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Challenges and potential for predicting and managing climate threats to cultural heritage in Sweden

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Cultural heritage in Sweden is increasingly at risk from a number of climate change related factors. These include the direct effects of erosion, flooding, landslides, melting permafrost and related threats, but also increasing industrial activity in the Arctic associated with energy production and the extraction of minerals for 'green' technologies. Whilst much of the physical science of climate related threats is well understood, the practical implications at the local and regional level, as well as the hands-on management of these risks has been somewhat neglected. In a recent pilot study we exposed problems in government planning processes, and in particular that even though the general risks and potential consequences are known, Sweden lacks any form of coordinated system for the prioritisation of sites in terms of conservation, protection, documentation or abandonment. On an international level, we also identified a tendency to focus on above ground archaeological remains and high status sites and monuments. Cultural landscapes, preserved organic and palaeoecological archives, and as yet undiscovered sites are, on the other hand, are less frequently studied and often neglected in planning processes.

Many important cultural heritage sites and landscapes are in close proximity to, and potentially impacted by, transport infrastructure. As the climate warms, roads in particular are increasing in number and traffic volume in the northern areas of Scandinavia. In cooperation with the Swedish Transport Administration we developed a prototype GIS system for assisting in the evaluation of climate related threats to sites in close proximity to transport infrastructure. Three areas were investigated in more detail, ranging from temperate coastal to sub-Arctic rural settings and including a broad variety of cultural heritage types from prehistoric to historical. Case studies looked at particular secondary risks, including the expanding use road salt, and the use of specific datasets (e.g. historical maps, erosion models). This work exposed not only the potential for using such a system in research and planning, but also a number of issues in the uncritical use of publicly available national databases for transport infrastructure, climate threats, and cultural heritage. For example, the poor spatial resolution of risk maps in the Arctic and the poor locational accuracy of many older archaeological and historical investigations can lead to an incorrect assessment of threats. Similarly, much of the rural north of Sweden is poorly surveyed, and existing predictive models for locating unknown sites are inadequate. There is thus a potential bias between risk assessment in the south and the north, and between urban and rural areas. A clear potential exists for the further development of GIS based models with a greater capacity for

visualizing and, to an extent compensating for, variability in the quality of the underlying data.

This presentation will show some results and conclusions from these studies, as well as some preliminary findings from ongoing research into the reasons behind problems of implementing strategies for the prioritisation of cultural heritage threatened by future climate change.