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DRY (Drought risk and you): Methodological issues in bringing narrative and science together to support decision-making in local drought risk management in the UK

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While traditionally drought risk assessment has drawn evidence primarily from specialist scientific domains, this paper shares a novel interdisciplinary and inter-professional approach that explores how, and by what processes, scientific and narrative evidence might be brought together to support decision-making. Our methods creatively draw on expertise of a team of researchers with non-contiguous disciplinary expertise, who have been working over three-years to integrate drought science and scenario-modelling with stakeholder engagement and narrative research. This approach reflects growing recognition of the multi-faceted nature of drought impacts, and the need to develop risk agendas and mitigation options for decision-makers. In past methods, drivers and stakeholders have been considered in isolation with strong foci on institutions with statutory responsibility for UK drought risk management (water companies; environmental regulator).

DRY (Drought Risk and You) is UK Natural Environment Research Council funded. Its methodology has been complex, fluid and emergent, embedding co-production processes throughout, and working with multiple stakeholders at national and catchment scales. Our approach is explicitly systems-based, working through connections and dis-connections, within drought risk and its adaptive processes. DRY's research design uses the river "catchment" as a physical-social-cultural system and place-based unit of analysis. Utilising case-study catchments in England, Scotland and Wales captures rainfall and drought risk across N-S/W-E climatic gradients, wide-ranging drought experiences and cultural/policy differences. Seven catchments (ca. 200 km2) were selected based on streamflow data availability along different gradients (including urban/rural; sociological). Within each catchment, our engagements focused longitudinally within and between six "domains": health/wellbeing, business, agricultural and horticulture, built environment, ecosystem services and public/ communities.

Within DRY's methodology, drought risk modelling using DiCASM (Distributed Catchment Scale hydrological Model) involved calibration and validation of past drought periods and scenario-ing of future drought risk within these catchments – a process shared with stakeholders. DiCASM quantifies water resource availability and gaps between water supply/demand. Mesocosm experiments on droughted grassland and crops have provided evidence bases for engaging different stakeholder groups including farmers/citizen scientists. In its process, DRY is evaluating alternative management strategies for mitigation of water shortages under present and future climate, using UKCP09 predictions for the 2020s, 2050s and 2080s. Our focus includes concern for the flood-drought continuum in adaptive thinking.

DRY captured these formative processes within interdisciplinary research team meetings (10), local and national advisory groups (40); individual stakeholder interviews, stakeholder workshops and short "off-road" conversations in local/regional events (250+). Our methodological reflections share creative explorations of issues at the science-narrative interface for drought research, considered in context of barriers to communicating drought risk and in surfacing drought narratives (dominant/counter). Issues include: conceiving narrative as data and data as narrative; co-working with science as a stimulus for narratives (past, present, future); interdisciplinary thinking in systems (feedback/tipping points); roles of visualisation in risk and complexity; co-developing "bite-sized" drought science; "What if" scenario-ing – bringing narrative and science together in engagements; developing catchment-based drought impact indices; and co-designing DRY's decision-support "Utility", drawing on both

science and narrative in catchments.