss\*, Orla Shortall\*, Jenni Stockan\*, Ade Ibiyemi\*, Ina Pohle\*, Stephen Addy\*, Marjorie Gabriel\*\*, Iain Gunn\*\*\* and Linda May\*\*\*.

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Strategies for sustainable water resources management require integration of hydrological, ecological and socio-economic considerations. The "Water for all" project has sought to develop a multi-disciplinary science case for innovative management of water levels and flows in a lowland catchment in Scotland. Local water demands of arable agriculture and protection from flood risk needed also to balance conservation needs of lowland mesotrophic wetlands. Hydro-ecological assessment focused on the outlet zone of Balgavies Lake, where the Lunan Water discharges into a partially confined common channel (lade) with water delivery to a mill, to the river, and to floodplain wetlands controlled by an existing weir. We analysed potential for (a) installing a remotely operated tilting weir, as a management tool for release and routing of flows. It is to be noted that this proposed structure would generate freer flows of water from upstream than is currently the case, but in a controlled way. (b) dredging of the common lade to deliver lower water levels and hence flood risk mitigation in the upstream lake. Both under current and dredged channel conditions, the

installation and active management of the weir provided opportunity for diversion of seasonal nutrient rich water from the upstream Lake away from a downstream floodplain wetland, Chapel Mires. A rapid assessment of the ecology of Chapel Mires and mixing analysis of the waters in these wetlands with the Lunan Water supported this view. Carrying out dredging of the channel reduced the current observed probability of upstream flooding from 3% to 1% and the proposed tilting weir would help to maintain these dredging benefits. Willingness to adopt such changes amongst catchment stakeholders and local residents was also considered. Survey and interviews showed constructive interest in the scheme, but also revealed concerns about the proposed project and its long term governance. The lessons learned had wider relevance to development of a catchment scale approaches to water ecosystem services provision.

Payments for environmental services provided by water management: what governance mechanism? Insights from the Lunan Water catchment, Scotland.

Water catchment management in Scotland negotiates a complex landscape of local and expert knowledge, cultural and historical norms, private water rights, and more recently, the pressures of environmental change. Recent forecasts of extreme weather events in Scotland (UKCP2018) has highlighted the need to think of water as a finite resource, requiring careful local management of this 'natural capital'. Various schemes have developed in recent years that aim to provide an integrated, consultative approach to environmental management, among which payment for environmental services has emerged as a successful example.

Yet, there are particular characteristics of water management that problematise current typologies of PES schemes and may also undermine local participation and willingness to pay. This paper explores these characteristics in a case study of the Lunan catchment in Angus, Scotland. We follow a scientific research project to develop and implement a tilting weir system in the catchment that aims to address wetland nutrient pollution, winter flooding in the upper catchment, and summer water shortages in the lower catchment. Proposed under a PES scheme, socio-scientific methods support the development of the weir system with a survey and series of interviews with local residents, farmers, and stakeholders to investigate land use, local environmental knowledge, and local support.

Research evidences conflicting levels of support between farmers and residents for engineered management of the catchment. We articulate these differences along four interlinked themes: local socio-historical norms; understandings of scientific knowledge and practice; the perception of individual rights and responsibilities in relation to water ; and concepts of 'nature'—particularly concerning interventions in 'natural' systems. Further, research evidences a number of concerns that we argue may characterise a) water management under a PES scheme and b) contemporary rural water relations in the Angus region.

