

Remote solutions for remote locations: A rural NFM monitoring framework for HMH's

Author: Mr Bartholomew Hill, 2020 PhD Starter

Supervisory Team: Professor Qihua Liang, Professor Lee Boshier, Dr Huili Chen

PhD Title: "A large-scale hydrodynamic flood modelling approach to explore nature-based solutions for catchment-based flood management"

Remote Challenges

No internationally recognised standard methodologies to monitor NbS implemented against HMHs

Data in remote regions or low-income settings can be poor, particularly in highly vegetated or mountain areas

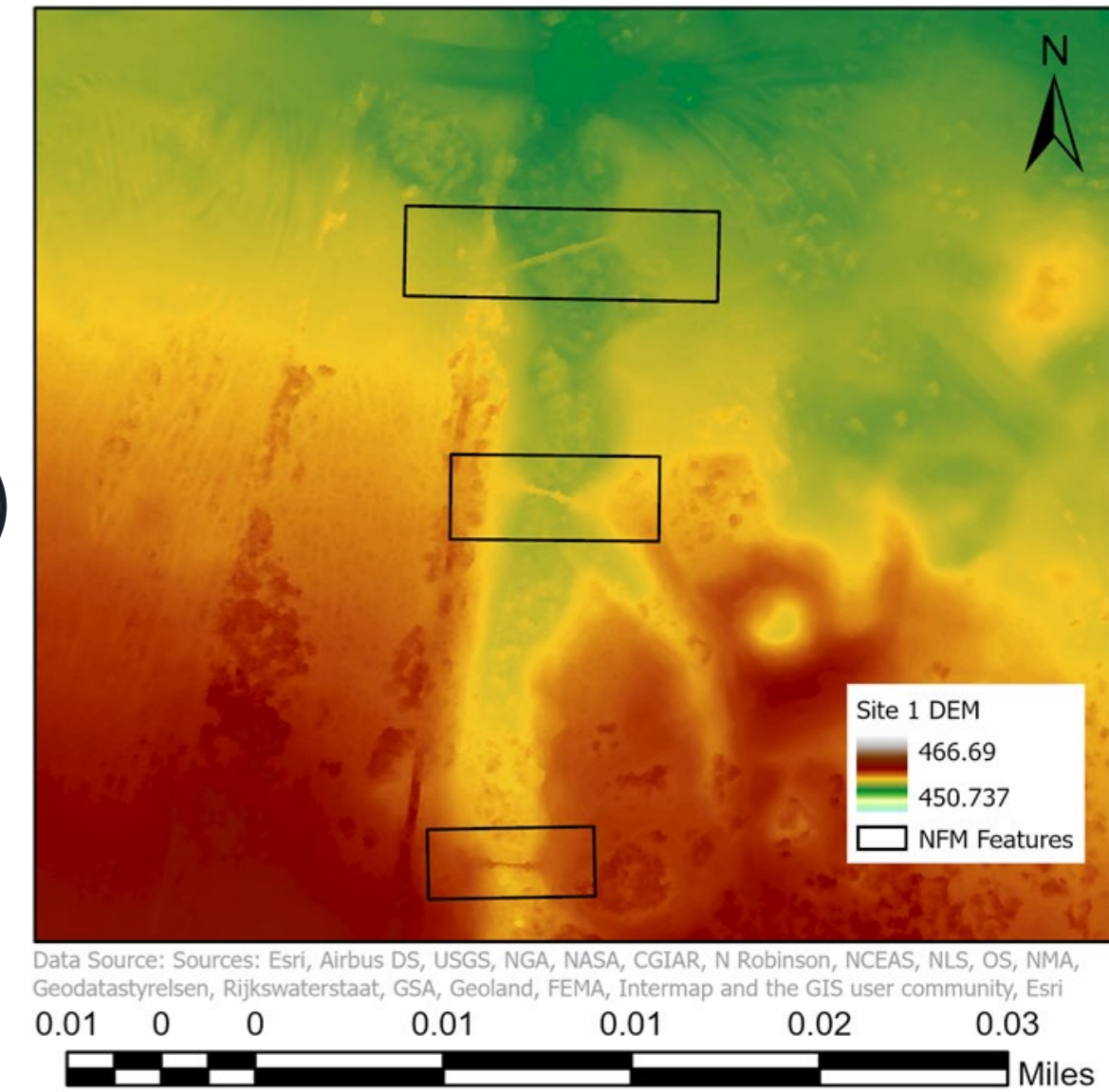
NbS features or site scale NbS opportunities are small (<1m) and are challenging to monitor

This work aims to explore methods to tackle data scarcity, and propose a monitoring framework for these areas

Remote Solutions

UAV photogrammetry and handheld LiDAR provide a method for gathering high-resolution data (<50mm)

Photogrammetry and LiDAR effectively picked up accurate; elevation, tractor tracks, and NbS features on-site.



STAGE 1: Desk-based Identification

Geolocating of current/proposed NFM sites

TOLS identification (Buffer)

Optimal gauge siting (Purpose & Budget)

Data need identification

STAGE 2: Data Gathering & Implementation

UAS flights (LiDAR or SfM)

LiDAR Scans (Ground & Airborne)

Gauging (LoWARAN sensors)

Community data gathering

STAGE 3: Post-processing and future proofing

GIS comparison (Annual change or since last survey)

Model comparison & updating (Expected vs Actual)

Planned next survey & assessment of any new changes

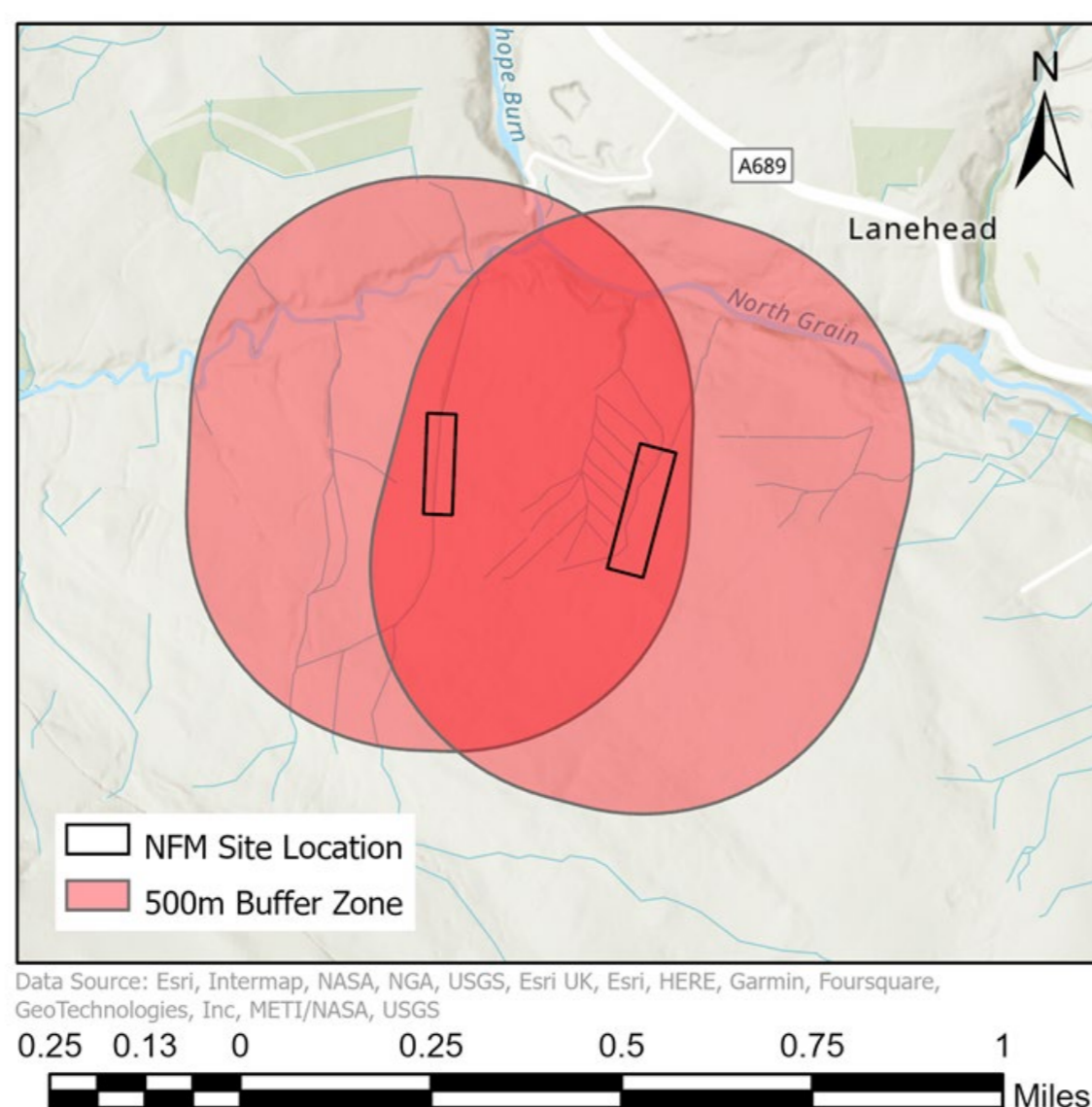
Gauging evaluation

Long-term monitoring plan (Including O&M)

Optimisation

Take-off and landing zone buffers would allow multiple sites to be serviced in one

Integrating this framework into my PhD will provide me with improved methods for collecting data in remote areas



Conclusions

UAV surveys combined with other monitoring methods can produce high-resolution (<50mm) DEM data

LoWARAN networks and community science combined with these survey methods, highlights a potential holistic HMHs monitoring framework

GIS and re-evaluation could optimise monitoring plans

Future Research:

While these methods were employed in the UK, they are yet to be employed in low- middle- income settings