



Promoting Adaptation to Changing Coasts

Summary of the practical guide



Foreword and acknowledgements





Foreword

The Promoting Adaptation to Changing Coasts (PACCo) project is a cross-border initiative which is financially supported by the INTERREG VA France (Channel) England programme, co-financed by the European Regional Development Fund (ERDF).

The broad aim of PACCo is to demonstrate that it is possible to work with stakeholders in estuarine regions to deliver a range of benefits for people and the environment by adapting pre-emptively to climate change. It has a total value of €27.2m, with €18.8m coming from the ERDF.

The project focuses on two pilot sites in the Lower Otter Valley, East Devon, England) and the Saâne Valley (Normandy, France).



Lower Otter



Saâne Valley



Acknowledgements

We would like to thank all our project partners who contributed to the development of the guide:





- Conservatoire du Littoral (CDL)
- Department for Environment and Rural Affairs (Defra)
- Communauté de Commune Terroir de Caux (TDC)
- Commune de Quiberville

We'd also like to thank the following contractors who've either helped write chapters or provided material for use in the report:

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- Kier
- KOR Communication
- Lisode
- Manchester Metropolitan University
- Natural Capital Solutions

Our French PACCo partners would also like to thank some additional partner organisation who contributed to the guide:

- Agence de l'eau Seine-Normandie
- Région Normandie
- Conseil Départemental de la Seine-Maritime
- Syndicat Mixte des Bassins Versants Saâne Vienne Scie









































Further reading

The document is a high-level overview of the PACCo guide. The full report can be accessed here: https://www.pacco-interreg.com/download-categories/pacco-guide/

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Funding & Natural Capit al

Design & Construction Monitoring & Legacy

Summary & Conclusion

Chapters

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Part A. Context and Background





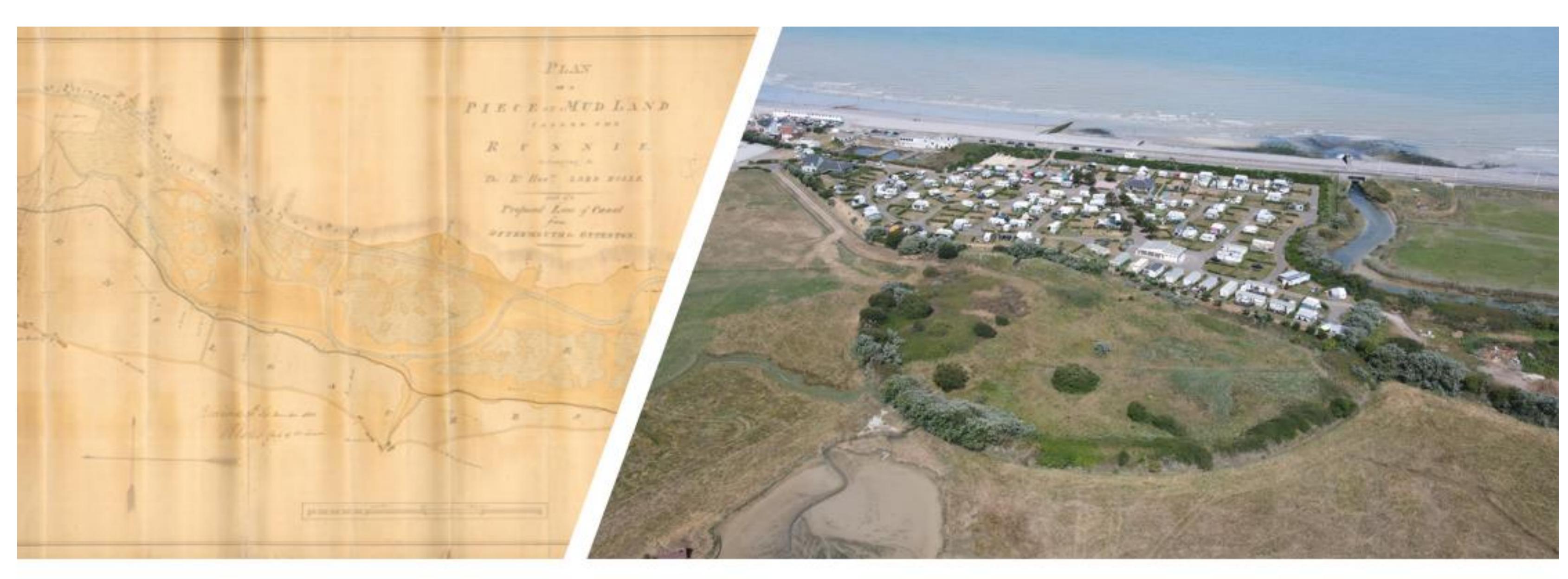
Context & Background

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Executive summary





Introduction

The PACCo project involved delivering a wide range of different activities forming part of the climate change adaptation strategies for the Lower Otter and the Saâne valley.

This included:

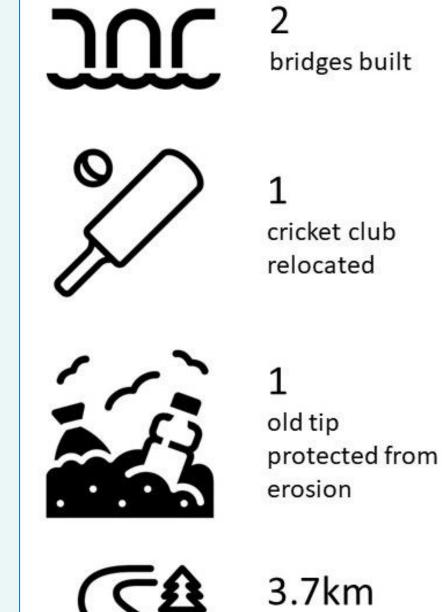
- Communicating about climate change and raising awareness
- Protecting and restoring lost intertidal habitats
- Relocating businesses and amenities to areas at lower risk of flooding
- Developing resilient design for new infrastructure

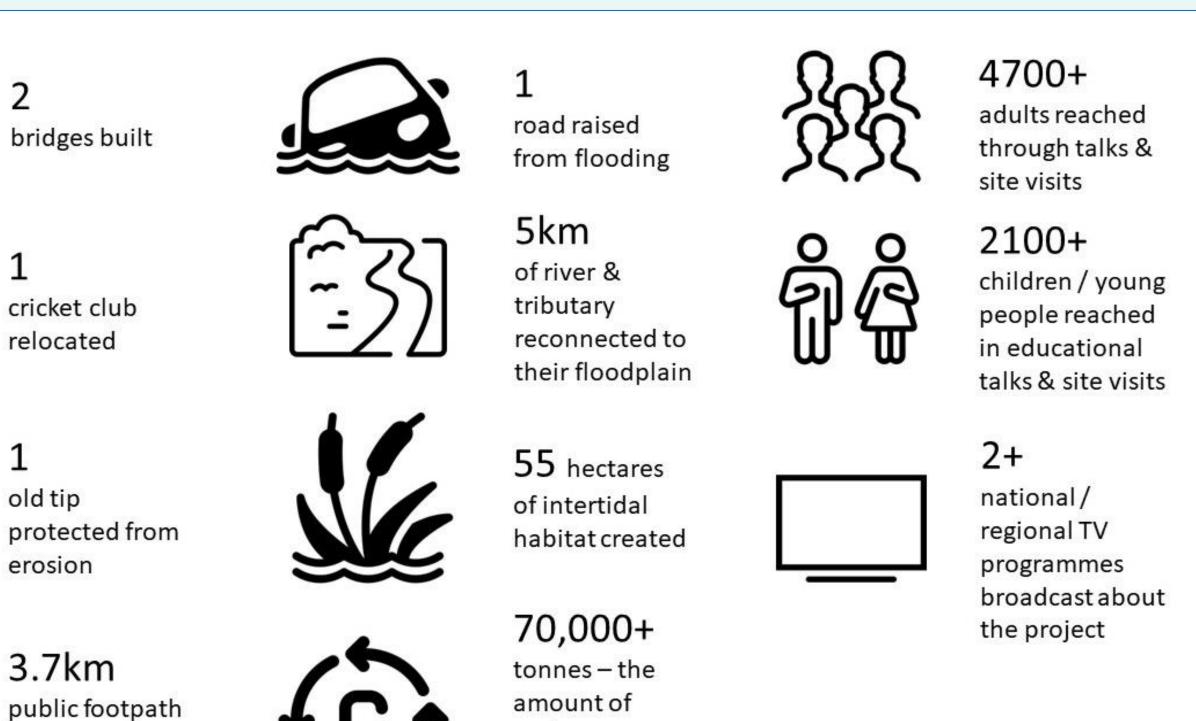
Purpose of this guide

The aim of the PACCo guide is to share our learning from the project to show that pre-emptive adaptation is possible and to enthuse practitioners working in other estuaries by providing take away tips applicable to their sites. Its purpose is to:

- Summarise the different elements PACCo
- Set-out the findings of the project
- Capture our lessons learnt both good and bad
- Share our recommendations for future projects
- Highlight policy level challenges associated with adaptation
- Sign-post readers to more detailed reports

Lower Otter





carbon

potentially

Icon source: https://icons8.com

Saâne Valley



L nunicipal campsite elocated



50 hectares of intertidal habitat create



300 pupils eached through resentations, or site visits



1
wastewater
treatment plan
created

30 km

and nearly 1500

homes connected



T river reconnected t its floodplain

engaged via

regional TV

channels

national and



summer exhibitions



site visits with elected representatives, experts, technical staff, funders and national and local press

Top tips

Main

- Identify suitable funders, landowners and partners at an early stage
- Understand your funders, landowners and partners requirements
- Ensure you know what the key constraints are
- Know your site's history to shape its future design
- Take a natural capital approach to articulate options and benefits
- Nurture your partnership throughout as it is the foundation for project success
- Bring your community with you through effective engagement
- Communicate constantly and effectively using a wide range of approaches
- Involve local communities from the earliest stage, engage effectively and be receptive to local views
- Be realistic about project phasing, especially if there are multiple dependencies
- Habitat and protected species constraints may impact on project timescales and cost
- Do not under-estimate the amount of time it might take to gain landowner agreement and to put legal agreements in place
- Use the project as an opportunity to engage the next generation
- Conduct a detailed site wide ground investigation and survey species present on site
- Show foresight and accommodate future engineering projects
- Be vigilant to continually changing climatic and ground conditions
- Working in flood plains can be very challenging
- Maintain and improve visitor infrastructure during and post-construction
- Anticipate problems and resolve them collectively
- Plan monitoring of project outcomes in advance and secure budget for it
- Think about the project's legacy when developing signage and infrastructure

raised /

enhanced

Chapter 1. Introduction





Introduction

Global warming has led to ice cap melting and the expansion and warming of the oceans. At the same time, we have seen global sea level rise (SLR) of 15cm over the 20th century. The impacts of global warming and SLR pose an existential threat to low lying coastal areas. These impacts, twinned with unprecedented loss of biodiversity, are being felt now. We need to act immediately to address the problem.

This chapter summarises the impacts of the climate and biodiversity crises. It helps to set the context for the rest of the report which is focussed on describing practical climate change adaptation measures.

Climate and Biodiversity Crisis

The International Panel on Climate Change (IPCC) has demonstrated that climate change is both inevitable and irreversible. Across Europe the impacts of climate change are becoming more and more noticeable, with a greater number and frequency of natural disasters from flooding and coastal erosion, through to drought and wildfire.

Over the last 300 years, human activity along our estuaries and coasts has led to habitat loss, resulting in over 65% of seagrass/wetland habitats being destroyed and over 90% of formerly important species being depleted (Lotze, et al., 2006).

Inter-tidal habitats provide a wide range of ecosystem services (Hudson, Kenworthy, & Best, 2021) (Burgess-Gamble, et al., 2017). These include acting as carbon sinks and helping coasts and estuaries become more resilient to the impacts of climate change.

Protecting, preserving and restoring salt marsh is vitally important in combatting the twin biodiversity and climate crises.

Policy Context

European policy drivers

In Europe over 100,000 citizens are at risk of coastal flooding each year. If no adaptation measures are put in place this figure could reach 3.9 million by the end of the century (Vousdoukas, et al., 2020). Recognising the existential threat posed by climate change, the European Commission has put in place a green deal (European Commission, 2019) which commits the EU to becoming climate neutral by 2050.

English policy drivers

In England, 247,000 homes and business are at high risk of coastal flooding and by 2030 over 700 properties could be lost due to coastal erosion (Environment Agency, 2015). English national strategies and policies describe the need to adapt to and become more resilient to the impacts of climate change.

French policy drivers

In France, a quarter of the developed coastline is at risk of erosion, 270km of which is retreating more than 50cm per annum (DGALN, 2021) with over 850,000 jobs at risk of coastal flooding (Bafoil, 2022). French national strategies and policies help protect the coast of France from development and set out a list of priority locations where communities need to be protected.

Franco-English Context

The EU INTERREG funded Living with a Changing Coasts (LiCCo) (LiCCO, 2014) project ran from 2011 to 2014 brought together partners from across Devon and Normandy who were united by similar coastal climate change challenges.

The purpose of LiCCo was to help coastal communities better understand, prepare for and adapt to the impacts of climate change, sea level rise and erosion on the natural and human environment. The project developed best practice for engaging coastal communities enabling them to understand the predicted impacts of climate change.

In France, the Saâne Valley (Normandy) was a LiCCo pilot site. Initial work in this catchment through LiCCo led to it being taken forward as part of the PACCo project where climate change adaptation measures are now being implemented.

In Devon, the River Exe was also a LiCCo pilot site. However, the estuary was not taken forward in the PACCo project because the Exe Estuary Strategy (Environment Agency, 2014) demonstrated that compensatory habitat creation was not possible. Instead, the Otter Estuary was identified as a potential site.

LiCCo was a pre-cursor to PACCo, and it helped cement the Anglo-French partnership whilst also identifying two catchments on either side of the channel with similar problems and challenges.

Focus of the report

The report describes the PACCo project's climate change adaptation strategies which included:

- Awareness raising
- Protecting and restoring nature
- Relocating businesses and amenities
- Resilient design

Lessons Learnt and Recommendations

Understand the scientific and policy context at the start of your project as this will help you to:

- Identify suitable funding sources
- Identify potential project partners
- Develop an adaptation solution which is in line with current scientific and political needs

Further Reading

Promoting Adaptation to Changing Coasts – a practical guide

Promoting Adaptation to Changing Coasts – a practical guide summary document



Chapter 2. The PACCo Vision





Introduction

The Lower Otter and the Saâne Valley have been physically modified, resulting in both rivers being disconnected from their floodplains. On the River Otter, an embankment was built during the early 19th century turning a large area of the floodplain into agricultural land. In the Saâne Valley, dykes/embankments were created during the 18th century draining the land for agricultural use diverting the river through a culverted pipe into the sea.

These historical modifications have affected both rivers from an ecological standpoint, leading to a loss of intertidal habitat.

Summary

Climate change and sea level rise are already affecting both valleys, flooding businesses and infrastructure. Adaptation to the impacts of climate change is needed in both locations to help protect communities, livelihoods and wildlife into the future. PACCo is important because it:

- Minimises future costs associated with the repair/maintenance
- Provides increased socio-economic benefits
- Provides public health cost savings
- Increases natural capital value
- Demonstrates that pre-emptive adaptation is possible

In both estuaries, adaptation has implemented four different strategies:

1. Awareness raising

- 2. Habitat creation
- 3. Relocating businesses and amenities.
- 4. Resilient design

Lower Otter

The climate change adaptation strategy has involved:

- Working with the communities in the Lower
 Otter to develop a long-term solution
- Restoration of 55 hectares of lost intertidal habitats
- Moving the local cricket club out of the floodplain
- Raising a road and protecting an historical tip



Awareness raising



Relocation



Resilient design

Saâne Valley

The climate change adaptation strategy has involved:

- Working with the communities in the Saâne
 Valley to develop a long-term solution
- Restoration of 50 hectares of lost intertidal habitats by reconnecting the river to its floodplain
- Moving the municipal campsite from the coast to an in-land site out of the floodplain
- Installing a new sewage treatment facility and network



Awareness raising



Relocation



Habitat creation



Resilient design

Lessons Learnt and Recommendations

- Place the site in its historical context
- Understand the reasons why your site was modified in the past
- Develop a suitable restoration plan to address these modifications
- Explain to stakeholders why change is needed now
- Engage with local communities early and understand the issues from their perspective
- Building a strong partnership early can help secure land and funding
- Develop an achievable adaptation strategy
- Securing funding can take time

Further Reading

The history of both estuaries - Lower Otter and Saâne Valley

<u>Disused tip case study – Lower Otter</u>

Methodology for evaluating and managing man made historical threats





Part B. Engagement and Communication





Context & Background

Engagement & Comms

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Monitoring & Legacy





Chapter 3. Engagement





Introduction

Engagement is the blend of activities we use to connect with people, understand their perspectives on problems with a view to arriving at solutions which have societal approval. It helps to keep them involved and informed and demonstrates that their input and feedback is valued.

Engagement also helps gain a common understanding between project partners and the local community. This in turn helps gain approval and support for projects. As part of our project we engaged the local community, landowners and schools. We also had our engagement independently evaluated.

Community engagement

Specialist communications and engagement staff joined both project teams to plan, support and deliver strategic engagement and communications. PACCo's engagement aimed to:

- Demonstrate it is possible to work with stakeholders to deliver a range
 of benefits for people and the environment by adapting pre-emptively to
 climate change; and
- Promote the PACCo guide to an extensive stakeholder network to influence policy makers at national and EU level to enable climate change adaptation at more sites.

To engage by reaching, connecting, and involving as many people as possible each of the projects used a blend of:

- Consultation and direct stakeholder correspondence
- Information sharing
- Innovative measures like 'Hello Lamppost' and virtual site visits
 Involvement in formal processes (planning and permitting)
- News and social media commentary
- Public exhibitions
- Quarterly wall newspaper
- Site visits and presentations
- Stakeholder meetings (group and individual)
- Visitor surveys

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Educational engagement

PACCo has a strong commitment to encourage learning and participation in the delivery of the project to develop a sense of social awareness, cultural responsibility and awareness of climate change adaptation. We ran over 70 educational engagements with schools in England and France.

We developed a PACCo Education and Communications Strategy and Plan. This included a bilingual education pack to help embed understanding of the principles of PACCo into future generations.



Landowner engagement

A priority in all proposals should be proactive engagement with the owners of the identified land at the earliest possible stage. There is a clear need to work with landowners to co-create the planned project and understand and overcome any concerns and closer to project delivery, and secure the necessary permissions to proceed.

Agreements in respect of rights related to archaeological finds, access arrangements, correspondence with tenants and land users must be established to avoid any later complications.

Independent evaluation of engagement

A critical review of engagement was carried out by specialist researchers at the University of Exeter and the Lisode Consultancy. This involved:

- Evaluation of historical documentation
- Workshops with community residents
- Interviews with project partners and stakeholders

Findings from this review were used to develop a model for engagement.

Clarity & Enupowerment Optimal Approach Representation Warking with Uncertainties

Lessons learnt and recommendations

- Never stop engaging with the local community and stakeholders on your project. There is always an appetite for information and opportunities to get involved before, during and after.
- People get their information from a variety of sources, not all of them accurate or supportive so the best way to keep stakeholders (old and new) up to date is to keep engaging with them.
- Capturing stakeholder feedback is an essential activity to check how they feel, what they understand and to identify knowledge gaps or concerns.
- Project stakeholders can fill any information gaps with rumour and criticism. Be pro-active and manage the timing of engagement to encourage an accurate narrative.
- When something goes wrong, respond quickly and honestly to manage the situation.
- At the beginning of a new project, it is difficult for stakeholders to visualise what their community will look like once the work is complete. Drawings, illustrations and trips to similar sites can help.

Further reading

Educational resources Lower Otter

Educational resources Saâne Valley

PACCo educational pack

PACCo educational resources

Socio-economic engagement (Executive Summary) – Lower Otter and Saâne Valleys

Socio-economic engagement (Documentary evaluation) - Lower Otter and Saâne Valleys

Socio-economic engagement (Stakeholder interviews) - Lower Otter and Saâne Valleys

Summary of visitor surveys – Lower Otter and Saâne Valleys

<u>Visitor Survey – Full Report Lower Otter</u>

<u>Visitor Survey – Full Report Saâne Valley</u>



Chapter 4. Communication







Communications (or comms) is frequently used as a catchword for all public relations, stakeholder engagement and communications activities. Communication connects people with information, increases understanding or prompts action.

Communication is essential for effective engagement. Effective communications use a variety of channels and methods to reach specified target audiences. These are identified during the communications planning stage, which researches the most effective and relevant communications channels.

Summary

Communications goals and objectives - At the start of the project, we defined our main communications objectives and goals, including:

- Raising awareness of the impact of climate change on coastal communities
- Promoting cross-border ways of working to enable pre-emptive adaptation.

Strategy - The PACCo Communication and Engagement Strategy set out the project's key climate change adaptation messages to be conveyed in all communications.

Tools - A communications log was used to record how the partners were involved, when and what communication was taking place, and by whom it was delivered.

Branding - We developed consistent project branding to be used by all partners in all our comms and project materials.

Translation and interpretation - On international projects, buying in professional language and translation service is important to enable smooth project delivery.

Printed Media

We developed written materials to describe the project or to make announcements to celebrate key milestones such as:

- Articles and blogs
- Information packs
- Leaflets
- Newsletters
- Posters

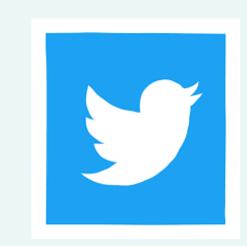




On-line Media

We developed a digital presence through a bilingual website and active and frequent use of Facebook, LinkedIn and Twitter accounts to reach the wider public and industry contacts, sharing news and images at key project stages.

We developed a series of videos and animations to show how adaptation can be achieved. On both sides of the channel drone footage and fixed-point drone photos helped demonstrate project progress in both estuaries.







Newspapers, Television and Radio

On both estuaries we made regular press releases to keep the local public aware of progress on-site or to flag up issues for their awareness. We also seized the opportunity to promote the project on local radio and national television in England and France.





Face to Face Events

The project has been disseminated at virtual and face-toface exhibitions, conferences and workshops. The team also led numerous site visits for a wide range of different groups including schools. A closing conference attracted over 200 delegates, from over 50 different types of organisations from 5 different countries.





Lessons Learnt and Recommendations

- Every piece of communication must consider the audience and timing, as well as the key project messages, plus the specific information and action.
- Researching into how and where stakeholders get their news provides valuable insights as to which channels to utilise to reach your target audience.
- Plan and map out communications activities to spot gaps, overlaps and to streamline.
- Partnership projects lead to large stakeholder networks/contacts which should be used effectively.
- During a project, audiences' interest will ebb and flow use a mix of communications channels irrespective of whether they are active or not.
- Put yourself in the stakeholders' shoes to consider how you would feel about your project if you lived there and use this insight to refine communications.
- Work with partners and funders to develop a brand and recognisable logo.

Further Reading

Reports

Communications and engagement strategy

PACCo Final Conference Report

Social media

PACCo Facebook page

PACCO Linkedin account

PACCo Twitter account

Videos, animations, drones

Cross-border exchange – Natural capital and socio-economic

Cross-border exchange - Virtual tour of the Lower Otter

Lower Otter drone Flyover

PACCo videos and animation

PACCo YouTube channel

Webpages

Basse Saâne 2050 webpage

Lower Otter webpage

PACCo webpage

Blogs, Newsletters, leaflets

Leaflets and information packs

Newsletters

PACCo blogs posts





Part C. Funding and Natural Capital





Context & Background

Engagement & Comms

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Chapter 5. Funding and natural capital







Introduction

In Europe, the cost of flooding is estimated to be €1.4bn, and without further investment this figure is expected to rise to €210bn by 2100 (Vousdoukas, et al., 2020). Annual economic losses will increase dramatically if nature-based solutions are not implemented (Van Zanten, et al., 2021).

Across Europe there is no specific funding source available to fund nature-based climate change adaptation. France and England, have accessed European Union funding to deliver past climate change adaptation projects, that would otherwise have been difficult to implement using only domestic funding sources (Conservatoire du Littoral, 2022). A natural capital approach can be used to help value the wider benefits of a project and this can in turn help generate investment into the project from other sources.

The Natural Capital Approach

The natural capital approach is a way of placing a value on the services provided by nature. It is defined as:

"The elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions" (NCC, 2014).

Natural capital is the air we breathe, the water we drink, the food we eat, and the environment we enjoy. The world's natural assets underpin our society and sustain our lives. Valuing natural capital assets enables us to make the case for protecting and restoring valuable habitats by providing an economic value for the services they provide.

Natural capital assessments are relatively flexible and can be undertaken with different levels of detail. The PACCo project undertook qualitative assessments across both estuaries to enable a comparison of ecosystem service provision across a range of options. A quantitative assessment was undertaken solely for the Lower Otter to numerically value the benefits of the site's restoration.

Qualitative Natural Capital Assessments – Lower Otter and Saâne Valley

Qualitative assessments considered three scenarios:

- **Baseline** Ecosystem services provided pre-project before any interventions are in place
- Do nothing Changes to the baseline scenario if adaptation measures are not implemented to address climate change impacts
- PACCo Ecosystem service achieved through restoration activities and other adaptation measures

For both valleys, the assessments showed if nothing was undertaken, and a catastrophic breach occurred, there would be a decline in ecosystem services compared to the baseline (pre-restoration scenario). The restoration scenario depicts an increased delivery of ecosystem services compared to the baseline and do nothing scenarios.



Quantitative Natural Capital Assessments – Lower Otter

A quantitative natural capital assessment was undertaken for the Lower Otter. It covered two scenarios:

- Baseline scenario Describes a situation whereby the Lower Otter restoration project is not delivered and an unmanaged breach occurs
- Restoration scenario Considers the full restoration of the Lower Otter

This report concludes that over 60 years the gross natural capital present value (PV) of the 'baseline' scenario is £23.6 million.

The Lower Otter's restoration scenario has a higher gross natural capital PV60 of almost £35 million.

The natural capital benefits associated with restoration scenario are therefore substantially higher (50%) than those calculated for the baseline scenario. The natural capital benefits related to the welfare value of recreational visits were valued most highly, followed by physical health benefits, water quality and carbon sequestration related benefits.

Lessons Learnt and Recommendations

- Funding adaptation projects is not straightforward, there is no one funding source available.
- A blended approach to financing is recommended, bringing together multiple sources.
- Taking a natural capital approach helps define the wide range of benefits that a project can deliver can help attract a wider range of partners and funders.
- Qualitative natural capital assessments can be a cheap and fast way of assessing different options to help identify which one has the potential to deliver the largest number of benefits.
- Quantitative assessments can:
 - odraw-in other partners and funders because they enable a more accurate financial value to be placed on environmental benefits
 - help communicate the wider benefits of a project and help demonstrate what the project will achieve long-term

Further Reading

Qualitative Natural Capital Assessments - Lower Otter and Saâne Valley

Quantitative Natural Capital Assessment – Lower Otter

Summary of natural capital assessment (Lower Otter) and surveys (Lower Otter and Saâne Valleys)

Summary of visitor surveys – Lower Otter and Saâne Valleys

Visitor Survey – Full Report Lower Otter

<u>Visitor Survey – Full Report Saâne Valley</u>



Part D. Design and Construction





Context & Background

Engagement & Comms

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Chapter 6. Lower Otter Design & Construction







Introduction

On the Lower Otter, the project's design and construction adopted a threepronged adaptation strategy which included:

- Protecting and restoring nature
- Relocating businesses and amenities
- Resilient design

An overview of the scheme is provided below.

Relocating the Cricket Club

The cricket club was originally located close to the sea in a location which flooded regularly. The cricket pavilion was demolished as part of this project and relocated to a flood-free location to the north of Budleigh. The new grounds include an improved adult pitch, new junior pitch and a new multifunctional two storey clubhouse.

The old cricket pitches now form part of the new creek network and are close to the location of the breach and a new 70m footbridge crossing the breach.



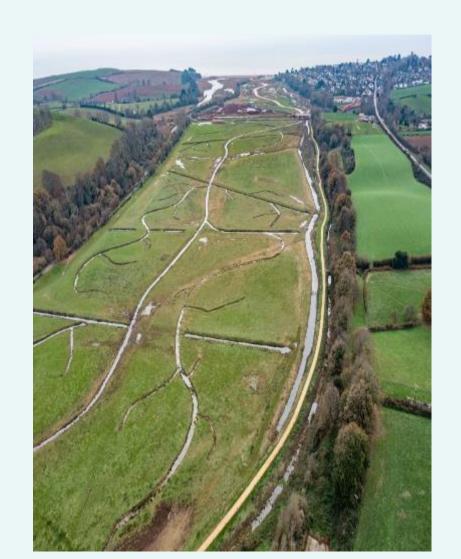


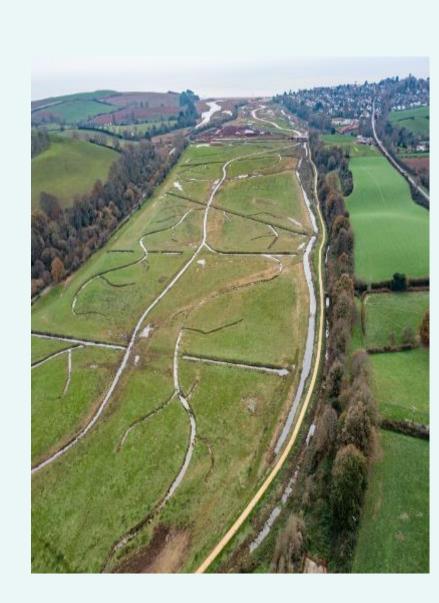
Creek Network and Budleigh Brook

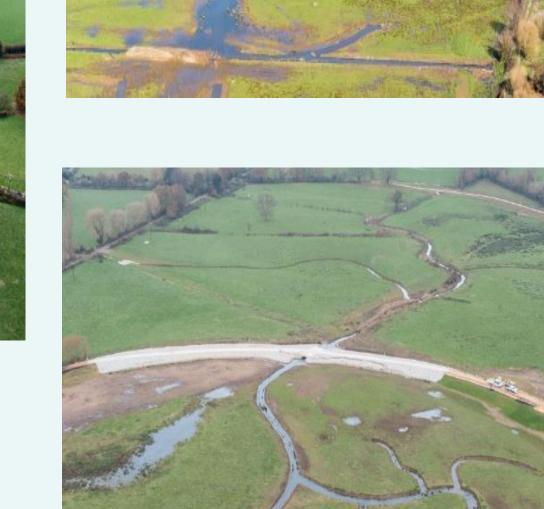
The River Otter was disconnected from floodplain with land being drained for agricultural purposes. As part of this project 55ha of intertidal habitat has been restored.

This involved excavating a new creek network extending 2.2km from the northern extent of the site (Little Bank) to the sea at Lime Kiln Car Park. Existing agricultural drainage ditches running west to east across the floodplain were utilised to reduce the cut and fill. The creeks cross through what was once agricultural land and the old cricket pitch. Twice a day the tide will drain in and out of the 70m breach.







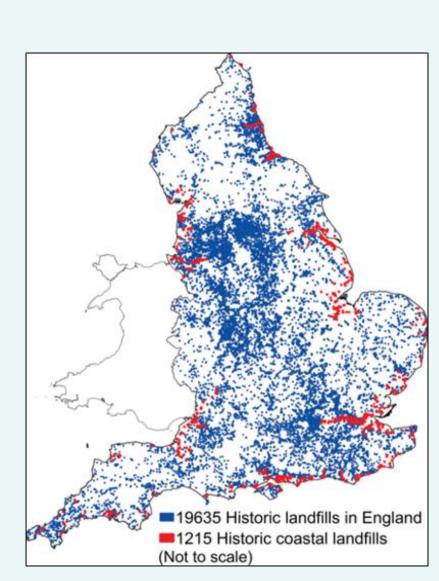


Protecting the Historic Landfill

The coast of the UK is home to numerous historic landfill sites. The Lower Otter is no exception; the tip was active from 1928 to 1978 receiving inert and household waste and small amounts of industrial and commercial waste.

Flooding in 1968 resulted in rubbish being carried into adjacent farmland, and the uncertainty of the tips contents and proximity to water abstraction boreholes meant that its protection needed to be considered.

Protection was achieved by capping the site and constructing shallow slopes over the landfill site to dissipate water energy, reducing the risk of erosion. An orange geotextile layer notifies future subcontractors to not disturb the area.









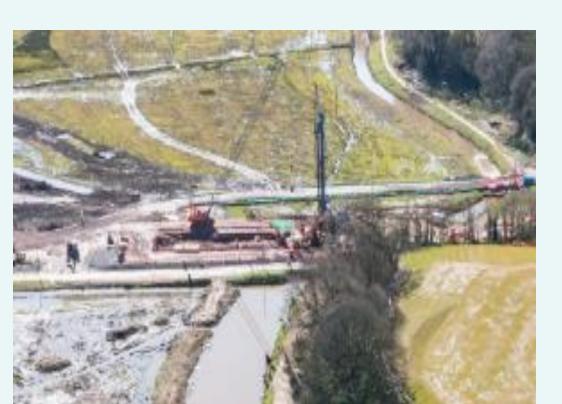
Footbridge and Highway Bridge Construction

Two new bridges have been constructed:

- Footbridge crossing the location of the breach
- Highway bridge over the creek network at South Farm Road

The footbridge spans 70 metres across the location of the breach retaining pedestrian access along the popular South West coastal path.

A road bridge and a raised road embankment on South Farm Road enable vehicular access along the road at high tide. The bridge connects the northern and southern creek networks without restricting access.







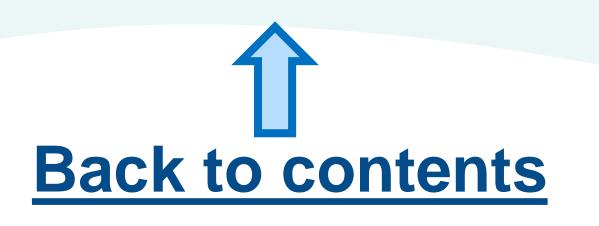


Further Reading

The history of both estuaries - Lower Otter and Saâne Valley

Methodology for evaluating and managing man made historical threats

Disused tip case study – Lower Otter



Chapter 7. Saâne Valley Design & Construction







Introduction

In the Saâne Valley, the project's design and construction adopted a three-pronged approach which included:

- Protecting and restoring nature
- Relocating businesses and amenities
- Resilient design

An overview of the scheme is provided below.

Relocating the Campsite

The campsite is located to the east of Quiberville on the coast where the Saâne meets the sea. The site has been subjected to fluvial flooding in the past and the risk will only increase with climate change and sea level rise.

The campsite is a vital socioeconomically to the community. It generates 40% of the income for the municipality through direct and indirect employment.

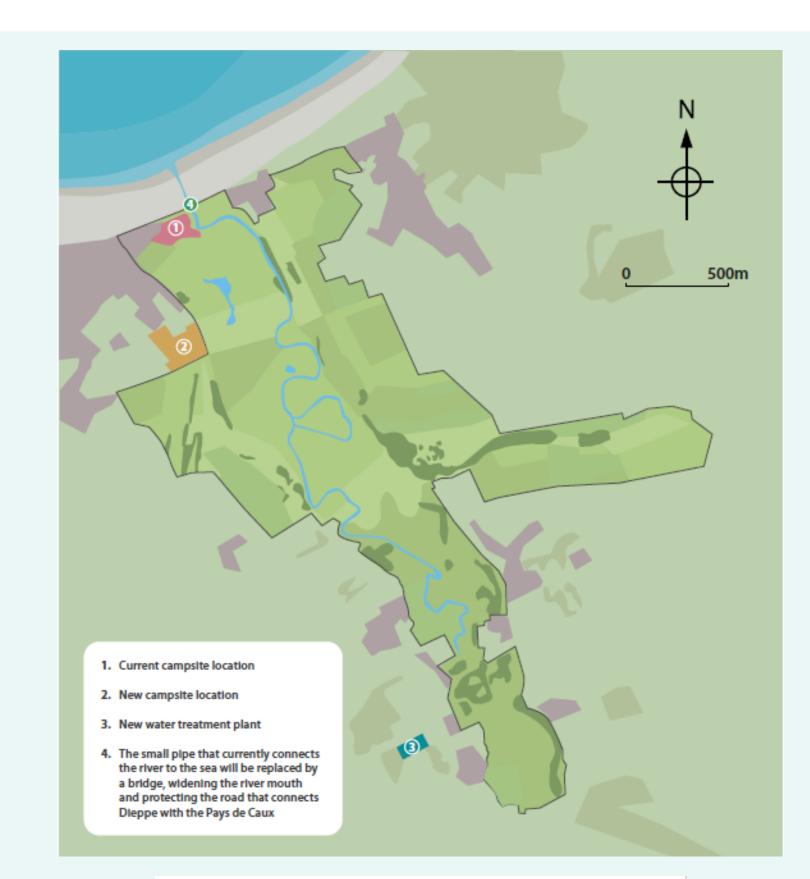
To relocate the campsite out the floodplain it had to remain on municipality-owned land. A site was found on the adjacent hill outside of the floodplain, that is within walking distance of the coast and Quiberville, with easy access to the road network. It aims to improve the tourism service and integrate into the surrounding landscape better than the existing campsite.

New Sewage Treatment Plant and Network

The new wastewater treatment works are located 200m west of village of Longueil.

Studies had found that the water quality of the Saâne required improvement to meet EU water quality standards. This was primarily due to the existence of septic tanks with inconsistent treatment levels and accidental discharging of sewage during flood events.

A new high performance collective wastewater treatment plant has been built, replacing five failing treatment sites. The new network connects 4,300 homes.











Restoring the Intertidal Habitat

The Saâne Valley drains into the channel between the settlements of Quibervillesur-Mer and Sainte Marguerite-sur-Mer. The road embankment and culvert prevent the efficient flow of water out of the valley and into the sea, and during flood events, waterlog the floodplain and flood properties and infrastructure.

The restoration of the floodplain is enabled through PACCo as relocating the municipal campsite creates the space for intertidal habitat. The habitat creation will be delivered by the Basse Saâne 2050 project and will entail:

- A larger outlet to the sea
- Lowering embankments and constructing new meanders
- Renaturation of Longueil poplar grove and planting of native species
- Creation of foot and cycle paths
- Change in land use practices

Lessons Learnt and Recommendations (Chapters 6 and 7)

- Ensure you know what the key constraints are
- Know your site's history to shape its future design
- Be realistic about project phasing, especially if there are multiple dependencies
- Do not under-estimate the degree to which habitat and protected species constraints may impact on project delivery (time and cost)
- Conduct a detailed site wide ground investigation and surveys of species present on site
- Show foresight and accommodate future engineering projects
- Be vigilant to continually changing climatic and ground conditions during construction. Working in flood plains can be very challenging
- Anticipate problems and resolve them collectively
- Think about the project's legacy when developing signage and infrastructure

Further Reading

The history of both estuaries - Lower Otter and Saâne Valley

Methodology for evaluating and managing man made historical threats







Chapter 8. Risks and solutions







Introduction

A key component of project management involves the identification, management and mitigation of risks and issues which could affect the pace of delivery and budget.

The PACCo project was delivered using a programme level risk register, enabling project partners to work together to identify and mitigate risks.

We developed two tools to help define the risks and issues we encountered, and solutions to resolve these risks.

Risk and Issues Tool

The risks and issues tool is an Excel spreadsheet and accompanying report that sets out different ways to mitigate risks and issues that could be encountered during the following four phases of a project:

Set-up

- Design and planning
- Construction and implementation
- Post-construction

The tool has one tab for risks and one tab for issue. The tool describes the risk or issue and its potential consequence. A matrix defines the probability, severity and consequence of the risk/issue materialising, and a priority level for resolving that risk/issue.

Criticality	Score	Colours
Low	1 to 3	
Moderate	4 to 7	
Significant	8 to 9	
Critical	10 to 16	

Criticality		Impact			
	X	1 - Minor	2- Significant	3 - Severe	4 - Catastrophic
Probability	1 - Very unlikely	1	2	3	4
	2 - Unlikely	2	4	6	8
	3 - Likely	3	6	9	12
	4 - Very likely	4	8	12	16

Solutions Tool

Our solutions tool that sets out how to resolve identified problems or manage the risks. The solutions tool is an Excel spreadsheet and accompanying report outlining ways to mitigate risks and issues.

Following a similar approach to the risks and issues tool, it defines a management strategy (or risk management hierarchy) and sets out a solution to mitigate the impact(s) of the risk or issue by:

- Eliminating the risk
- Transferring the risk
- Mitigating the risk
- Accepting the risk

Mitigatory measures are then described to manage the risks and remedial actions are described for the issue encountered during the PACCo project

Application of Tools – Example of the Historical Tip (Lower Otter)

The environmental risks associated with the tip on the Lower Otter were defined. The potential that if left un-mitigated this could result in negative environmental impacts.

Describing the risk

	Description of the risk
Risk#	27
Phase of the project	Design and planning
Risk identification	Risk of pollution due to the presence of a landfill in the middle of the valley
Nature of the risk	Environmental
Risk description	Historical landfills are often located in coastal area. If these sites are not protected against flood, contaminants can be released in the environment affecting water quality and species located on site.
Impacts/consequences	The presence of a landfill in the Otter valley increases the risk of pollution. If the landfill capping fails during a flood event or if the design is inadequate, contaminants can leak, and waste can be uncovered. It will impact the wildlife, the water quality and human health. This risk is already present from fluvial flooding but could be made worse through the increased frequency of tidal inundation.
Probability	2
Likelihood	4
Consequence	Significant
•	

By identifying this risk early and planning for it through all stages of the project enabled the risk of pollution to be minimised to a very low level through designing robust engineered solutions.

Describing the solution

	Description of the solution
Management strategy	Eliminate the risk
Mitigation measure	During the planning and design phase of the project, man-made threats such as the presence of landfill were considered and anticipated. Engineering solutions have been designed to prevent any impacts. The impact of the tides on the site were modelled to demonstrate that this risk could be mitigated through the way in which the site was designed and constructed, eliminating the risk of pollution.
Probability	1
Likelihood	2
Consequence	Low
Monitoring of mitigation measure(s)	Post-project, the maintenance and the monitoring of the ground where the disused tip is located should ensure that the protective design solutions in place are sufficient and not damaged.

Lessons Learnt and Recommendations

- Develop risk and solutions registers for all projects irrespective of their financial value or spatial scale
- Update your register regularly with partners to help:
 - track when old risks are resolved
 - develop solutions to new risks
- Horizon scan to identify new risks early so that they can be resolved before they become a problem
- Escalate highest risks with highest consequences up your project management hierarchy to gain assistance from leaders to resolve
- When risks are resolved identify and share any lessons learnt with partners

Further Reading

Transferable methodology for identifying and cataloguing risks/issues

Transferable strategy for addressing risks and problems

Methodology for evaluating and managing man made historical threats

Disused tip case study – Lower Otter



Part E. Monitoring and Legacy





Context & Background

Engagement & Comms

Funding & Natural Capital

Design & Construction

Monitoring & Legacy



Chapter 9. Monitoring





Introduction

Monitoring is often an overlooked activity but is necessary to:

- Demonstrate success
- Learn from mistakes
- Know when adaptive management is needed
- Fill known research gaps
- Help demonstrate a project's success

Developing a Monitoring Plan

One of the first steps when developing a monitoring programme is to articulate the overall aim of the project, describing what you are trying to achieve.

Defining clear objectives ensures monitoring is cost-effective and aligned to the project's targets. It also identifies the required baseline data and resources for monitoring.

Monitoring should primarily focus on demonstrating that project objectives have been achieved. The figure below, adapted from RRC (2017), sets out the steps needed to develop a monitoring plan.



Why Monitor?

On projects such as the Lower Otter and Basse Saâne, environmental monitoring and evaluation is particularly important to understand the environmental and social benefits and disbenefits of the project. The monitoring is undertaken for many reasons such as:

- Statutory/legal
- Managing an environmental risk
- Adaptative management
- Long-term learning to demonstrate the value of a project

It is important to note these reasons as they help shape what you monitor, how you monitor it and when you monitor. The PACCo environmental monitoring report describes the monitoring undertaken across both estuaries.

Lower Otter and Saâne Valley

On the Lower Otter, steering and working groups were set up to help develop monitoring objectives, priorities, reporting format and timescales.

In both estuaries, monitoring was undertaken across three phases of the project's lifecycle:

- Phase 1 Project development
- Phase 2 Construction/delivery
- Phase 3 Legacy

Monitoring data collected during Phases 1 and 2 helped develop the project's design, planning application, environmental permits and its subsequent delivery. It has also provided a baseline upon which to base future legacy monitoring to understand what has changed post project.

Lessons Learnt and Recommendations

- Identify the need for monitoring at the outset of a project and secure budget for it
- Develop a monitoring plan with SMART monitoring objectives. This will enable you to ensure that your monitoring answers specific questions.
- Prioritise monitoring activities based on available budget
- There may be a statutory requirement for your project to be monitored
- There will be different reasons for monitoring and your monitoring plan will help ensure you are collecting the right types of data for the right purpose



Further Reading

Summary of environmental monitoring & evaluation tools

Summary of visitor surveys – Lower Otter and Saâne Valleys

Visitor Survey – Full Report Lower Otter

Visitor Survey – Full Report Saâne Valley

Carbon assessment – Lower Otter

Fish surveys - Lower Otter



Chapter 10. Legacy infrastructure





Introduction

PACCo developed 'hubs' and long-term educational tools explaioning to visitors the reasons why the project was undertaken, what climate change is and the need for adaptation.

The hubs and the tools are designed to engage local communities, visitors, conservation organisations, recreational groups and educational organisations. They show people how the sites have changed over time, the benefits of the project to local communities, biodiversity, ecosystem services, local economies, businesses and wellbeing.

Summary

Legacy infrastructure is important as it promotes the project, provides interesting visitor information such as the site's historical context and raises awareness of climate change and its impacts. The PACCo project developed interpretation hubs to describe the:

- Benefits of adaptive change in heavily modified estuaries
- Changes to ecosystem services (pre and post project)
- Socio-economic benefits of adapting to climate change
- Future impacts of climate change
- Benefits of early adaptation
- Applicability of the project to other estuaries in England and France

These hubs took a different format in both estuaries and were designed to suit the individual estuary and its end users. Alongside the hubs, educational tools were also developed for use within schools.

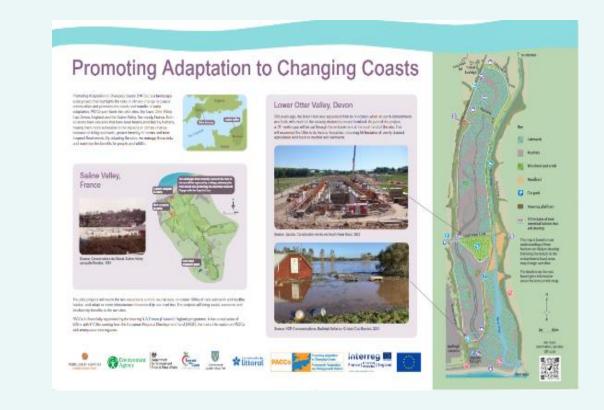
Lower Otter

Temporary signage was initially installed across the site during the construction phase to outline what was being undertaken and why. During this phase, different engagement measures were put in place to enable community members to interact with the project to ask questions or raise concerns.

Towards the end of the project the permanent hubs were installed across five locations. This included signage and some physical infrastructure such as seating areas and viewing platforms across the site describing:

- What had been undertaken and why
- The plants and animals visitors might be able to spot



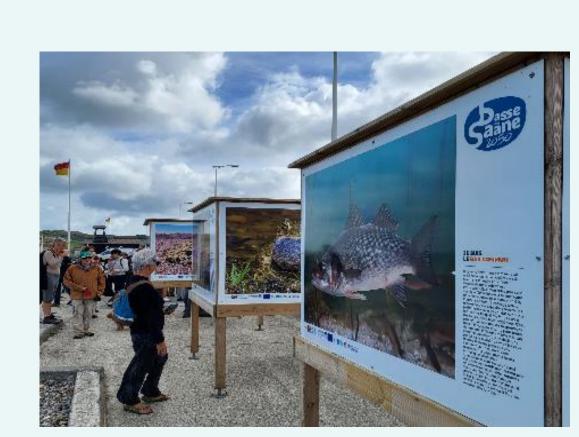


Saâne Valley

The hubs were designed and erected in the second year of the project to raise awareness within the local community and visitors to the estuary, and to set out what changes to the estuary would be seen in the future.

The hubs are strategically placed within the communities to capture the attention of passers-by. Every year, a new theme is described such as:

- In 2021, description of the PACCo project, the Basse Saâne project and LORP
- In 2022, description protected species and habitats located within the Saâne valley
- In 2023, they showed feedbacks received from the inhabitant and the users of the valley





Lessons Learnt and Recommendations

- Consider, plan and budget for legacy infrastructure at the project's outset so it is not an add-on
- Understand the needs of partners, funders and stakeholder so that any boards or facilities meet their needs
- Don't underestimate how much time is needed to agree on designs and content
- Design information boards and visitor infrastructure with the public in mind
- Develop packs of materials and tools which can be used by the local community groups for example for citizen scientists.





Further Reading

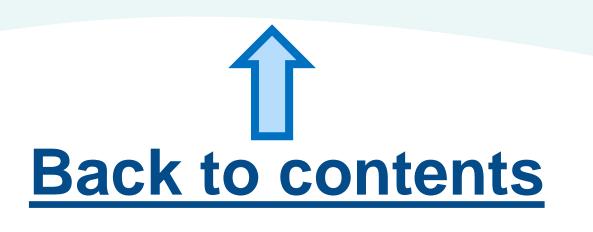
PACCo educational pack

PACCo educational resources

Educational resources Lower Otter

Educational resources Saâne Valley

Communications and engagement strategy



Part F. Summary and Conclusion





Context & Background

Engagement & Comms

Funding & Natural Capital

Design & Construction

Monitoring & Legacy





Chapter 11. Summary and Conclusion





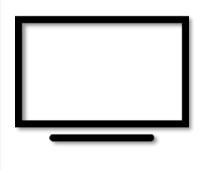
Introduction

The PACCo project involved delivering a wide range of different activities forming part of the climate change adaptation strategies for the Lower Otter and the Saâne valley. This included:

- Communicating about climate change and raising awareness
- Protecting and restoring lost intertidal habitats
- Relocating businesses and amenities to areas at lower risk of flooding
- Developing resilient design for new infrastructure

Below we summarise the key achievements from the PACCo project demonstrating that pre-emptive climate change adaptation is possible following this four-pronged strategy.

Awareness raising



2+ 14

national / regional TV million people engaged programmes broadcast via national and regional about the project TV channels



4700+ adults 20 reached through site talks & site visits elect

site visits with elected representatives, experts, technical staff, funders and national and local press



2100+ children /
young people
reached in
educational talks &
site visits

800 pupils reached through presentations, forums or site visits



3 summer exhibitions

Protecting and restoring nature

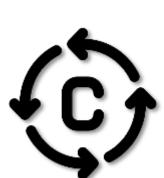


5km

of river & 5km of tributary reconnected to their floodplain



105 hectares of intertidal habitat created



70,000+ tonnes – the amount of carbon potentially stored

Relocating businesses and amenities



municipal campsite relocated

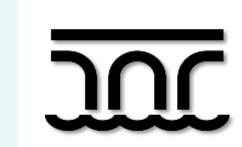


1 cricket club relocated



3.7km
public footpath
raised / enhanced

Resilient design



2 bridges built



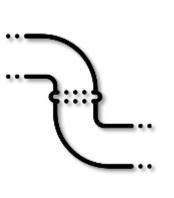
1road raised
from floodin



1 old tip protected from erosion



1
wastewater
treatment plant
created



30 km

of sewerage networks created and nearly 1500 homes connected

Top tips

Through the PACCo project we have identified a series of top tips we would recommend to other projects developing climate change adaptation projects:

- Identify suitable funders, landowners and partners at an early stage
- Understand your funders, landowners and partners requirements
- Ensure you know what the key constraints are
- Know your site's history to shape its future design
- Take a natural capital approach to articulate options and benefits
- Nurture your partnership throughout as it is the foundation for project success
- Bring your community with you through effective engagement
- Communicate constantly and effectively using a wide range of approaches
- Involve local communities from the earliest stage, engage effectively and be receptive of local views
- Be realistic about project phasing, especially if there are multiple dependencies
- Habitat and protected species constraints may impact on project timescales and cost
- Do not under-estimate the amount of time it might take to gain landowner agreement and to put legal agreements in place
- Use the project as an opportunity to engage the next generation
- Conduct a detailed site wide ground investigation and surveys of species present on site
- Show foresight and accommodate future engineering projects
- Be vigilant to continually changing climatic and ground conditions
- Working in flood plains can be very challenging
- Maintain and improve visitor infrastructure during and post-construction
- Anticipate problems and resolve them collectively
- Plan monitoring of project outcomes in advance and secure budget for it
- Think about the project's legacy when developing signage and infrastructure



PACCo reports







Blogs, Newsletters, leaflets:

PACCo blogs posts

Leaflets and information packs

Newsletters

Communication:

Communications and engagement strategy

Education:

Educational resources Lower Otter

Educational resources Saâne Valley

PACCo educational pack

PACCo educational resources

Social media:

PACCo Facebook page

PACCO Linkedin account

PACCo Twitter account

Webpages:

Basse Saâne 2050 webpage

Lower Otter webpage

PACCo webpage

Videos, animations, drones:

Lower Otter drone Flyover

PACCo videos and animation

PACCo YouTube channel

Cross-border exchange – Natural capital

and socio-economic

Cross-border exchange - Virtual tour of the Lower Otter

Natural capital

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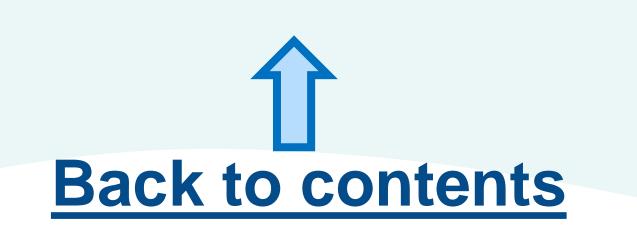
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