SSRP
SUSSEX SUSTAINABILITY RESEARCH PROGRAMME

Life in a shared landscape: varied land management can provide the diversity of outcomes people and nature need

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BACKGROUND

‘Zero Hunger’ and ‘Life on Land’ are two Sustainable Development Goals (SDGs) that regularly come into conflict. Through agriculture and conservation, both compete for land area and can dictate the form and function of landscapes. The ways in which land is dedicated to sustainable food production and biodiversity conservation will determine how these and other SDGs are achieved. Here we explore the synergies and trade-offs between meat production, biodiversity conservation, and wider ecosystem service provision on agricultural and nature conservation sites in South-East England. We specifically focus on the role large herbivores play, asking the question: what are appropriate assemblages and abundances of large herbivores to provide for people and nature?

METHODS

By combining qualitative and quantitative techniques and concepts from social science and ecology, this project provides an innovative and interdisciplinary approach to address a complex sustainability question. The study comprises of two interlinked methodological strands – 1) a Multi-Criteria Mapping (MCM) exercise, and 2) ecological field studies at six sites (Ashdown Forest, Brighton and Hove City Council, Butcherlands on the Ebernoe Nature Reserve, Saddlescombe Farm, Tablehurst Farm). The MCM exercise explored different understandings of the performance of contrasting management approaches which partially mirror the study sites. Six ecological metrics (vegetation structure, medium/large mammals, birds, bats, invertebrates, soil) at four randomly situated plots were measured at each of the six sites. A management questionnaire was used to gather information about how the sites and large herbivores were managed.

FINDINGS

Our MCM exercise provided 67 criteria by which successful land use and large herbivore management can be judged. Just over 70% of these relate to various categories of Ecosystem Services, the remainder related to different aspects of viability and desirability of the different approaches. Overall, our MCM exercise indicates that our stakeholders believe agroecological farming is the single best option to deliver the needs of people and nature. This is driven by more conservation focused stakeholders’ aversion to conventional farming and farmers’ favouring of agroecological farming. However, the performance of different options varies across criteria and combinations of options may be best at landscape scales. The management survey highlighted that no two sites have the same large herbivore assemblage and stocking density varies considerably. Our ecological field studies highlighted the variety of biodiversity, food production, and other ecosystem service outcomes delivered across the sites. Of particular note was that the agroecological farm (Tablehurst) produced the most red meat and was amongst the best performing sites for biodiversity. We recorded the greatest number of taxa at Tablehurst and it ranked in the top three for diversity in all four of the taxa recorded.

Fig 1: LiDAR derived vegetation cross-section (Top), Arial photograph (Middle), and Stocking densities and Vegetation management descriptions (Bottom) for each our six ecological field study sites. LiDAR and photographs are representative selections from one of the four plots situated on each site. Stocking densities and vegetation management are given at the site scale. Columns indicate sites are geographically close to each other with similar soil types

Fig 2: Written and visual descriptions of the four land management options used in the Multi-Criteria Mapping (MCM) exercise

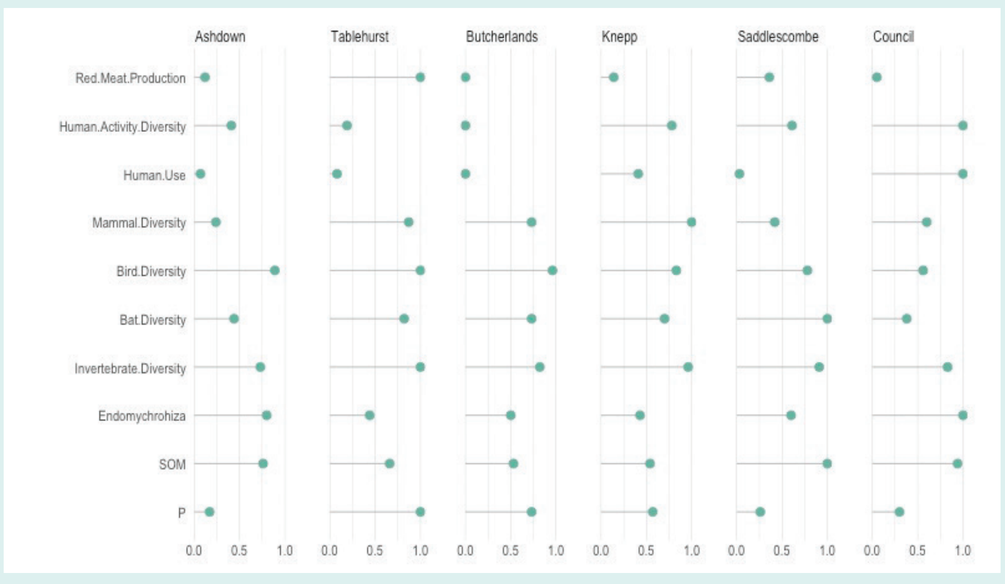

Fig 3: Summary results for a variety of measured variables for each field study site, covering a range of ecosystem services. Each variable is given on a relative scale with the site recording the highest value scoring a 1. Variables from bottom to top: P = Soil Phosphorous (mg/l), SOM = Soil Organic Matter (%), Endomycrohizae = Soil Endomycrohizae (%), Invertebrate/Bat/Bird/ Mammal Diversity = Shannon’s Diversity Index for given taxa, Human Use = Number of people recorded using the site, Human Activity Diversity = Shannon’s Diversity Index of recorded human activities, Red Meat Production = Site’s estimated production of red meat (kg/ha/year)

CONCLUSIONS

Taken overall, the results suggest that sustainable red meat consumption (14 grams/person/day) can be provided for (with the potential to help achieve ’Zero Hunger’) while contributing to biodiversity conservation (’Life on Land’) and ecosystem service delivery. Further work could incorporate MCM, ecological assessment and GIS to enable a more context-sensitive and spatially explicit approach and support decision making. The SDGs offer guidance on the diversity of issues that relate to sustainable land use, but our study highlights that the needs of nature and society at a local scale are even more complex and do not map easily onto the SDG targets and indicators.

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