Institution: Edge Hill University

Unit of Assessment: 17 - Geography, Environmental Studies and Archaeology

Title of case study: An innovative partnership between academic researchers, coastal management groups and end-users delivers targeted research and enhances communication.

1. Summary of the impact

A research partnership between Edge Hill University and Sefton Metropolitan Borough Council developed innovative methods of identifying gaps in knowledge and understanding about sedimentary coastal dynamics and investigating practitioner needs. The partnership enabled the dissemination of scientific information to audiences across the wider community. The partnership provided a framework which enabled and enhanced integrated coastal zone management (ICZM). Within this framework coastal zone managers were supported in the development of adaptation and mitigation strategies, taking account of both long and short term environmental change. Policy and management decisions are now based upon sound scientific evidence wherever possible, ascertained by research where time allows, with significant scientific, social and policy benefits. Practice elsewhere on the UK's Irish sea coast, and elsewhere in the EU, has been influenced.

2. Underpinning research

The research partnership between Edge Hill University (EHU) and Sefton Metropolitan Borough Council (SMBC) began in 2003, funded by SMBC and the NERC FREE programme. It built upon Worsley's membership of the Sefton Coast Partnership (SCP) from 2000, with the aim to investigate non-academic/practitioner needs (e.g. understanding rates of coastal change) to enable effective *Integrated Coastal Zone Management* (ICZM) and to identify gaps in knowledge and understanding about soft sediment coastal dynamics. Such understanding is vital in soft sediment coasts because they have the potential to change rapidly in response to global climate variability. This was achieved by enhancing the understanding of coastal environmental change, further developing links between researchers and end-users, including practitioners, particularly those involved in policy and decision making, both locally and nationally; academics of different disciplines, such as archaeologists and ecologists; educators; and local residents (hereafter, 'end users'). In addition, new research was undertaken that met the needs of these users, predominantly into coastal dynamics specific to Sefton.

The work of the partnership was funded from 2008 to 2011 by the European Union's Interreg IVB Innovative Management for Europe's Changing Coastal Resource (IMCORE) programme and by DEFRA's **Pathfinder** project. The IMCORE programme promoted trans-national, innovative and sustainable approaches to reduce and adapt to the ecological, social and economic impacts of climate change on coastal resources. The EHU-SMBC partnership was one of 13 'expert couplets' of academics and practitioners across Northwest Europe. Through the Pathfinder project, SMBC, supported by the coastal partnership, was one of 15 local authorities selected to explore new approaches to planning for and managing adaptation to coastal change together with their local communities. Between 2008 and 2011 the partnership investigated and evaluated the responses of end-users to concepts such as rapid and long term environmental change, sea level rise and sedimentary dynamics. All work undertaken by EHU was carried out by Worsley (Professor in Physical Geography, employed by EHU 1999-2011 F/T; 2013 P/T) and Holden (Research Fellow, employed by EHU 2008-2011). The IMCORE 'expert couplet' in NW England was unique, involving multi-disciplinary and multi-stakeholder practitioners, end-users and educators to investigate the use of key concepts and develop new means of transferring knowledge and understanding to the community. The research entailed:

- Detailed coastal sedimentary analyses and characterisation to map sediment transport pathways along the north Sefton coast (1), fundamental in assisting management decisions at the medium to long-term scale. The sedimentary data are held as an open resource for research by the British Oceanographic Data Centre (BODC) which is a national facility for marine and coastal researchers, both academic and practitioner.
- Analysis of saltmarsh accretion and erosion. This was undertaken in order to further inform decisions and provide evidence of coastal processes occurring in real time that could be utilised to inform and educate end users (1,3,6).
- Research into historical secondary data pertaining to the Sefton coastline, and development, with SMBC, of a database of archival and historical resources, accessible for all (4,5,6).
- Developing a schematic model of coastal sedimentary dynamics in the Eastern Irish Sea (6,7).

- Collaboration with local groups, delivering knowledge and understanding to identify gaps in the understanding of coastal dynamics and environmental change, and investigate how concepts e.g coastal environmental change were used in non-academic settings (2,3,7,8,9).

3. References to the research

Items 1 & 4 subject to peer review, and fundamental aspects of Holden's PhD (supervised by Worsley).

1. Holden, V.J.C., Worsley, A.T., Booth, C.A. & Lymbery, G. (2011) Characterisation and sediment-source linkages of intertidal sediment of the UK's north Sefton Coast using magnetic and textural properties: findings and limitations. Ocean Dynamics. 61 (12) 2157-2179. doi: 10.1007/s10236-011-0448-x (Impact Factor 2012: 1.761; 5 Year Impact Factor: 1.846, journal ranking 27/60 in Oceanography, ISI Journal Citation Report (2012), Thompson Reuters).
2. Holden, V.J.C. and Worsley, A.T. (2011) Adaptation to Coastal Change: The Sefton Coast. Report on the approach taken by Sefton Council to adapting to coastal change. Report to the UK Government, Department of the Environment, Food and Rural Affairs.
3. Worsley, A.T., Lymbery, G., Holden, V.J.C., & Newton, M. (Eds) (2010) Sefton's Dynamic Coast, Proceedings of the conference on coastal geomorphology, biogeography and management. Sefton MBC. http://imcore.wordpress.com/partners/sefton/
4. Holden, V.J.C. (2010) The historic development of the north Sefton Coast. In: Worsley, A.T., Lymbery, G., Holden, V.J.C., & Newton, M. (Eds) Sefton's Dynamic Coast, Proceedings of the conference on coastal geomorphology, biogeography and management. Sefton MBC.
5. Holden, V.J.C. (2008) Report on the Evolution of the Ribble Estuary, with Particular Reference to the North Sefton Coast. Prepared for Coastal Defence, Sefton Council. Pp 69.
6. Holden, V.J.C. (2008) Report on the Salt Marshes at Marshside, Southport. Prepared for Coastal Defence, pp 39
7. Worsley, A.T., Holden, V.J.C., and Millington, J. (2012) Coastal Communities. In: Booth, C., Proverbs, D., Hammond, F. and Lamond, J. (Eds) Solutions for Climate Change Challenges of the Built Environment. Blackwell Publishers.
8. Holden, V.J.C., Lymbery, G., Booth, C.A., Worsley, A.T., Suggitt, S. and Wisse, P. (2005) Collaboration between researchers and practitioners within the context of Integrated Coastal Zone Management: a case study of the north Sefton coast. In: Kungolos, A., Brebbia, C.A. & Beriatos, E. (Eds) Sustainable Planning and Development. WIT Press, Southampton. p.485-494.
9. Worsley, A.T., Lymbery, G., Booth, C.A., Wisse, P. and Holden, V.J.C. (2005) The 'Sefton Coast Partnership': an overview of its integrated coastal zone management. In: Kungolos, A., Brebbia, C.A. & Beriatos, E. (Eds) Sustainable Planning and Development. WIT Press, Southampton. p. 475-484.

4. Details of the impact

During the period January 2008 to July 2013 the collaboration between researchers, coastal management professionals and other coastal stakeholders improved the management of coastal resources in Sefton and other coastal areas.

As a result of research by Worsley and Holden on the NERC FREE programme (Section 3: 1, 4, 5) and through ongoing engagement with SMBC, Edge Hill was invited by SMBC to form an expert couplet in a collaborative coastal management project (IMCORE). Collaborative work undertaken in this couplet increased capacity to respond to ecological, social and economic impacts of climate change on the viability of coastal sectors and the defence of coastal communities from flooding and erosion (Section 5: 3, 7, 8, 9). The role that Worsley's and Holden's expertise on sedimentary dynamics and integrated coastal zone management (Section 3: 1, 4, 5, 6, 8, 9) played in the formation and success of this expert couplet in the IMCORE project is confirmed by SMBC's Flood and Coastal Erosion Risk Manager, (Factual Statement (FS) 1): "The partnership with Worsley and Holden was initially research-focused, in order to gain a better understanding of coastal processes." (Section 3: 2, 7; Section 5: 5, 7, 8).

EHU expertise and research undertaken before 2008 and subsequently, were key to SMBC's approach to integrated coastal zone management (Section 3: 8,9; Section 5: 7) based on the following principles: 1) Decisions must be based on sound science; 2) Adaptation to coastal change involves the community itself and therefore necessitates the adequate and timely sharing of information, knowledge and understanding; and 3) wherever possible practitioners should engage in working partnerships with academic teams. SMBC's Flood and Coastal Erosion Risk

Manager, (FS 1) notes: "As a result of this collaboration we all gained an understanding of our respective objectives and developed an excellent working partnership between EHU academics and practitioners. This thereby facilitated an improvement in the management of the coast through evidence based policy making. This notion of 'partnership working' is now strongly founded in ICZM across the UK and can be seen in EU coastal research". Coastal resource management in Sefton was (and continues to be) improved by:

1 – Generating a flow of new research that responded to the needs of coastal managers and communities in order to better support ICZM. The SCP, IMCORE and Pathfinder projects provided a framework within which new targeted research was commissioned, with a key feature being that the needs of coastal zone managers and end users were the predominant factor in shaping the research questions investigated by the Edge Hill team.

2 – Disseminating research findings effectively to all coastal stakeholders and undertaking Knowledge Exchange work. The partnership provided a vehicle for the dissemination of research findings and knowledge exchange. Presentation of scientific or technical information in an accessible format with key messages was central to this (Section 5: 4,8). Activity included field-based training days on historic coastal change, aimed at end user individuals involved in talking to the wider community about the changing coastline. Information was presented in a way that allowed attendees to pass on the knowledge. This was followed by the creation of support materials for the Sefton Coastal Heritage Landscape project e.g. Historic Coast and Archaeology visit days, guided walks, postings on Facebook and Twitter. EHU-delivered/informed training has therefore become an integral and accessible part of the programme of events for communities in the region. A national conference held in Sefton in 2008 allowed peer-reviewed conference proceedings to be produced (Worsley & Holden joint editors) and encouraged involvement from practitioners, including authors who did not wish to present at the conference, but whose work was important to include in the published proceedings (Section 5: 6). This has provided a valuable resource on a national scale to both academics and non-academics. Around 150 people attended the conference, highlighting the importance of the coastline both regionally and nationally. 300 printed copies of the proceedings were produced, along with approximately 50 CD versions. Printed versions were distributed to conference attendees, regional public libraries and university libraries. All material is available to download from the IMCORE web-site. The publication and web materials have increased public awareness and improved understanding of the changing nature of the Sefton Coast. Reflecting on dissemination work, SMBC's Flood and Coastal Erosion Risk Manager comments, "Due to the long-standing nature of the partnership, Worsley and Holden established a reputation as trusted facilitators and sources of knowledge within the wider coastal practitioner community. This was further strengthened by me having the confidence in them to be able to recommend them unequivocally in this role. Through the partnership we recognise our respective strengths and work well together as a team. All this has led to a significant dissemination of academic knowledge far better than any I have previously experienced". (FS 1).

A 52 page publication timelining the historical events of the Sefton coast was produced, for an inclusive audience, by Sefton Council Coastal Defence and EHU (Holden and Worsley) in collaboration with the Sefton Coast Landscape Partnership Scheme. It highlights how the coast has changed continually, and how people have adapted to change. It is available in all libraries in Sefton, from coastal partners (e.g. the National Trust) and online via Sefton's Natural Coast website. Initially 4,000 copies of the publication were printed and distributed, but with every copy being allocated, and libraries requesting further copies, a further 4,000 copies were printed. The publication was considered very informative for a range of stakeholders, from members of the public to students, visitors, and as a key reference for practitioners concerning expertise outside of their own field (Section 5: 9). SMBC's Flood and Coastal Erosion Risk Manager comments "The [publication] provides a good example of collaborative working, being a document with a clear purpose and format - to communicate a substantive message regarding coastal change to the public in a way that is both accessible and interesting. It was brought together as a collaborative approach through the partnership but benefited greatly from the ability of Worsley and Holden to communicate technical knowledge to a non-technical audience". The quality and impact of this work is confirmed by North West Coastal Forum (NWCF) Secretariat in FS 2: "The partnership working involved in producing the Timeline publication was acknowledged as a key part of the reason why Sefton Council were awarded the North West Award for Coastal Excellence 2012: Best Practice. The publication, and an innovative education pack, produced as part of the IMCORE

project work, were considered outstanding examples of best practice and successful stakeholder engagement, contributing to four of NWCF's six core objectives designed to create a more sustainable coast". The Timeline publication is being replicated by Administração da Região Hidrográfica do Tejo (Portugal) for their coastal zone to enhance understanding of long-term change (FS 2), and elsewhere in the UK (Other Source 9).

The influence of collaborative work in Sefton has been transmitted through the North West Coastal Forum (chaired by Worsley since 2011), to other coastal groups, as confirmed by SMBC's Flood and Coastal Erosion Risk Manager (FS 1): "The experiences gained through this research partnership with EHU have become embedded in the way that we now approach management on the Sefton Coast. Further to this we seek to encourage its use in other partnerships within which we operate, such as the North West and North Wales Coastal Group". As the North West Coastal Forum Secretariat confirms (FS 2): "Professor Worsley's involvement with the NWCF arose directly from her work with Sefton Council, it was felt she would bring a good understanding of the need for and benefits of multi-sector partnership working on complex coastal issues, with her experience being particularly relevant in terms of bridging the gap between academic research and practitioners' needs".

Influence has also been transmitted beyond the Irish Sea coasts of England and Wales. As the NWCF Secretariat confirms (FS 2), "The success of the SCP and IMCORE was reflected in the lead role taken by the North West Coastal Forum in the EU SUSTAIN project (2009-12) which brought EU coastal communities in partnership with academic institutions across the EU to devise new methods of defining sustainability in coastal zones". The NWCF Secretariat continues (FS 2): "Professor Worsley's role in the NWCF and her knowledge and expertise built up through many years of working on coastal issues have been key in influencing and driving forward the work of the Forum from this time onwards and in supporting the full range of Forum interests in integrated coastal management. Because of this, the Secretariat, on behalf of NWCF, has been called upon to advise coastal groups nationally and internationally."

5. Sources to corroborate the impact

Factual Statements: Issues addressed identified in Section 4.

1. Flood and Coastal Erosion Risk Manager, Sefton Metropolitan Borough Council.
2. Regional Coastal Project Officer, North West Coastal Forum.

Other Sources:

1. Licco (2013) Compendium of Best Practice for Managing Coastal Change – Monitoring and Community Engagement Techniques:http://www.licco.eu/wp-content/uploads/2013/03/Capitalisation_Report_EN.pdf This reports lists IMCORE for its use of innovative approaches – expert couplets of researchers and policy makers working closely together (p14).
2. Coastlines articles – e.g. Article in 'Coastlines' by Graham Lymbery, Technical Services, Sefton Council: http://www.seftoncoast.org.uk/articles/03winter_research.html 'Research ... enables us to improve our overall understanding of this complex and changing environment, and to assist with management decisions which are based on the best available knowledge at any given time' (research referred to includes Holden's PhD project).
3. Sefton Coast Partnership Annual Reports http://www.seftoncoast.org.uk/index_publications.html.
4. Roberts, G. and Worsley, A. (2008) Evidence of human activity in mid-Holocene coastal Palaeoenvironments of Formby, North West England. In: Lewis, J. and Stanistreet, J. (eds). *Sand and Sea: Sefton's Coastal Heritage: Archaeology, History and Environment of a Landscape in North West England.* Sefton Council, Leisure Services Department, pp. 28-43. ISBN 978-1874516163
5. http://www.coastaladaptation.eu/index.php/en/9-experiences-3/sefton/74-sefton-climate-change-drivers-and-coastal-management
6. http://www.coastaladaptation.eu/index.php/en/9-experiences/sefton
7. http://www.coastaladaptation.eu/images/Sefton_Issues_and_objects_workshop_output.pdf
8. http://www.coastaladaptation.eu/images/Sefton_Coastlines_summer_2010_magazine.pdf
9. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69508/pb13720-coastal-pathfinder-review.pdf pp167-175, particularly p170.