CMAC : WCMC

Canolfan Monitro Arfordirol Cymru
Wales Coastal Monitoring Centre

Annual Report

2022/23

VALE of GLAMORGAN
BRO MORGANNWG

CYNGOR GWYNEDD COUNCIL

CLlLC
WLGA

CONWY
CYNGOR BWRDEISTREF SIROL
COUNTY BOROUGH COUNCIL

Contents

Strategic Direction

Purpose

To monitor coastal change to inform sustainable risk management decisions.

Vision

The vision for 2026 is to be a role model monitoring centre that provides an accessible platform of understandable coastal process data.

Mission

Delivering a dynamic evidenced programme, optimising access to coastal process data and engaging stakeholders.

Values

Our values, developed by our team, are at the core of all our decisions.

Foreword

2022-23 has proven to be another successful year for the Wales Coastal Monitoring Centre. Thanks to Welsh Government continued support and funding, our grant allocation increased in line with our business case. This is allowing us to deliver almost 50% more surveys as well as recruit Ben Ranson, our second Coastal Process Scientist.

This increase in surveys was challenging to manage, testing both our processes and capacity to deal with this surge of data. Once more, our team supported by Conwy and Gwynedd councils proved to be extremely resourceful leading to the delivery of our pan-Wales programme on time and budget.

We were also successful in securing additional funding from Carmarthen County Council to deliver additional surveys on their frontage which will help inform future management decisions in accordance with the local shoreline management plan policies. Coastal Groups also contributed to the costs of the MSc placement for the KESS2 Project, and we received further funding from the department of Work and Pensions for our Kickstart placements.

Our Undergraduate Programme continues to attract the next generation of talent with an interest in the coast. To date we have had 10 placements and we are pleased to say that 4 graduates have since secured full-time employment in flood & coastal erosion risk management.

Our Consortium and Advisory Panel remain vital in steering, advising, and supporting the WCMC, pushing us to ensure we continue to demonstrate value for money and maximise on opportunities and sharing of expert knowledge.

2022/23
AT A GLANCE

210 Survey Units along the Welsh coastline - **Extra 16 units** monitored in 2022/23

Total frontage surveyed **370 km - Extra 51.69 km** 2022/23

Total profiles to survey **2430 - Extra 469** profiles 2022-23

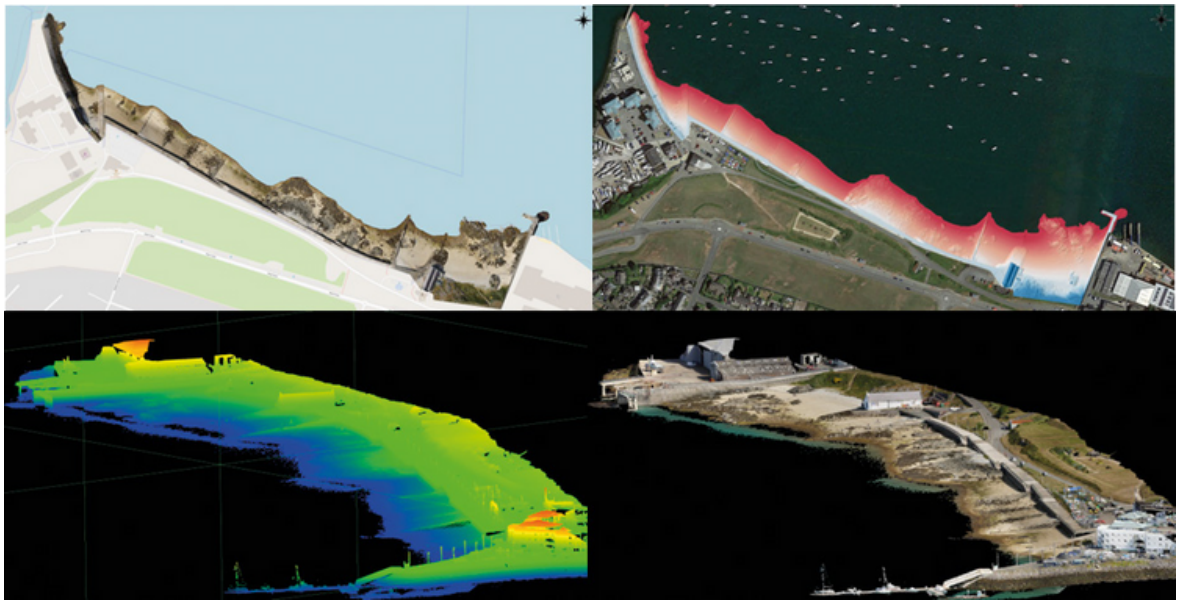
Schemes benefitting from our data - Our monitoring data is supporting **8 CRMP** [1] sites already under construction and a further **8** that are in the business case development stages.

1. Coastal Risk Management Programme (CRMP)

2022
IN MORE DETAIL

Baseline Surveys

The purpose of a baseline survey is to provide as accurate a representation of the topography of the beach as possible, they are comprised of 2D profiles (staked lines) at 50m spacing and a 3D plan survey (as seen in the image below).



A boost in funding this year has allowed the centre to increase the baseline frequency at the highest risk locations, leading to the creation of our new Category '0'. The table below highlights the changes to our cyclical programme. The most notable CMRP schemes utilising this data are in North Wales where 9979 properties are set to benefit in Llandudno, Kinmel Bay, Prestatyn and Rhyl. We have chosen to increase annual baseline surveys as they offer the most comprehensive data capture and combined with a bi-annual profile survey, provide a robust picture of the sediment dynamics.

	2021-22		2022-23	
	Profiles	Baseline	Profiles	Baseline
Cat 0			bi-annual	yearly
Cat 1	bi-annual	every 3 years	bi-annual	every 3 years
Cat 2	bi-annual	every 5 years	bi-annual	every 5 years
Cat 3	no profiles	every 10 years	bi-annual	every 10 years

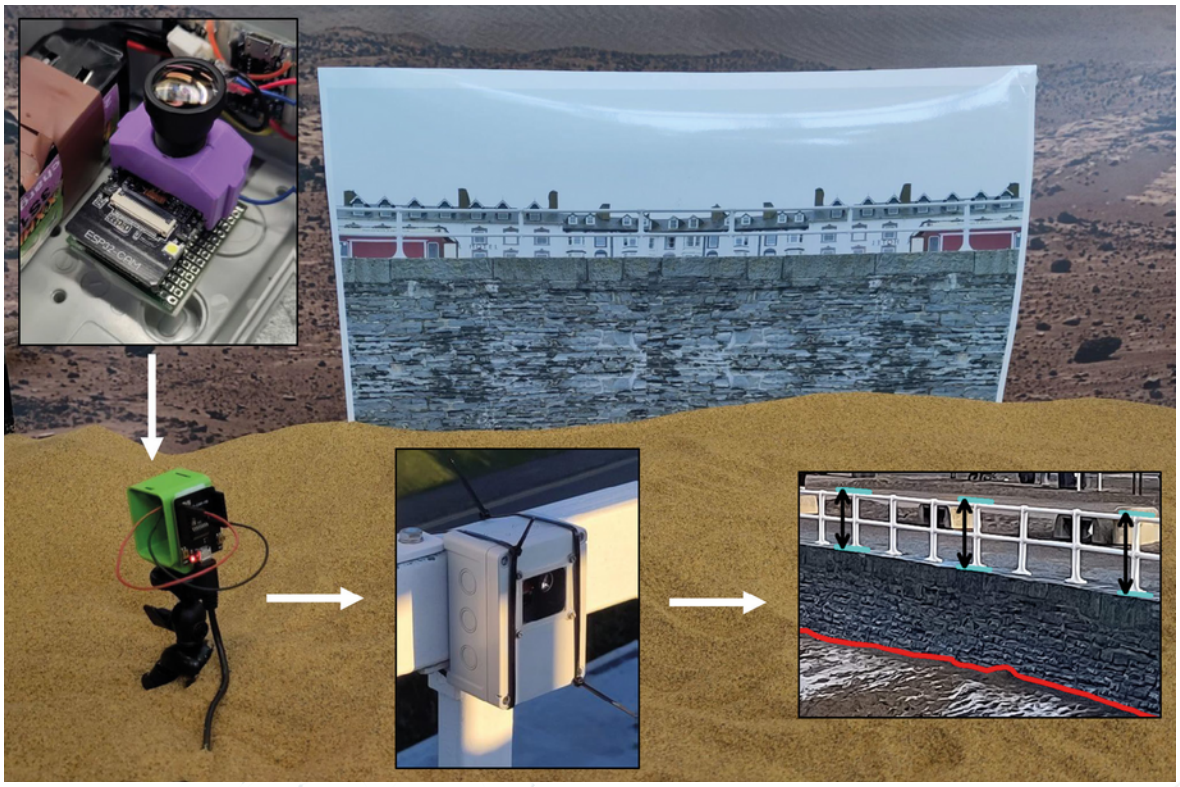
Innovation

Latest Robotic Project

A single storm event can have devastating erosion impacts on our coastline. Our monitoring programme visits the highest risk locations up to twice per year – a lot can happen in between these visits! What if an autonomous device could live on a beach and take measurements in between our visits? What if that device could alert us of significant erosion events?

This was the challenge set for the Aberystwyth robotics team, funded by Kess2, their aim is to develop a low-cost device to measure beach levels at high-risk locations and send alerts when necessary.

The team have been developing an intelligent low cost and low maintenance camera which uses computer vision to analyse beach levels in front of coastal defences. Using LORAN communications, the device aims to identify daily levels and report them in real time to local risk managers.



UAV LiDAR

Whilst traditional methods of coastal monitoring have evolved to newer methods using Global Navigation Satellite Systems (GNSS) solutions, this still means that boots on the ground are needed and that large areas between the profile lines aren't represented in the dataset. Over the years, we have worked to identify a whole beach approach, but this remained difficult and labour intensive with costs limiting these surveys to only every few years (5 in most cases).

The use of drone LiDAR helps increase the area which can be covered making the survey work on the ground easier and importantly less dangerous, and moves the main time spent to the processing of data. However, this method also comes with downsides. High wind speeds play havoc with drone flights, rain will stop flights as the water drops show up in the LiDAR data and designated protected sites can only be flown at certain times.

Drone LiDAR technology provides an exceptionally detailed dataset, capturing data points at intervals of 5 to 10cm. This high-resolution data enables the generation of diverse output formats and comprehensive photographic coverage, all achieved with a remarkable ground sampling distance (GSD) below 2cm . Importantly, this capability extends beyond the conventional boundaries of accessible land areas, thus establishing drone LiDAR as a potent and versatile tool in the realm of coastal monitoring. Moreover, the adoption of drone LiDAR allows for a shift in the way we analyse datasets. Instead of focusing solely on movable sediment areas like the foreshore, we can adopt a more holistic approach, encompassing cliffs, sea defences, and areas beyond the beach that are susceptible to coastal threats. As technology rapidly evolves to capture coastlines, we remain agile in adapting our monitoring methodologies to achieve more intricate and comprehensive analytical results.

Contractor AG Surveys has been conducting beach surveys for the WCMC since 2019. They have continuously refined their methodologies and embraced advancements in geomatics technology to support our program. Andreas Garbe, Director of AG Surveys, says: "The world is a fast-moving place when it comes to technology and its advances, and surveying and coastal monitoring are no exception to this. Being at the forefront of new developments in technology gives us the 'edge' but also involves a lot of testing, R&D, and proving new concepts. With the WCMC, we are lucky to have a like-minded client in Wales, which allows us to show the benefits of these technology moves."

Capturing works at Colwyn Bay

Successes this Year

Coastsnap Project

We are now asking citizen scientists to step up and help us tackle coastal erosion with a little help from their smartphones!

It's all part of 'CoastSnap' a global citizen science initiative developed by the University of New South Wales. CoastSnap relies on the public to take repeat photos at the same location to track how the coast is changing over time due to processes such as storms, rising sea levels, human activities, and other factors.

We have installed phone cradles at locations across 14 stations in Wales, in collaboration with the Wales Coastal Path. It is a great addition to our coastline and Coastal Path offering additional activities and a means to learn about coastal processes.

We are encouraging the public to take part in the programme by looking for our signs and cradles, snapping smartphone photos and sending them to us via our QR code.

Each location has been surveyed by our team across the beach, allowing us to georeference your images and identify sediment levels. Over time the images will inform us of local sediment changes and potential to alert us of coastal erosion. Grab your phone and head to the beach, do you really need an excuse?

Contractor Performance Timeline - All Projects

The below graph showcases the achievements of our contractors from 2019 to 2023. Over this period, their performance has demonstrated a commendable upward trend, reflecting enhanced quality and speed in their work. Notably, in 2023, despite a significant increase in workload by 48.2%, our dedicated contractors managed to maintain their performance levels. The attached graph visually illustrates their consistent and impressive output throughout these years. We extend our appreciation to our contractors for their unwavering commitment and expertise, which have been instrumental in driving our continued success.

Protected sites assent

75% of our coastline is designated for its environmental importance and a lot of our activities will take place in or next to protected sites. It is therefore paramount for us and our contractors to follow due process to minimise impacts in these areas.

We have worked closely with Natural Resources Wales to coordinate Pan Wales, multiyear assents for both All-Terrain Vehicle (ATV) and Unmanned Aerial Vehicle (UAV) surveys. 7 WCMC personnel worked over 245 hours to collate information, produce 96 maps and write 48 reports. Natural Resources Wales have approved operational procedures for surveys in protected areas, allowing the WCMC and external contractors to collect data without impacting the features of interest.

Forward Look

We have consistently been gathering data since 2019 enabling us to start building a picture of coastal evolution around key locations in Wales. However, next year we intend to review our Risk Based Methodology which has informed our programme since 2019. The review will ensure we use the most up to date dataset to inform our programme and will also closely align with practitioners needs.

Looking ahead, we are getting closer to 2025 and epoch 2 of Shoreline Management Plans. As it stands, 57 locations with a current Hold the Line policy are due to transition to No Active Intervention or Managed Realignment. There is much work to do in these locations and the Centre will work closely with its partners to ensure our work can support decisions.

We also intend to explore how our latest technology and methods can support local authorities with coal tip safety and management.

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