

SESSION 1: River restoration

SMART: Sediment and Mitigation Actions for the River Rother

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In the UK, some rivers are failing to meet the criteria for Good Ecological Status (GES) set out in the European Union Water Framework Directive. Current failures across the UK are complicated and are reported to include a range of chemical failures and / or have excessive sediment pressures in some cases leading to the burial of former gravel bed rivers by sand and silt. The Environment Agency and South Downs National Park Authority have identified sediment pressures as a key issue for the River Rother, a 350 km² river catchment draining much of the South Downs National Park in Southern England.

While fine sediment (which is known to transport nutrients and pollutants) has been identified as a key variable likely to prevent the attainment of GES in the Rother, the specific sources and causes of the problem have yet to be fully evaluated. Within this project we will explore potential sources and causes using a combination of primary and secondary data. Several of the soil associations in the catchment are known to be at high risk of erosion. However, erosion risk may have changed either as a result of changes in weather and climate or changes in land use and land management or some combination of the two. We will explore temporal changes in sediment yield using both long term records of turbidity and flow and reconstructing changes in rates of reservoir sedimentation over the last ~100 years in order to identify trends and possible causes.

Ten monitoring sites have been identified on 4 major tributaries and the main channel of the Rother. Tributaries have been chosen to represent a range of land use types and lithologies. Sediment samples are being recovered from sediment traps and from bed disturbance experiments in order to fingerprint potential sources within sub-catchments and the relative significance of individual sub-catchments. Using sedimentary archives in lakes and floodplains, core data can be compared with historical land data to determine any changes through time and assist on evaluating sources of soil erosion. Monitoring in key sub catchments can also aid in targeting mitigation options to problematic fields and pathways.

SESSION 1: River restoration

Lessons for the future: Learning from river restoration in the National Park

Jennifer Cox

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The River Rother in West Sussex flows along the greensand ridge through the heart of the South Downs National Park, draining approximately 350km². Over time significant land use pressures within the catchment have contributed to the degradation of the riverine ecosystem, and catchment restoration is now driven by the European Water Framework Directive (WFD). In August 2013 a 60m riffle glide feature was installed by the Arun and Rother Rivers Trust downstream of Shopham Bridge, near Petworth to enhance fisheries and spawning habitat within the catchment. The enhancement scheme has been monitored by the University of Portsmouth in partnership with the South Downs National Park Authority with the view of informing future restoration schemes within the catchment.

Repeat topographic, bathymetric and velocity surveys were completed using an Acoustic Doppler Current Profiler and an RTK GPS over a 180m reach, a pre-restoration survey complements a suite of 6 post-project surveys undertaken over an 18 month period. During the 2013-14 winter, a 1 in 100 year flood event tested the resilience of the newly installed feature. Post-processing of the data has led to the development of a series of Digital Elevation Models (DEMs) and velocity maps enabling analysis of the scheme's performance of physical habitat provision. Substantial morphological change to the feature and the wider reach was observed directly following the flood event. Deposition >1m over the head (upstream) of the feature saw the relocation of the crest and significant scour >1m was observed upstream and downstream of the feature deepening existing pools.

Diversity of depth and velocities are maintained since installation within the reach, however peak velocities at low flows have been lost with the morphological change. Evaluation of the data against suitability criteria for selected fish species suggests diversification of physical habitat provision within the reach. Despite physical habitat improvements for fry over the riffle, the weighted usable volume of the channel for fry is still significantly lower than for other life stages of the same species. The results indicate that the feature has been resilient, however post-flood monitoring suggests sediments mobilised upstream during the flooding are pulsing through the system with seasonal deposition of sediment observed within the reach. This project has highlighted the benefits of detailed high resolution monitoring of river restoration schemes, and future surveys of the River Rother will reveal if the feature is self-cleansing with the remobilisation of temporary sediment deposits, and confirm this seasonal trend.

SESSION 2: Cultural heritage and built environment

Industrious Estates

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Introduction

Around 80,000 people are estimated to work within boundaries of the South Downs National Park (SDNP). Our group of students has studied fourteen working industrial estates within the Park. These aggregations of sheds are important places in the rural landscape and economy, housing the small industrial and warehousing businesses which provide around a quarter of the jobs in the SDNP.

Aims

The project has two key goals:

1. Analysis: to increase understanding of the existing industrial estates within the SDNP, both in spatial terms and as elements of the local rural economy.
2. Propositional Research: to explore new models for sustainable rural industrial architecture.

The Study

The study consists of:

- desktop research
- observational measured drawings
- conceptual architectural propositions
- economic models.

Outcomes

On these sites between ancient woodland, open downland, heathland and farmland, we recorded a layering of historic and contemporary vernacular architecture; low cost, informal, improvised, driven by economics and contingency but lively and rich in its functionality and interaction with the landscape.

We found the sites being used by wedding caterers, candle factories, manufacturers of military vehicles, importers of chewing gum, furniture makers, children's party venues and music classes, and plenty of places to repair a car. Alongside studying these sites, we studied a number of parallel conditions including the whimsical gatehouses of the 'Great Estates', held a seminar with the New Economics Foundation, and studied the Social Enterprise and Makerspace movements.

Based on this research, we have proposed new types of industrial buildings, through extensions and adaptations to the existing industrial estates. The proposals are studies for new forms of rural industrial architecture, harnessing sustainable energy sources and developing the local economy by enhancing existing clusters and proposing new circular business models. The proposals include plants making biodiesel from used cooking oil, multi-storey industrial buildings inspired by South-East Asian precedents, breweries, and meanwhile uses activating sites.

SESSION 2: Cultural heritage and built environment

The Postman's Park: the South Downs and the cultural heritage of the Post Office

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The Post Office has been a focus of every rural village, town and city for centuries. As sole provider of mass, cheap, communication, it allowed rural communities to remain connected with the wider world. In more recent years, its prominence has declined both in use and position on the high street. Post Offices are no longer grand, public sites of civic culture, instead placed at the back of small supermarkets, out of sight and out of mind. Consequently this demise places greater importance on remembering the cultural heritage of such an ubiquitous institution.

The paper will highlight the history of the Post Offices found within the boundaries of the South Downs National Park Authority, their relevance and the importance they maintain within the heritage of the area. From Winchester in the West to Lewes in the East, each Post Office was bound by the same regulations, employed local people under the same terms and provided the same service. This is not a history of communication, instead the bringing together of the histories of those who lived, worked and breathed the institution. Every community found within the area covered by the South Downs National Park would have had used the service, and known those employed by the Post Office.

Using photographs, local and area maps and personal details of local Post Office employees from the period of 1870 to 1918, the paper will take a historical approach to the Post Office. It will demonstrate how it was found during this period, in stark comparison to that of today and the implications such a loss will have on local and national areas. Moreover, given the Post Office's dominance, the importance of maintaining the history of an national institution on a local level will be discussed. Overall it will create discussion and new discourse regarding the often forgotten histories of the Post Office, as both a site of employment through the area for many, and its lasting legacy within rural communities.

SESSION 3: Biodiversity

Barn Owl Nestbox Occupation in relation to Habitat Quality in South Downs National Park

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Habitat destruction has led to the decline of many native species in the UK, including those typically associated with farmland. The Barn Owl (*Tyto alba*), a flagship farmland species, has been experiencing habitat loss and population declines across its range, with the British population declining by approximately 69% over the last 50 years¹. A number of factors have contributed to this decline, the main being the loss of suitable habitat for nesting and roosting and for hunting of their small mammal prey, such as Field Voles (*Microtus agrestis*)².

Many changes in farming practices associated with agricultural intensification over the past 50 years have led to a reduction in the availability of such habitat in the UK³. As a result of losses of old farm buildings and hollow trees, the British Barn Owl population has become increasingly dependent on the availability of man-made nestboxes². Vegetation characteristics of prey habitat in areas containing nestboxes is therefore a topic of conservation concern. The main aim of this project is to quantify vegetation structure and composition of Barn Owl hunting habitat at a fine scale and compare this to Barn Owl occupation of nestboxes at sites within the South Downs National Park (SDNP), to assess whether there is a relationship between vegetation characteristics and the occurrence of Barn Owls in the area.

To determine this relationship, vegetation assessments with a particular focus on the quality of prey habitat will be carried out around nestboxes at multiple sites within SDNP. The vegetation analysis will utilize the point quadrat method to assess features of the vegetation within the Barn Owl's hunting range. Considering the requirements of Field Voles and other small mammal prey species, the assessment will take vegetation cover, density, sward height, litter layer, and structural heterogeneity into account. Camera traps and data from the South Downs nestbox monitoring scheme will be used to determine Barn Owl occupation/utilisation of nestboxes.

The main outcome of this study will be to provide a detailed picture of the vegetation characteristics that support Barn Owl occupation of areas within SDNP. This information will provide local land managers with information on what kind of vegetation structure and composition to maintain in order to enhance the chances of Barn Owl occupation/breeding in an area, and will provide recommendations of habitat features and vegetation characteristics that should be taken into account when deciding where to erect nestboxes in the future.

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3. Askew, N. P., Searle, J. B., & Moore, N. P. (2007). Agri-environment schemes and foraging of barn owls *Tyto alba*. *Agriculture, Ecosystems and Environment*, 118, 109–114. doi:10.1016/j.agee.2006.05.003

SESSION 3: Biodiversity

Effects of Structural Heterogeneity on Butterfly Response to Variable Weather Conditions in Woodland and Grassland Habitats

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Management practices are being developed that seek to reconcile the need for habitats to generate a commercial yield, whilst also promoting biodiversity through structural heterogeneity. It is important that studies are carried out to assess the level to which these goals are being achieved. I aim to quantify the success of these practices through taking direct measurements of structural variables in neighbouring woodland and grassland habitats using butterflies as indicator species due to their sensitivity to habitat alterations.

Structural measurements will be taken from both habitat types (canopy closure, foliage height diversity and tree density in woodlands; sward height, ratio of grass to herb, and structural measurements using point quadrats in grasslands) and related to fluctuating numbers of butterflies, identified to species level, during the breeding season. I aim to investigate if habitat structure has an effect on how rapidly butterflies disappear in unfavourable conditions, and how quickly they re-emerge when favourable conditions return.

I will walk transects through woodland and grassland patches, and along the borders between them, at Marwell Wildlife's site near Winchester. Marwell currently owns and manages a network of woodland and grassland patches in a multi-functional approach to sustainably harvest products and provide high levels of biodiversity. I aim to assess the success of these goals by monitoring butterfly species richness and fluctuating abundance, and carrying out structural measurements of the habitat.

The measurement of structural heterogeneity of similar paired habitat types of woodland and grassland with differing management plans, and differing levels of transition between the habitats, will allow us to gain insights into the relative merits for each in providing biodiverse habitats. If the sites being managed with biodiversity goals in mind are found to accommodate significantly higher levels of butterfly species richness in higher abundances, and allow for faster recovery after unfavourable weather conditions, it suggests that these practices are successful in enhancing the habitat for wildlife.

The fine-scale data on butterfly fluctuations generated from this project will indicate whether the policy of greater structural heterogeneity can be successful in promoting diversity at a local level in a landscape that is a mosaic of differing habitat types, and where patches can easily become isolated.

SESSION 3: Biodiversity

Targeted Agri-Environment Schemes Significantly Increase The Size Of Bumblebee Populations

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Changes in agricultural practice across Europe and North America have been associated with range contractions and local extinction of bumblebees (*Bombus* spp.). A number of agri-environment schemes have been implemented to halt and reverse these declines, predominantly revolving around the provision of additional forage plants. Although it has been demonstrated that these schemes can attract substantial numbers of foraging bumblebees, it remains unclear to what extent they actually increase bumblebee populations.

A number of Higher Level Stewardship (HLS) farms implementing flower-rich schemes were selected across Hampshire and West Sussex with several within and alongside the South Downs National Park (SDNP). An equal number of Entry Level Stewardship (ELS) farms in the same area were selected for comparison. We used standardised transect walks and molecular estimates of bumblebee population size to compare the size of bumblebee populations between HLS and ELS control farms.

Bumblebee abundance on the transect walks was significantly higher on HLS farms than ELS farms. Molecular estimates of colony density revealed that *Bombus hortorum* (46 vs 10 nests/km²) and *Bombus lapidarius* (42 vs 20 nests/km²) nested at significantly greater densities on HLS farms than ELS farms. *Bombus terrestris* was found at marginally non-significantly higher densities on HLS farms (84 vs 34 nests/km²) and there were no differences for *Bombus pascuorum* (29 vs 37 nests/km²). Across all bumblebee species, HLS management had a significantly positive effect on bumblebee nest density. These results show that targeted agri-environment schemes that increase the availability of suitable forage can significantly increase the size of wild bumblebee populations within an agricultural landscape.

SESSION 3: Biodiversity

An analysis of the restoration of chalk grassland at the Beddingham landfill site, with particular reference to the possible impact of *Rhinanthus minor*

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Chalk grassland supports some of the most diverse plant communities in Europe. Changes in land use means chalk grassland has diminished significantly in recent years. Estimates suggest that chalk grassland covered up to 50% of the Downs in the 1940's and now covers just 3-4%. There are many local schemes seeking to slow this decline, either to restore areas back to good condition, or to re-instate areas that have been lost.

Beddingham Landfill site is an example of an ongoing attempt to re-instate a piece of chalk grassland. A former chalk quarry, the first section of the landfill site was operational 1980 and the last waste was received at the site in May 2009. My research is focused on an area of the site that was seeded with a chalk grassland mix in 2010. It is adjacent to Firl Escarpment, in full view from the South Down's Way.

In common with all restoration and reinstatement of chalk grassland the aftercare and long-term management are vital to ensure the habitat is maintained. Some studies have shown that Yellow Rattle (*Rhinanthus minor*) has the potential to be used as a practical management tool to assist the colonization of species-poor grasslands by a more diverse range of species. *R. minor* is semi-parasitic and can suppress the growth of its host, thereby increasing biodiversity by enabling other species to thrive. This is a particularly attractive possibility where more traditional management techniques such as grazing are not possible.

The aim of my research is to monitor the plant species composition and diversity of the newly reinstated grassland at Beddingham over four years, and to test the effect of *R. minor* on the plant community on different types of grassland that exist on the site.

To achieve this I have assigned 4 areas on the site (North, South, South West and Top). On each area I have 15 x 2m² randomly allocated permanent plots (total of 60). Each plot received 1 of 3 treatment in October 2014; 5g *R.minor* seed, 1g *R. minor* seed, or no *R.minor* seed. I am carrying out 3 surveys a year using a 1m² quadrat to record the plants on each plot.

To date 3 surveys have been completed, and it is too early in the research to draw any conclusions. Though initial results have shown the germination rates were variable around the site and that there are many factors that will effect how *R.minor* could be effectively used as a management tool.

Poster Presentation

Painting the South Downs: a caregiver's experience of outdoor landscape painting as an occupation after losing a father

Avril Holworthy

University of Brighton

This research will explore how the experience of re-engagement with a meaningful occupation and connecting with nature contributed to reconstructing well-being as a caregiver after losing my father. I used the activity of outdoor landscape painting as an expressive emotional tool during the process of bereavement. Specifically, I will use the story of a day painting on the South Downs.

I will explore, how as an artist, I took inspiration from painters in art history who used landscape to describe and explore their emotions (Neve 1990). I will connect this to the therapeutic nature of meaningful occupations during bereavement that may act as a bridge from loss to future hopefulness (Hoppes 2005).

(i) Main aim of the project

To explore the experience of outdoor landscape painting as an occupation for a caregiver following loss.

Caregivers who have been bereaved often experience 'double deprivation' (Keesing et al 2011). Keesing et al's (2011) grounded theory study, suggests caregivers feel both deprived and disengaged from their normal occupations. This can occur whilst caring for a loved one and often continued into the early process of bereavement.

Neve (1990) suggests painting is a way of discovering self and that the landscape may help to precipitate this. In turn, imagined landscapes may also play a role in mirroring emotions (Rose 2012). Rose's (2012) theoretical paper supports the idea from a psychoanalytical perspective arguing that therapeutic landscapes of the mind could be used to improve a person's self-understanding and well-being.

Autoethnography as a qualitative research method will be used. This is characterised by the researcher using themselves and their story as the research (Muncey 2010). There is a precedent for using autoethnography in occupational therapy research to examine bereavement, loss and occupation (Hoppes 2005, Forhan 2010). While there is a focus on the personal experience, autoethnography connects the self-narrative to the wider outward facing social and cultural world (Ellis and Brochner 2000).

The value of preserving my story in an autoethnographical form will be to find meaning through structured academic analysis within a social context. This meaning may help benefit others experiencing bereavement or loss. It may also help occupational therapists to see the value in an occupation, such as painting and the experience of nature. Currently, literature reveals there is limited occupational therapy research in relation to bereavement and loss. Therefore, the understandings from this research may go towards helping inform how occupational therapy practice can be effective in this area.

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