REST-COAST

LARGE SCALE RESTORATION OF COASTAL ECOSYSTEMS THROUGH RIVERS TO SEA CONNECTIVITY

WADDEN SEA

RESULTS & ACHIEVEMENTS REPORT

SUMMARY

The Ems-Dollard estuary situated on the Wadden Sea, in the Province of Groningen in the Netherlands, represents a transition from pilot-scale experimentation to large-scale restoration planning. The pilot site contribution centred on the development of a scalable governance and implementation framework for nature restoration and climate adaptation, combining multiple ecological, economic and social development priorities.

While the project builds upon multiple elements of physical restoration works already piloted, its principal achievement is a signed cooperation agreement involving nine institutional partners, committing to the restoration of 150 ha of nature and the raising of 300–500 ha of subsided agricultural land. This agreement, reached after extensive stakeholder engagement including more than 30 community meetings, represents a substantial institutional milestone and the foundation for a full implementation plan currently under development.

Funded by the European Union

This project receives funding from the European Union's Horizon 2020 Innovation Action under grant agreement No 101037097.

THREATS AND PRESSURES ADDRESSED

- Excessive sedimentation and turbidity in the estuary
- Degradation and loss of natural intertidal and coastal habitats
- Coastal squeeze by sea-level rise on salt marshes
- Climate change pressures, including intensified storm events
- Inland subsidence and salinisation of agricultural land
- Disrupted land–sea ecological connectivity
- Conflicting land-use and economic pressures between agriculture, nature, and port activities
- Governance and implementation challenges in multi-stakeholder coastal management

BASELINE CONDITION

The Ems-Dollard estuary has experienced long-term degradation driven by land reclamation, embanking, and agricultural intensification, resulting in significant loss of intertidal habitats and disrupted ecological connectivity between land and sea. Ongoing subsidence of reclaimed agricultural land and accelerating sea-level rise are increasing flood risk and salinisation pressure, threatening the viability of current land uses. Excessive sedimentation and turbidity in the estuary further constrain ecological recovery. The area is subject to overlapping and often conflicting interests among farming communities, nature conservation bodies, port authorities, and water management organisations, creating a highly complex governance environment.

Over the years, several pilot projects demonstrated the feasibility and effectiveness of potential restoration approaches, expanding the knowledge base and strengthening investor confidence. The REST-COAST timeframe built on this foundation to design an upscaling framework.

RESTORATION STRATEGY SELECTED AND WHY

Given the scale of the challenges and the complexity of the stakeholder landscape, the project focused on building the governance architecture and financial structures necessary for large-scale restoration, rather than delivering small-scale physical interventions. The strategy was grounded in three complementary elements:

- Developing a cooperation agreement among nine institutional partners as the foundational governance instrument for the plan development phase.
- Establishing a co-design process with local inhabitants and stakeholders to develop an implementation plan built on shared understanding and legitimacy.
- Designing a multi-stream financial structure using co-financing mechanisms, with a ten-year planning horizon to ensure manageability and long-term commitment.

The Province of Groningen also acquired approximately 400 ha of land in the area to facilitate negotiations and reduce barriers to implementing the restoration and land-raising programme.

Constructed saltmarsh at Marconi buitendijks

HOW THE CHALLENGES WERE ADDRESSED AND KEY RESULTS ACHIEVED

Excessive sedimentation and turbidity

Addressed through the upscaling exploration and cooperation agreement framework. Port authorities are contributing to the restoration programme based on avoided dredging costs, aligning their economic interests with ecological restoration outcomes. Locally sourced clay for upcoming dike-reinforcement projects is being secured through negotiated off-take agreements, creating synergies between sedimentation management and coastal defence.

Degradation and loss of natural habitats

The cooperation agreement commits to restoring 150 ha of nature in the Ems-Dollard estuary and coast. The Province of Groningen's acquisition of approximately 400 ha of land in the area provides the spatial basis for this restoration. Physical works have not yet begun but are planned for the implementation phase, building on lessons from earlier pilot projects in the region.

Impacts of sea-level rise

The cooperation agreement also commits to raising 300–500 ha of agricultural land, addressing the subsidence and sea-level rise challenge by elevating land levels using locally sourced sediment. This measure simultaneously addresses flooding risk and, while helping habitat transition at the land–sea interface.

Climate change pressures

The ten-year planning horizon and scenario-based approach embedded in the cooperation framework are designed to build long-term climate resilience. The multi-stakeholder governance structure allows adaptive management responses as climate conditions and implementation of restoration evolve.

Inland subsidence and salinisation

Land-raising through sediment deposition is the primary proposed response to subsidence, addressed within the cooperation agreement and to be implemented through the forthcoming implementation plan. This is closely linked to the sea-level rise challenge and addressed through the same mechanism.

Disrupted land–sea ecological connectivity

Restoration of 150 ha of nature within the Ems-Dollard area is intended to re-establish ecological connectivity across the land–sea gradient. The implementation plan will define specific connectivity interventions per thematic pillar.

Conflicting land-use and economic pressures

The Province of Groningen's land acquisition of approximately 400 ha reduced a key barrier to negotiation. The cooperation agreement brings together municipalities, water boards, the national government, harbour authority, agricultural authority, and nature parties, explicitly acknowledging and managing competing interests within a shared governance framework.

Governance and implementation challenges

The cooperation agreement itself is the primary result addressing this challenge. Moving from broad terms of agreement to a detailed implementation plan is acknowledged as the next critical step, requiring continued intensive engagement with inhabitants, who have participated in over 30 meetings, and integration of expert assessments across thematic pillars. Integrated project management teams are being established per pillar to drive implementation.

SPECIFIC SOLUTIONS IMPLEMENTED

Cooperation agreement (9 parties)

A signed multi-party agreement committing to restore 150 ha of nature and raise 300–500 ha of agricultural land in the Ems-Dollard area, establishing the governance basis for the plan development phase.

Land acquisition

The Province of Groningen acquired approximately 400 ha of land in the restoration area, reducing barriers to negotiation and enabling flexible land-use planning.

Multi-stream financial architecture

A ten-year co-financing structure combining port contributions (based on avoided dredging costs), clay off-take agreements for dike reinforcement, and initial steps toward carbon credit market access.

Stakeholder engagement programme

Over 30 community meetings with inhabitants; core group, programme team, and integrated project management teams per pillar are being established. Expert teams have been assessing ideas against objectives and feasibility.

Pilot legacy

Across the Ems-Dollard region, REST-COAST has demonstrated restoration feasibility, generated knowledge, and built investor confidence, providing the evidential foundation for the upscaling agreement.

Construction of Double Dike

KEY STAKEHOLDERS INVOLVED AND HOW

The restoration programme involves an exceptionally broad stakeholder coalition. Institutional partners in the cooperation agreement include municipalities, the water board, the national government, the harbour authority, the agricultural authority, and nature conservation organisations. The Province of Groningen, as the lead authority and landowner, plays a central coordinating role.

Local inhabitants are treated as key stakeholders and have been engaged in over 30 meetings to date. In the next phase, community engagement will intensify, with meetings planned weekly or twice weekly to co-develop the implementation plan. Integrated project management teams per thematic pillar will bring together technical experts, institutional partners, and community representatives to assess proposals against agreed objectives and feasibility criteria. The core team monitors the overall process and goal delivery.

INFLUENCE ON DECISION-MAKING

The Ems-Dollard pilot operates at the intersection of government and restoration practice: the Province of Groningen and its institutional partners are themselves the decision-making authorities for the area. The REST-COAST project provided the framework and evidence base that enabled the cooperation agreement to be reached, directly influencing the institutional commitment to restoration at scale. The province's land acquisition decision was also shaped by the restoration programme's logic. The project is effectively a case of government-led decision-making informed and structured by the REST-COAST process.

RECOMMENDATIONS FOR FUTURE DEVELOPMENT

Implementation plan development

Develop detailed implementation plans per thematic pillar, co-designed with inhabitants and validated by expert teams, building from the cooperation agreement to actionable, funded interventions.

Legal and permitting processes

Proactively navigate the legal procedures required for large-scale habitat restoration and land-raising, which are acknowledged as a significant challenge in the upscaling phase.

Physical restoration delivery

Begin on-the-ground works for habitat restoration (150 ha) and land-raising (300–500 ha) as the implementation plan is finalised and funding streams are confirmed.

Carbon credit market

Formalise access to the carbon credit market as a long-term revenue stream supporting the financial sustainability of the restoration programme.

Monitoring and adaptive management

Establish a comprehensive monitoring programme to track ecological recovery, sediment dynamics, and climate resilience outcomes, feeding into the adaptive management framework over the ten-year programme horizon.

Community ownership

Maintain and deepen the intensive community engagement process to ensure that the implementation plan has broad legitimacy and local support throughout delivery.

FINANCIAL MECHANISMS USED AND PROPOSED

The programme uses a multi-stream financial structure designed to combine and manage multiple funding sources over a ten-year period. Port authorities contribute funding based on avoided dredging costs, aligning economic self-interest with ecological restoration. Locally sourced clay for dike-reinforcement projects is being secured through off-take agreements, creating a revenue stream from sediment management. Initial steps have been taken to access the carbon credit market as a prospective long-term income source.

The ten-year planning horizon was deliberately chosen to make co-financing manageable and to provide the stability needed to attract diverse funding partners. Some funding streams require co-financing, with different streams supporting and reinforcing one another across the programme period.