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Monitoring and Modeling the Impact of Grazers Using Visual, Remote and Traditional Field Techniques

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The relationship between wild and domestic animals and the landscape they graze upon is important to soil erosion studies because they are a strong influence on vegetation cover (a key control on the rate of overland flow runoff), and also because the grazers contribute directly to sediment transport via carriage and indirectly by exposing fresh soil by trampling and burrowing/excavating. Quantifying the impacts of these effects on soil erosion and their dependence on grazing intensity, in complex semi-natural habitats has proved difficult. This is due to lack of manpower to collect sufficient data and weak standardization of data collection between observers. The advent of cheaper and more sophisticated digital camera technology and GPS tracking devices has lead to an increase in the amount of habitat monitoring information that is being collected. We report on the use of automated trail cameras to continuously capture images of grazer (sheep, rabbits, deer) activity in a variety of habitats at the Moor House nature reserve in northern England. As well as grazer activity these cameras also give valuable information on key climatic soil erosion factors such as snow, rain and wind and plant growth and thus allow the importance of a range of grazer activities and the grazing intensity to be estimated. GPS collars and more well established survey methods (erosion monitoring, dung counting and vegetation surveys) are being used to generate a detailed representation of land usage and plan camera siting. This paper describes the data collection techniques, outlines the quantitative and qualitative data collected and proposes online and offline systems that can reduce the data processing time and increase focus on important subsets in the collected data. We also present a land usage model that estimates grazing intensity, grazer behaviours and their impact on soil coverage at sites where cameras have not been deployed, based on generalising from camera sites to other sites with similar morphology and ecology, where the GPS tracks indicate similar levels of grazer activity. This is ongoing research with results continually feeding back to the data collection regimes in terms of camera placement. This all makes a valuable contribution to the debate about the dynamics of grazing behaviour and its impact on soil erosion.