

## Leverhulme Doctoral Scholarships Programme for Interdisciplinary Resilience Studies (PIRS) University of Southampton

---

RECRUITMENT CYCLE for studentships starting: October 2024

### SUPERVISORY TEAM

Primary Supervisor **	Prof. Craig Lambert
School & Faculty:	History, Faculty of Arts and Humanities
Email:	<a href="mailto:c.lambert@soton.ac.uk">c.lambert@soton.ac.uk</a>
Co-Supervisor **	Prof. David Sear
School & Faculty:	Geography & Environmental Science, FELS
Email:	<a href="mailto:d.sear@soton.ac.uk">d.sear@soton.ac.uk</a>
Additional Co-Supervisor(s)**:	Dr Ben Pears
School & Faculty:	Geography & Environmental Science, FELS
Email:	<a href="mailto:B.R.Pears@soton.ac.uk">B.R.Pears@soton.ac.uk</a>
Additional Co-Supervisor(s)**:	Prof. Mark Bailey
School & Faculty:	History, Arts and Humanities, University of East Anglia
Email:	<a href="mailto:mark.bailey@uea.ac.uk">mark.bailey@uea.ac.uk</a>

---

### STUDENTSHIP PROJECT TITLE

**Understanding long-term change in coastal resilience**

### OVERVIEW

Globally soft coastlines represent major regions of population and biodiversity. They are under threat from rapid environmental and population growth. To date, understanding of the resilience both environmental and community systems are based on short (<150yr) records. This research will combine long (600yr) sources of evidence found in documentary and sediment archives.

---

### SUMMARY

Coastal erosion and flooding are natural processes and a global hazard threatening the property and livelihood of two billion people. Looking

forward, the impacts of changes in climate are overwhelmingly adverse. In Europe, 16% of the coastline is crumbling, while in the UK 13% (4077km) of the coastline is eroding, threatening heritage, coastal communities and placing stress on national budget. The frequency of coastal flooding is forecast to increase, resulting in changes in national governments' response to coastal management to include managed retreat or abandonment.

There are important questions raised by the scale and timing of coastal settlement losses, most notably the impacts on local-regional-national and international trade, impact on shipping and the economic viability of communities living at the coast. This project seeks to address these questions through, in the first instance, a detailed analysis of specific coastal communities on the east coast of England, with the aim of developing a methodology for analysis and communication of coastal change and community response over 600 years, which coincides with the highest rates of coastal change and settlement loss in the last 900 years. The key innovative feature of the project is that it will correlate evidence drawn from historical documentary sources with data derived from palaeoenvironmental and geoarchaeological surveys. Historical sources offer precise dating and allow us to measure the social, cultural and economic impact of inundation, the latter permits us to precisely quantify the impacts and type of coastal change – for example establishing rates of change in surrounding landscape and coastal environments.

---

## **PROJECT CONCEPT**

### **Research Context**

Historically, coastal recession and inundation has resulted in the loss of over 300 settlements and the disruption of coastal communities around the southern North Sea basin over the past 900 years. In many cases these were small hamlets or villages, but some were important international trading hubs and the centres of regional prosperity. Collectively, these settlements are poorly researched in terms of their historical value and marine heritage, although notable exceptions exist. Taking and Dunwich and Eastern Bavenas as case studies this project aims to explore the following questions:

- How frequent were storms and what magnitude of damage/coastal change did they produce?
- What changes to coastal community structures did storms and erosion introduce, and how did communities respond to these?
- How did coastal communities react to the social and economic challenges produced by coastal change?
- How far could communities act autonomously, or as part of wider social and economic systems, to help them cope with coastal change?

**Methodology:** We will adopt a cross-disciplinary approach nested within a robust coastal resilience framework, drawing together (1) historical documentary evidence and analysis to reconstruct the chronology of reclamation and inundation, and to chart it against key economic and institutional drivers; (2) targeted palaeoenvironmental and geoarchaeological reconstruction and dating of changes in floodplain and estuarine sedimentation rates, sediment sources and habitats. Using both classic tried and tested techniques (Pollen, plant macrofossils, diatoms, forams etc) will be used alongside groundbreaking SedaDNA; (3) informed by geospatial modelling across a range of data sources, including the use of traditional remote sensing techniques (e.g. Lidar and Laser Scanning) alongside groundbreaking AI modelling methods to automatically identify relevant features of historical change (embankments, field systems, settlements, etc). Together these will allow the first comprehensive assessment of the processes driving changes in coastal resilience to flood hazard and landscape change (reclamation for agriculture) over five centuries, which can then (4) be translated into advice relevant to coastal stewardship and public policy. We will do this by focusing on two case study estuaries on the Suffolk coast – one a suite of rural settlements and manor (Easton Bavents area) and one a major urban coastal port (Dunwich).

Existing interpretations of coastal change and community impact are heavily influenced by paradigms based on observations drawn from the past 150 years. These in turn inform current coastal and heritage management plans, and influence the future investment and adaptation measures in response to changing climate. But the coast is a function of dynamic natural and human interactions over a much longer timescale, and the longer perspective greatly enhances our understanding of the drivers of coastal change. By reconstructing the chronology of reclamation and inundation from local historical sources and sediment samples, and by correlating this information against long-term indices of economic incentives, institutional structures and climatic variability, we can establish how particular combinations of natural and human processes strengthened or weakened resilience. This longer perspective on how the coast has evolved will provide a richer set of analogies to inform future debate and the comparative modelling available to those who steward our coastline.

The use of scientific and historical data will generate robust qualitative and quantitative data on coastal community responses to climate and morphodynamic changes and contribute to an understanding of the impact environmental changes had on the socio-economic development of coastal settlements. The key historical records which will help us to examine commercial harbour use, land use, demographic and political and socio-economic changes are those relating to merchant shipping, taxation, and local records such as manorial accounts. These sources will enable us to contextualise and enrich the scientific data. Lambert already possess records for over 70,000 ship-voyages for the period 1326-1600. This data source covers huge numbers of ships and a wide range of ship types and capacities. They are consistent in format and content, giving, for each ship, its name and port of origin, the master's name, dates of voyage and often tonnage.

For an examination of the changing demographics of coastal communities' taxation records are the most useful, as these offer the most complete directory of the adult population. For this project the Lay Subsidies of 1327, 1332 and the 1520s-1590s, and the poll taxes of 1377, 1379 and 1381 will be used, many of which are published. We can further examine the impact of coastal change through town charters and manorial records. There are numerous surviving documents in East Anglian local record offices (e.g. Dunwich charters in Suffolk Record Office, EE6/1; HD1538/208 Phillipps 36067). There are also many charters which survive as strays in other archives (for instance, BL Add. Ch. 7262, 7266, 7274). Manorial records include court rolls, surveys, maps, terriers and documents relating to the boundaries, wastes, customs or courts of a manor. In Suffolk we have identified 952 rolls (1200-1600) that cover coastal settlements (e.g. Blythburgh and Walberswick, HA30/314/19a Suffolk Record Office) and these can be used to analyse the impact coastal change had on Suffolk.

---

### **Contribution to interdisciplinary resilience studies:**

The evolution of the coast and estuaries is the product of many centuries of dynamic interactions between climate change, the physical processes of erosion and accretion, and human interventions. Thus, it demands an integrated inter-disciplinary approach, but hitherto it has been mainly studied through the silos of single and separate academic disciplines. We bring together leading experts in the fields of history and environmental science in a radical and original collaborative venture, combining the use of historical sources, sediment analysis and computer modelling of coastal change to produce an output greater than the sum inputs of each individual discipline working alone. The proposal offers an innovative inter-disciplinary approach; a novel and refreshing departure from established modes of working; and manifestly transcends disciplinary boundaries. It is highly original, representing the first project globally to attempt to trace 800 years of coastal evolution from archival records and physical data to reveal when, how and why coastal communities embanked estuaries and reclaimed (or periodically abandoned) inter-tidal marshland for agriculture. Its importance lies in creating a new inter-disciplinary methodology for reconstructing coastal change, providing a better understanding of how coastal wetlands were formed and managed, and, by extension, will inform future research and thinking about how we manage modern responses to rising sea levels and climate change in the most vulnerable coastal areas. The genuinely inter-disciplinary approach makes it less suitable for traditional funding bodies.

---

**Please list and describe any specific/additional technical training or support to undertake and successfully deliver this project. Note that students recruited into this programme will undertake a bespoke training curriculum. Students and their supervisory teams will also identify generic**

*skills gaps to address through training courses offered by the University's Doctoral College.*

In addition to laboratory support provided by SOGES, this project will be supported by the supervisory team, through targeted training in geospatial skills (GIS, Geospatial modelling), palaeoenvironmental skills in environmental techniques and Geoarchaeology for sedimentary analysis, and interpretation (BOSCORF NERC core ITRAX XRF scanning facility), geochronology (dating methods), Oxcal Radiometric dating provided by Prof Sear and Dr Pears, GAU Analytical services), and potentially AI techniques for automated data extraction from mapped sources via links with ArchAI (AI business). Document interpretation and contextual analysis will be provided via Profs Bailey and Lambert. Documentary and historical support for Dunwich studies will be provided by Dunwich Museum and Coastal Heritage centre, who will also host opportunities for student work experience (3 months in the Dunwich Museum) and presentations to stakeholders.

---