



# Failte-Croeso-Welcome

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Fáilte go Port Láirge agus comhdháil dúnta STREAM

Croeso i Waterford a'r gynhadledd gloi STREAM

Welcome to Waterford for the closing conference of STREAM



Swansea University  
Prifysgol Abertawe



# STREAM – Who are we?

Ireland Wales Programme – Priority 2.

Adaptation of the Irish Sea and Coastal Communities to Climate Change.

Working collaboratively to preserve and enhance the marine and coastal environment for the enjoyment of future generations in the face of the increasing impacts of climate change.

**Original ideas proposed in 2015** – to develop an online portal to provide real-time information on the impacts of climate change on our estuaries – through the development of lower cost innovative sensors – acquired information will lead to the development of toolkits for the assessment of potential climate impacts on the Irish Sea.

**Funded 2018, €5.4M investment into the cross-border regions - €4.3M in EU funds.**



# The CO<sub>2</sub> Problem



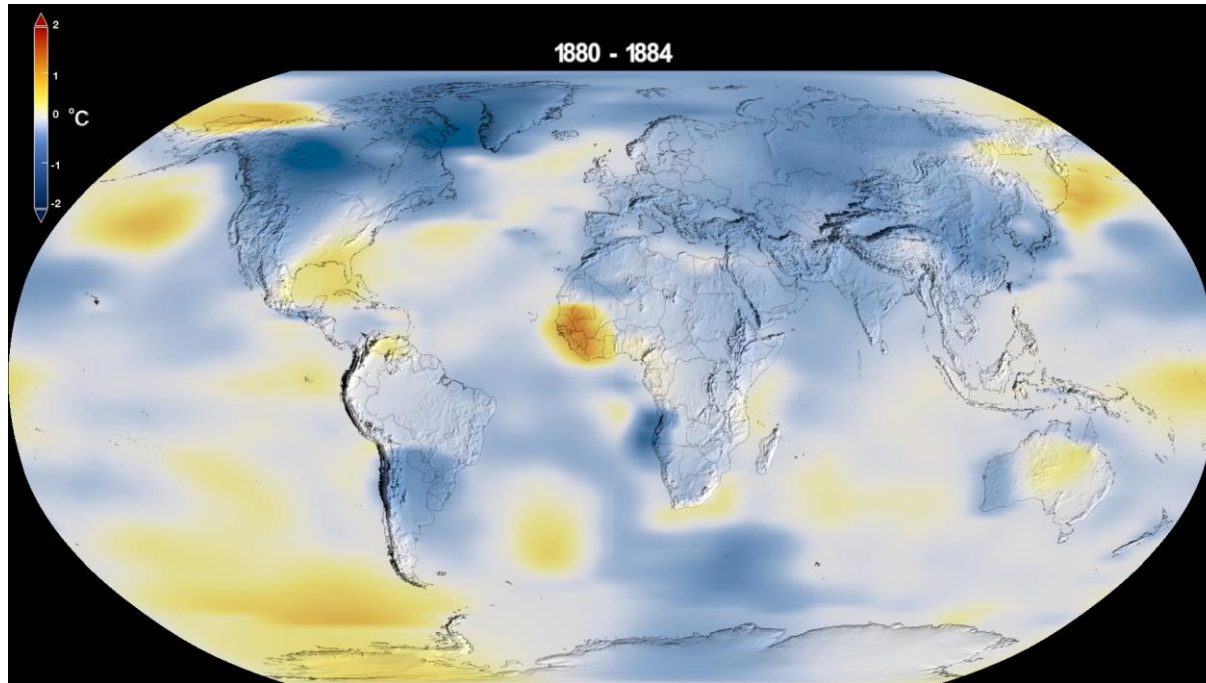
**Summer** – 50% of anthropogenic CO<sub>2</sub> emissions absorbed by Vegetation and Oceans.

**Winter** – vegetation returns some of CO<sub>2</sub> to atmosphere

Global CO<sub>2</sub> levels rise by ~2.5ppm per annum.

Ocean Temperature and Acidity Rises.

# The Temperature Problem



Northern Europe expected to be **3.6°C hotter** on average by 2050.

More **frequent and intensive rainfall** for NW Europe.

Flood risk and **environmental risks**.

Significant impacts on local economy, agriculture and marine.

# Living with Climate Change

Mitigation -> Stop doing it -> Alternative Energy Sources, Recycle More, Insulation, Upgrade buildings to lower energy, Carbon Tax, Alternative Transport, Lower Intensity Agriculture -> methane / dairy industry

CO<sub>2</sub> & Methane levels still rise but at a lower rate... We can only go so far.... Population Growth and societal demands. Mitigation creates industrial opportunities, more energy required...

Adaptation -> We are locked into climate change - we need to accept this and face reality!

How does Adaptation affect me? -> Flood Risk, interplay between agriculture and the marine, alternative food sources, more sustainable living ????

We need to understand the Impacts before we learn to adapt.

Global Problem -> Local impacts, predicting local impacts are difficult and expensive.



# STREAM – A Concept

*A wire free sensing solution allows highly dense spatial and temporal interrogation of the marine environment – producing large data sets from multiple sensor technologies.*

*This large collection of data arriving from multiple sensor types (temperature, pH, DOM, DO, N03-N, TDS, TSS.) provides a greater amount of trust in the monitoring operation.*

*Multiple sensor outputs can be combined through appropriate back-end software to extract hidden trends in the datasets – leading to improved information flow - thus effectively addressing localised knowledge gaps relating to climate change and its impact on the marine environment.*

*Data access and processing can be delivered through the cloud – thus information can be made accessible to all, via the internet.*

# Work-Packages

**Work Package 1** Management and Governance {SETU}

**Work Package 2** Specification {ALL}

**Work Package 3** Dissemination {ALL}

**Work Package 4** Development of ICT enabled Sensor Technologies for Estuarine Monitoring {SETU/SU}

**Work Package 5** Estuary Water Sampling & Precipitation Monitoring {MTU}

**Work Package 6** STREAM Deployment {SETU/SU/MTU}

**Work Package 7** Building capacity to respond to climate change impacts on the Irish Sea {SU}



# Intermission

## March 2020 to September 2021

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# STREAM Locations – Water Sensors

Wexford Quay

Wellington Bridge

Dungarvan Harbour

Bannow Bay

360 Aquaculture Swansea Bay

Tawe Lock (Swansea Barge)

Waterford Pontoon

Dunmore East

Castletownbere

# STREAM Locations – Weather Stations

Fort Davis - Cork

Swansea University Bay Campus

SETU West Campus

Tramore Coastguard Station

Wexford Quay

Faha - Dungarvan

Castletownbere

# STREAM Optical MEMS Sensors

Nutrient Sensors – for saline and freshwater systems

Cloud Connected with Edge processing

Energy Harvested with Battery Backup

NO<sub>3</sub>-N, TOC, Solids, DOM and Carotenoids

Pumped system – Field trials underway.

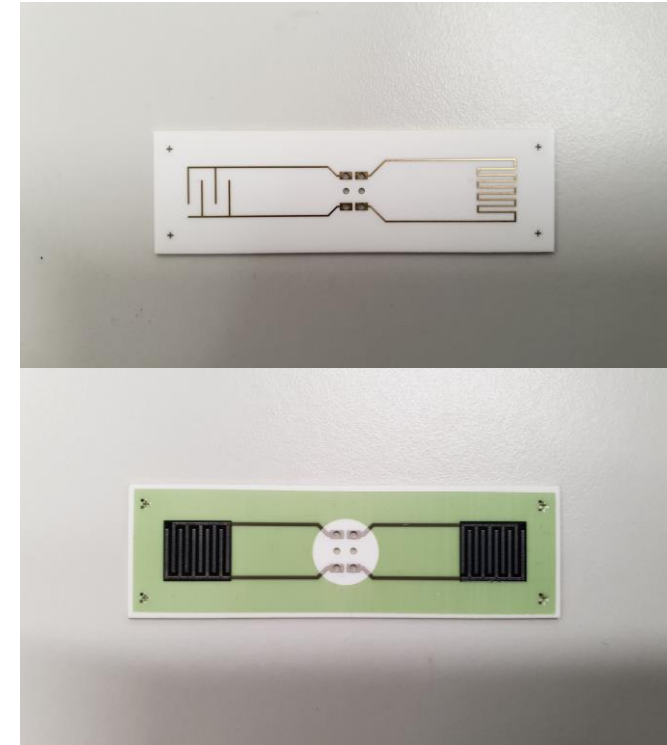


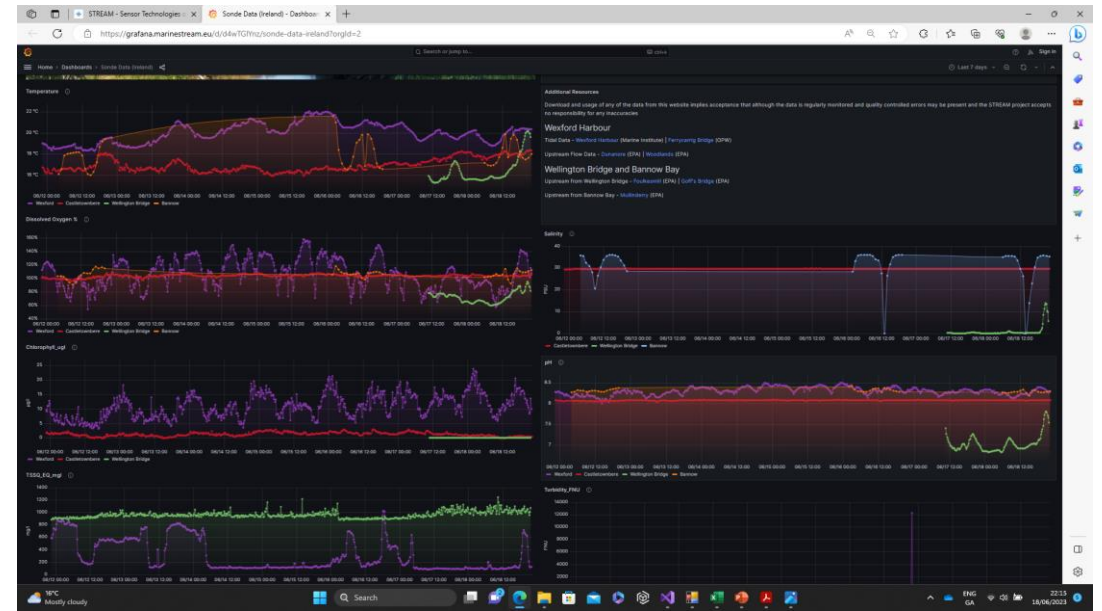
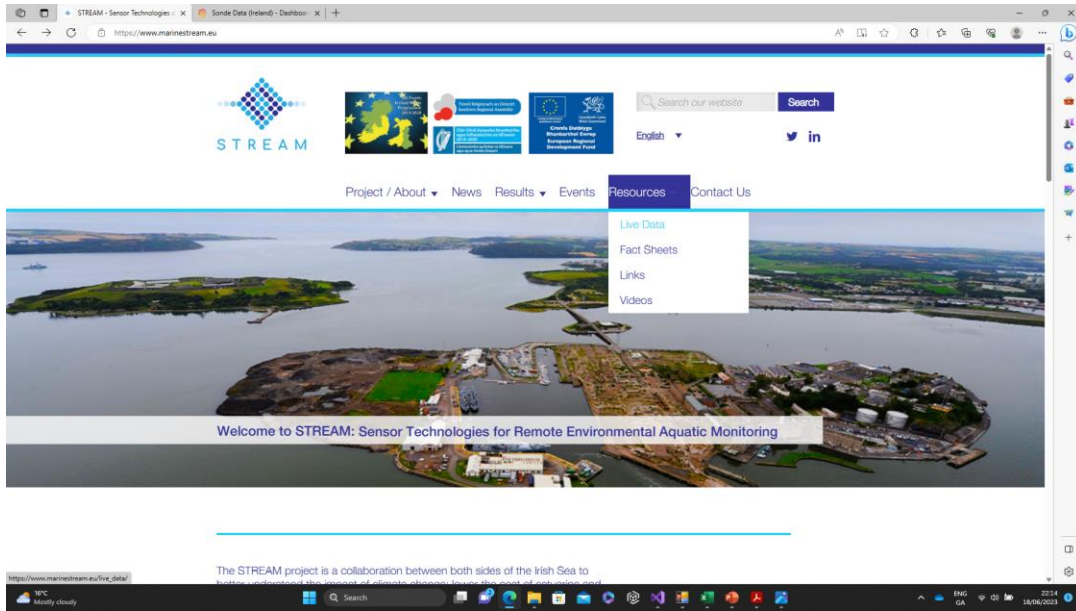
# STREAM Printed Sensors

Printing of sensors for Temperature, Conductivity, pH and Oxygen sensing.

Lower cost solution, light weight and simple deployment.

Increasing the pervasiveness of sensing technologies for estuarine waters.





# STREAM Portal

# Special Thanks

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STREAM Teams at SETU/SU/MTU

Breda Curran Project Officer at Southern  
Regional Assembly

Cristíona Innseadúin Finance Office SETU

Brendan Cooney Wexford County Council

Brian O'Loan BIM

Shane Begley National Fisheries College

David Millard BIM

Deidre Lane – DAFM

Robert Wilkes EPA

Geoff Robinson BIM

Dave Clarke Marine Institute

Jonathan Kelly Marine Institute

Tramore Coast Guard

Waterford City River Rescue