

A recent study found that one restored coastal saltmarsh in the UK stores as much carbon over four years as just over one million new trees grown for 10 years. This is equivalent to taking 32,900 UK cars off the road for one year. More studies will enable us to build an even clearer picture

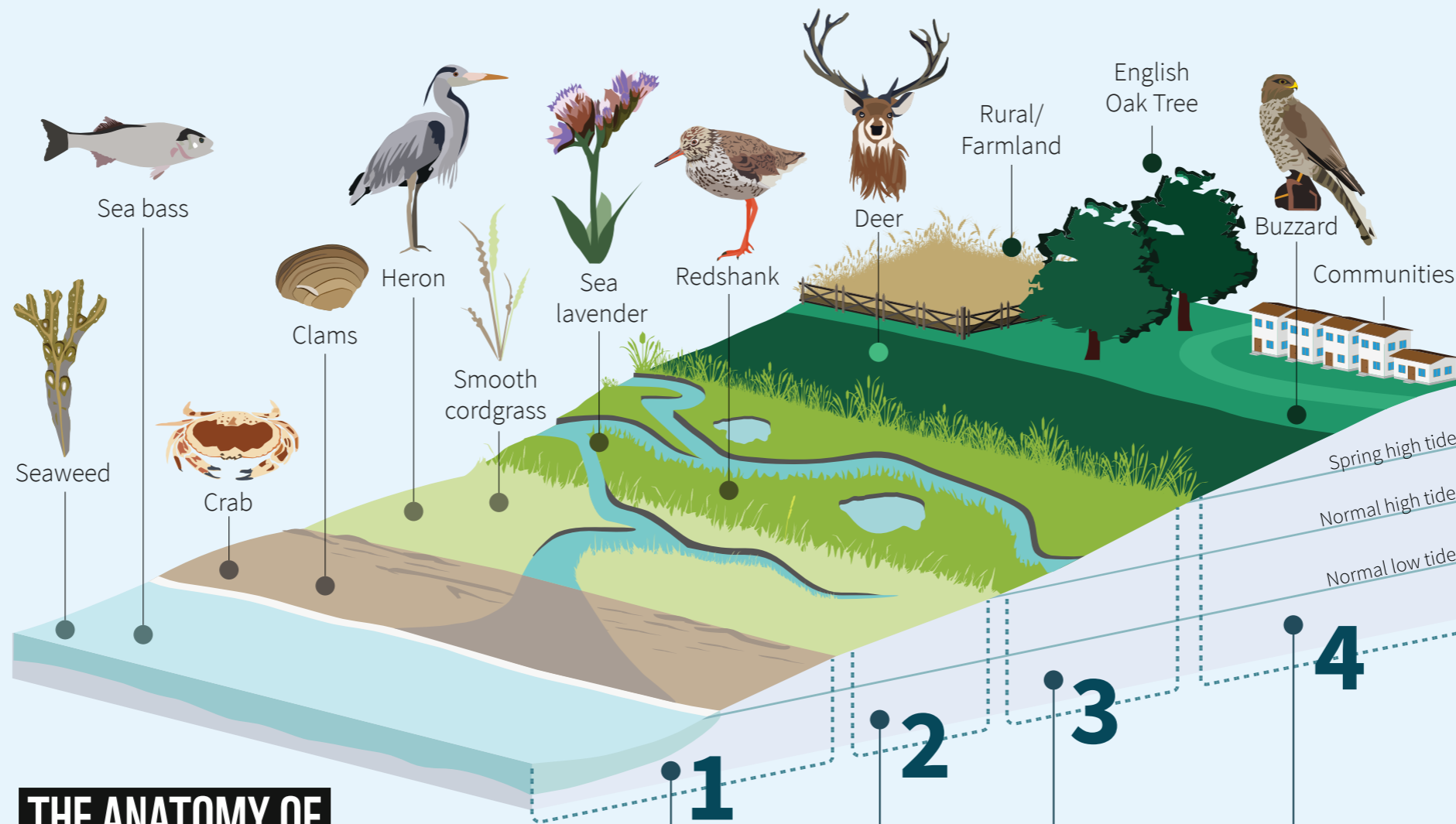


A CHANGING TIDE

Saltmarshes are serious multitaskers – they provide vital sea defences and a home for wildlife, and they're super-speedy carbon absorbers. Thanks to Aviva, we're investing in cutting-edge technology to understand more about these precious habitats and help tackle climate change

Words: Paul Bloomfield | Image: © Andrew Parkinson / WWF-UK

▼ Saltmarshes are home to unique plants such as the glasswort family that thrive in salty environments. Their roots absorb and store carbon, making them a valuable ally in the fight against climate change



THE ANATOMY OF A UK SALTMARSH

Saltmarshes have a key role to play in reversing nature loss in the UK as they provide a range of rich and unique habitats. They support a variety of plants with different levels of tolerance to salt water and tidal flooding, and provide a nursery for young fish. They're important for resident and migratory birds such as herons, egrets and waders, which use the tall grass to raise their young and the mudflats as a source of fish, molluscs and insects.

TIDAL ZONE AND MUDFLATS

The lowest part of the saltmarsh. It's rarely above water other than at low tide. Home to seaweeds, fish, crustaceans and shellfish.

LOW MARSH

Submerged frequently by the high tide. Home to wading birds, grasses, fish and shellfish.

UPPER MARSH

Only submerged during very high tides. Home to a wide variety of grasses and plants as well as nesting for migratory birds.

INLAND

The border of the saltmarsh. Rarely submerged outside of storm conditions. Inland areas receive natural protection against coastal flooding from saltmarshes. Home to woodland, grasses, deer, birds of prey – and people.

Walking around Lancashire's Ribble estuary, taking a breath of fresh wetland air, you might struggle to make sense of last summer's new arrival. Why would there be a squat yellow scaffolding tower in the nature reserve's marsh, with no visible purpose? In years to come, this odd structure – part of a research partnership between WWF and Aviva – may be hailed as a hero in the fight against climate change. But for now, it just keeps counting.

The tower's damp feet are sunk in a habitat whose dual nature is embodied in its name: saltmarsh – a once-ubiquitous feature of the UK's flatter coastal fringes, where rivers and streams meander and spill out into the ocean, meeting tides that rush inland. In this mixing of waters, silty deposits become ever-shifting mudflats, while wave-borne sediment accumulates on the land.

Plants with a taste of the sea, such as samphire and sea lavender, grow and flourish on the accumulating sediment. Wading birds and wildfowl come in their hundreds and thousands to feed on a banquet of snails and worms in the mudflats, and roost in the marshes. Otters fish the creeks.

WILD PLACES

There are saltmarshes in all of our great estuaries – the Thames, Bristol Channel, Wash, Humber, Mersey, Solway Firth, Firth

of Forth, Clyde and Cromarty Firth – as well as other sheltered coastal places. But there aren't as many as there should be.

Though rich in wildlife, saltmarshes have often looked poor when seen through human eyes. Since Roman times, people have 'reclaimed' this land for agriculture. More than 85% of our saltmarshes have vanished, and now a new threat has emerged: they're at ever-increasing risk from rising sea levels caused by climate change. But one

particular tide may be starting to turn for the better.

We've long known about the soft power of saltmarshes – their ability to absorb and dissipate the energy of waves and soak up water that might otherwise flood further inland. Economists pore over the perceived value of such flood mitigation and estimate it's worth £2 billion. And if sea levels continue to rise, this value can also only go up.



The Ribble Valley is a migration hotspot for many birds. As the tide encroaches onto the saltmarsh, skulking snipe are flushed into view

The degree of interest has mounted as storms become stormier and high tides rise ever higher. Many saltmarshes have been lost as incoming waves flood over them, hit the barrier of the concrete sea walls behind them, and then wash away the marshes as they retreat. And in time storms will wash away the walls themselves.

In an accepting approach called 'managed realignment', we're beginning to adapt, to let the waters come in, opening gaps in sea walls

“SALTmarshES PROVIDE NATURAL PROTECTION FROM FLOODING AND COASTAL EROSION TO UK HOMES”

to allow controlled incursions, a process that in itself will restore the saltmarshes.

We know about the properties of saltmarshes in purifying both river and sea waters, absorbing and storing in deep (and deepening) soil the chemicals from fertilisers and heavy metals. But there's one more benefit that could be this habitat's most effective saviour – the amazing ability of saltmarshes to absorb and store carbon.

SAVING FOR THE FUTURE

The concept of 'blue carbon' was all but unknown when wetland biogeochemist Annette Burden completed her marine biology studies in 2006. Upon graduation she accepted a job in peatland research with the UK Centre for Ecology & Hydrology (UKCEH). Years later, her land-based role has proved to have an uncanny connection with a seashore need, and Annette has become a key figure in supporting a new and vital WWF saltmarsh project. This is because it's become evident that saltmarshes act like a bank – only the gold is blue. We're talking blue carbon, the term used for carbon captured by marine and coastal ecosystems.

“Once a saltmarsh becomes vegetated, it forms a stable habitat,” says Annette, explaining how the 'bank' works. “Just like peatland, a saltmarsh is waterlogged, so when the vegetation dies off it isn't broken down. Instead it's incorporated as carbon. Taking cores of sediment – sampled using tubes pushed into the ground – enables us to see how much carbon is stored there.”

How does a saltmarsh become vegetated? It's a race against time and tide. Sediment builds up on the saltmarsh and provides a substrate for plants. However, rising sea levels threaten to wash away the sediment ▶

Illustration: Provided by Aviva

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My Action

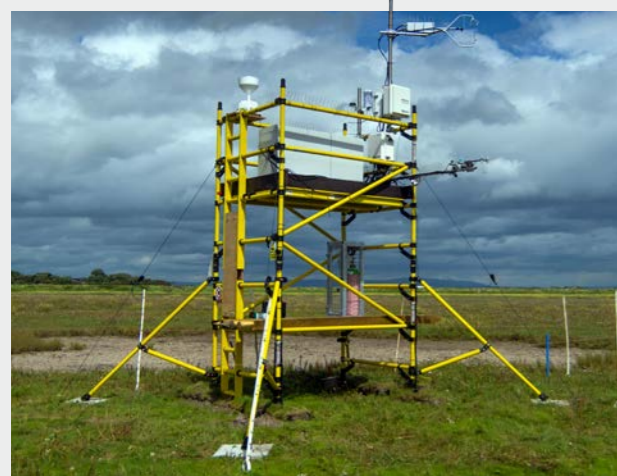
DISCOVER MORE

You can find out more about saltmarshes, their role as wildlife and climate champions, and our new flux tower in our short film: myaction.wwf.org.uk/saltmarshes



◀ Along the Ribble estuary, saltmarshes provide a haven for wildlife alongside built-up areas. Tunnels under roads and gaps in sea walls allow sea water onto the marshes to regenerate them

▼ Short-eared owls are often seen hunting over saltmarshes, particularly during the winter. They mainly hunt during the day, flying low over the marsh to feed on field voles and small birds, such as pipits and larks



CARBON FLUX: VISUALISED

Sitting on the Ribble estuary, the WWF saltmarsh flux tower, funded by our partner Aviva, measures the flow of greenhouse gas. It can be likened to a weather station, with cutting-edge sensors that measure gas exchange. It's continuously collecting a 3D view of wind speed and direction, allowing us to measure the capture and release of carbon from a large area of saltmarsh. The flux tower is online, so UKCEH researchers can observe in near real time what's happening with carbon dioxide in the air and where it's flowing between the land and the atmosphere. Other sensors measure the weather, sediment and tides.

Bring all this data together and you get a picture of the flow of carbon between the saltmarsh and the atmosphere. We know how much carbon is stored in the ground but understanding how long it's stored for, and whether it will remain stable in a changing climate, is a critical piece of the saltmarsh carbon puzzle.

Our flux tower is complemented by another placed by Natural England on the nearby RSPB reserve at Hesketh Out Marsh. The WWF platform is on natural marshland, whereas the Natural England platform is on a site that was restored 12 years ago. Such flux towers are already functioning on peatlands, croplands, grasslands and forests throughout the UK, and UKCEH's aim is to install more to widen our understanding of regional differences among the UK's saltmarshes.

before plants have a chance to take hold. How quickly can saltmarshes stack up sediment, outcompete sea level rises and therefore maintain themselves?

The first aim of the project, which brings together WWF with Aviva and UKCEH, is to set up the UK Saltmarsh Monitoring Network to answer these questions. The team have pinpointed six estuaries around the UK to study the rates of sediment build-up and determine which areas of saltmarsh can or can't respond to rising sea levels. The sites have been chosen to encompass all their differences – in plants, hydrology, geography, geology and rates of sea level rise. Such evidence will enable us to prioritise which areas around the UK coast need protection or restoration.

A NEW FRONTIER

The second aim leads to that mysterious tower, AKA the WWF saltmarsh flux tower. Science is trying to prove how

“OUR PROJECT WILL STUDY THE ROLE UK SALTMARSHES CAN PLAY IN FIGHTING CLIMATE CHANGE”

effective saltmarshes are at capturing carbon, how much is stored, how quickly and for how long. But Annette identifies a critical gap in our understanding: “Scientists have focused on carbon stored in the sediment, either brought in on the tide, or from the plants. Not as much emphasis has been put on carbon moving in and out as a gas.” And elementary biology tells us that while plants breathe in carbon dioxide, they also breathe it out once darkness falls.

The flux tower is there to provide the sophisticated technology that will give us the missing data (see box, left) and true figures for saltmarshes' capacity for storing blue carbon. Why do we need such exactitude? Here we turn to Tom Brook, WWF's blue-carbon technical officer, for an answer.

“At the moment, a shift in society dictates that companies looking to take more responsibility in the push towards net zero need to show that they're being nature-

positive and climate-neutral,” Tom explains. “For them that means good results in terms of communications and ethics.” Essentially, it's about ascribing a numerical value to blue carbon – one that shows how much is stored and for how long, in a way that's easily understood by companies and consumers.

UKCEH's intention is to replicate the lead taken on woodland and peatland and create a Saltmarsh Code – a voluntary scheme in which companies formally contribute to climate-change mitigation. The scheme has a specific target – at least £1 billion of private investment in saltmarsh restoration projects over 25 years, covering 22,000 hectares of habitat. That would increase the area of UK saltmarsh by a third or more.

CARBON CODE

Tom is sure that as the pressure to reach net zero quickly increases, the voluntary aspect of the scheme will be overtaken. “The signs are that we're moving towards companies having financial incentives

and legal obligations to invest in nature-based solutions that will tackle the climate emergency,” he says. “We're working with Aviva to demonstrate how the business sector can take leadership in moving toward a low-carbon future. Through this climate research, Aviva are also making an important contribution to achieving societal net zero ambitions, with the project taking a significant step in addressing critical knowledge gaps in saltmarsh management. Our ultimate goal is to build a framework that can be used to create more investment in saltmarshes.”

If the numbers look promising, saltmarshes could also be the first blue carbon habitat in the UK incorporated as a mitigation measure in our Nationally Determined Contributions (our plan to reduce emissions) under the Paris Agreement. The future for saltmarshes may yet be brighter, not just here, but all over the planet. But for now, that yellow tower just keeps counting. ■