Department of Geography and Environmental Science

Evaluating the Multiple Functions of Woodlands for Natural Flood Management (NFM)

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Introduction

NFM is the reduction of flood risk by protecting, restoring, altering, and emulating natural river catchment features[1,5]. NFM, part of working with natural processes (WWNP), has clear environmental benefits in comparison to its less sustainable, hard engineering alternatives[3]. It can also be initially cheaper and is an integrated element of the landscape, interconnected with both the social and natural sciences[2] . This study will focus on leaky barriers and woodlands (tree-planting) as forms of NFM along with community engagement.

Leaky barriers slow the flow of water immediately upstream, improving vertical and lateral connectivity to the floodplain and groundwater[4]. This discourages incision of watercourses, which heightens downstream flood risk as discharge is greater[6]. Arguably, there are 3 kinds of leaky barrier: natural (a tree has fallen), semi-natural (tree trunks and branches are cut and positioned to look natural e.g. Figure 1), and structured (purposefully engineered)[8]; this is influenced by what 'look' a landowner prefers.

Figure 1: leaky barrier in Englefield

It is an integral part of NFM to incorporate local knowledge into NFM measures as this encourages a bottom-up approach to flood management. Community engagement encapsulates this; it is a participatory method where the public have an input in changing their environment as opposed to a top-down approach[7].

Research Sites

2 locations within lowland groundwater dominated catchments, fed by chalk streams in the West Thames area:

1) River Bourne, Englefield, Berkshire.

- Pang Valley Flood Forum (PVFF) selected this location based on the underlying geology of the catchment as it is a flashy watercourse which feeds into the River Pang

2) River Whitewater, Mill Corner, Hook.

- Chalk streams running through gardens and private property, with additional sewer flooding

Aims

- **Evaluate the impact of woody leaky barriers on peak flow using field monitoring data**
- **Evaluate the impact of woodlands on infiltration and soil water storage**
- **Assess the role of community engagement and knowledge in NFM project design, delivery, and monitoring**

Methods

- Flow monitoring (equipment and software and timescale)
- Soil sampling to compare soil water storage abilities under recently planted trees versus that of long-established woodland
- Interviews (walk and talk) with individuals from communities affected by flooding (Mill Corner and Pangbourne), and the use of images to describe their interactions with NFM in the environment

Wider Implications

- This research will reduce the current knowledge deficit there is regarding the effectiveness of NFM as part of WWNP by addressing research gaps and improving our understanding of NFM measures within the West Thames area
- This research is being co-produced by local communities and higher authorities for a bottom-up and sustainable (both socially and environmentally) approach to flood management (figure 2)

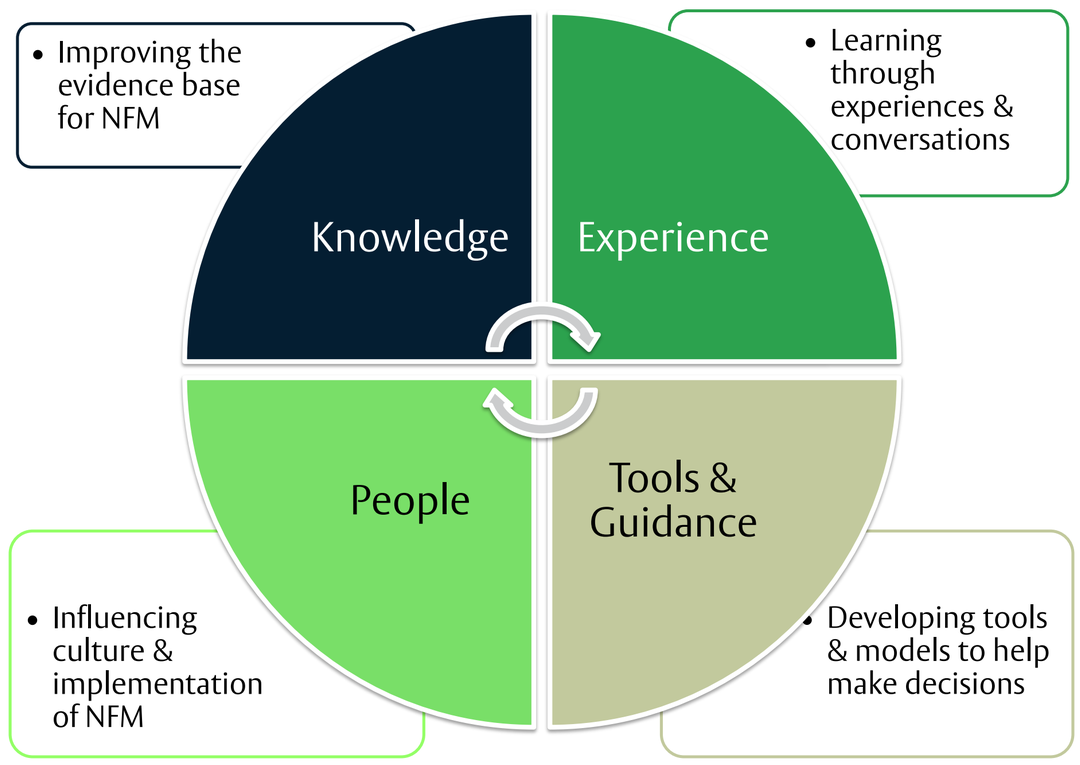

Figure 2: WWNP model showing the integration of community with NFM to form sustainable solution to flood risk management

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