The medieval port area of 'het Zwin' is a dynamic landscape, influenced for centuries by the interaction between men and nature. The broad sea channel of 'het Zwin' supported the development of a linear portuary area with flourishing harbour settlements on its banks and crowned by Bruges which grew into an economic and cultural metropolis. After 1500, the economic importance of Bruges and the surrounding areas diminished due to increased silting of the tidal inlet. The Zwin area lost its function as a harbour and many settlements along it became deserted.

For more than a century the debate around Bruges' connection to the sea and the lost villages was dominated by historians and pedologists, while archaeological input was almost nonexistent. In recent years however, landscape archaeology demonstrated the potential of non-invasive prospection techniques. A combination of traditional and new non-destructive prospection techniques promises to deliver a broader and more valuable archaeological dataset, resulting in a better understanding of the evolution of the Zwin-area.

The Zwin-project

The Zwinproject is a remote sensing project in which the Linear portuary area is researched to gather the necessary documentary data from the city of Bruges, abbeys and water boards and from the Zwin area, resulting in a better understanding of the evolution of the Zwin-area.

The Zwin project lies in the multi-proxi data in a historical GIS framework.

The objective in this 'final' stage is to validate the before mentioned prospection techniques. There are three invasive options that can be used:

- Detecting the location, morphology and quality of preservation of the lost Zwinports
- Cross-disciplinary study of the historical and landscape evolution in the area between Bruges and the Zwin
- Further developing and evaluating an integrated methodology to study submerged landscapes

Research outcomes

- High-resolution scan and developing new data layers on the selected sites
- Non-invasive
  - UAV: The Trimble UX5 accurate remote sensing prospection tool having the gap between terrestrial scanning and photogrammetry. The mapping consists of a remote sensing project with airborne and overlapping frames which can be processed into a highly detailed and accurate DSM.
  - Geophysical Survey: The subsurface of the test-sites will be surveyed simultaneously deploying two geophysical soil sensors: a) 4-mirror coil and EMI-sensor, measuring simultaneously the electrical conductivity and the magnetic susceptibility. In stepped-frequency continuous wave GPR operating over a frequency range from 100 to 3000MHz.

- Invasive
  - Fieldwalking: The objective of this ‘final’ stage is to validate the before mentioned prospection techniques. There are three invasive options that can be used:
    - Augering in specific areas where archaeological or geomorphological anomalies were detected
    - Limited test-pits, depending on specific questions relating to nature and date of features detected in the surveys or aimed at assessing quality of preservation

- Large scale infrastructural developments that make a cross section of our project area will have to be follow-up closely: Simon Steven & A+I

Acquisition & processing of existing data layers for the entire Zwin area

- Desktop objectives
  - State of the art of the Zwin-debate, embedded in its broader geographical, historical and geomorphological framework
  - Retrospective integration of the multi-proxi data in a historical GIS
  - Delimitation of test-regions

- Desktop

- Literature & cartography
  - All literature, existing remote sensing projects and historical geography, archaeology, geology, relevant to the area are gathered.
  - The archives from the city of Bruges, abbeys and water boards are searched to gather the necessary documents and maps

- Remote sensing
  - Aerial Photography
    - The UGent-dataset contains more than 15000 aerial photographs for the Zwin-area. After a first assessment, 122 of them were georectified. Approximately 1100 photographs were identified and mapped.
    - The pictures especially reveal cropmarks located on higher soils. In addition, the UGent-dataset contains around 1200 vertical photographs from the area taken during WW I.
  - Orthogonal
    - The UGent-dataset consist of ground photos with a density of at least 1 photo per 500 m² and an average density of 1 photo per 100 m².
  - LIDAR
    - The LIDAR-data consist of ground points with a density of at least 1 point per 2 m² and an average density of 1 point per 2 m².

- Archaeological data

- Soil & geological data

- LiDAR
  - A valuable addition to those photographs of the area taken during WW I. The aerial data layers are available, recorded between 1990 and 2012. The aerial images can be used to detect cropmarks. The LiDAR-data consists of accurate points with a density of 1 point per 2 m².

- GIS
  - Orthogonal surveying and photogrammetry. The LiDAR-data consist of ground points with a density of at least 1 point per 2 m² and an average density of 1 point per 2 m².

- Field survey by Hillewaert and oblique photographs have proven the archaeological potential of this site. Finds dating back to the 9th c. AD combined with cropmarks and specific landscape setting on a sandy ridge, hint at an ancient settlement. The LiDAR-data consist of ground points with a density of at least 1 point per 2 m² and an average density of 1 point per 2 m².

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