

## **Conflicts in landscapes. The potential of HGIS for sustainable heritage management and research in dynamic landscapes and multi-stakeholder environments**

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Wetlands are typically among some of the most dynamic type of landscapes on earth. Their distinct geomorphological characteristics make them strongly susceptible for environmental changes such as climate, demography, and economy. Equally, these characteristics have made these areas appealing for inhabitants throughout history and provide excellent preservation conditions. Subsequently shaping these landscapes in unique and invaluable heritage archives reflecting long-term human-earth interactions. Furthermore, these wetlands are increasingly perceived as valuable ecoservice systems for amongst other carbon storage and water management. As a result, interest in these areas is growing and attracting a wide variety of stakeholders. The precise impact of these dynamics on the heritage contained in these landscapes remains generally unclear and protective measures often strongly differ (i.e., ranging from regional planning restrictions to World Heritage). Most of these protective measures however focus only on one aspect in these dynamic landscapes (e.g., ecological, biological, or cultural) and integrated approaches are generally lacking. This is problematic not only because of the dynamic nature of the landscapes (i.e., cultural and natural processes are strongly intertwined), but equally for local inhabitants. For example, the preservation of archaeological remains, plans for rewilding, or local inundation can clash with the interests of people living and working these areas (e.g., farmers). The same holds true for many coastal marshes, where strictly focusing on preserving natural processes often directly contradicts heritage preservation and economic activities such as fishing and shipping, which often have been at the core of the livelihood and identity of local communities for centuries and helped shape the same landscape. These local inhabitants often have been preserving the precarious balance between natural and cultural factors for ages. Therefore, in order to sustainably maintain and develop these landscapes a multidisciplinary approach is essential. An approach integrating cultural and natural, historical and modern-day data and equally taking into account different stakeholders and specific interest groups (e.g., politicians, inhabitants). In this paper we present a recently-developed methodology recently developed specifically aimed at supporting such an integrated approach and facilitating a wide variety of stakeholders. By focusing on two typical wetlands in the Netherlands (i.e., the fenlands of the western Netherlands and the world-heritage site of Schokland) we will present our 'Wetland-HGIS' which is specifically designed to facilitate sustainable management and multidisciplinary research of heritage in dynamic environments. The system uses concepts derived from Historical Geographical Information Science (HGIS) and allows to integrate

varying types of data (i.e., natural vs cultural and historical vs modern) and proxies, service a wide variety of stakeholders, and design and execute tailor made queries. We will show that (1) our approach is highly suited for unravelling the diachronic complexity of landscapes, (2) our method underlines the importance of history, especially in wetlands, for sustainable (re)development of present-day and future landscapes, and (3) the system helps to translate these historical and modern data in to one integrated overview beneficial for policy making and public outreach.