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Catchment Systems Engineering: A New Paradigm in Water Management

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Recent catchment initiatives have highlighted the need for new holistic approaches to sustainable water management. Catchment Systems Engineering seeks to describe catchment the function (or role) as the principal driver for evaluating how it should be managed in the future. Catchment Systems Engineering does not seek to re-establish a natural system but rather works with natural processes in order to engineer landscapes to accrue multiple benefits. The approach involves quantifying and assessing catchment change, impacts and most importantly, suggests an urgent and proactive agenda for future planning. In particular, an interventionist approach to managing hydrological flow pathways across scale is proposed.

It is already accepted that future management will require a range of scientific expertise and full engagement with stakeholders. This inclusive concept under a Catchment Systems Engineering agenda forces any consortia to commit to actively changing and perturbing the catchment system and thus learn, in situ, how to manage the environment for collective benefits. The shared cost, the design, the implementation, the evaluation and any subsequent modifications should involve all relevant parties in the consortia. This joint ownership of a 'hands on' interventionist agenda to catchment change is at the core of Catchment Systems Engineering.

In this paper we show a range of catchment engineering projects from the UK that have addressed multi-disciplinary approaches to flooding, pollution and ecosystem management, whilst maintaining economic food production. Examples using soft engineered features such as wetlands, ponds, woody debris dams and infiltration zones will be shown. Local scale demonstration activities, led by local champions, have proven to be an effective means of encouraging wider uptake.

Evidence that impacts can be achieved at local catchment scale will be introduced. Catchment Systems Engineering is a concept that relies on all relevant parties within a catchment to take responsibility for the water quantity and quality that arises from the catchment. Further, any holistic solution requires a bottom up, problem solving agenda which is facilitated by policy makers and is underpinned by scientific knowledge.

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