

CLIMATE CHANGE AND COASTAL ADAPTATION: USING GIS AND VISUALISATION TO IDENTIFY ISSUES AFFECTING COASTAL COMMUNITIES IN ABERDEEN, SCOTLAND, UK

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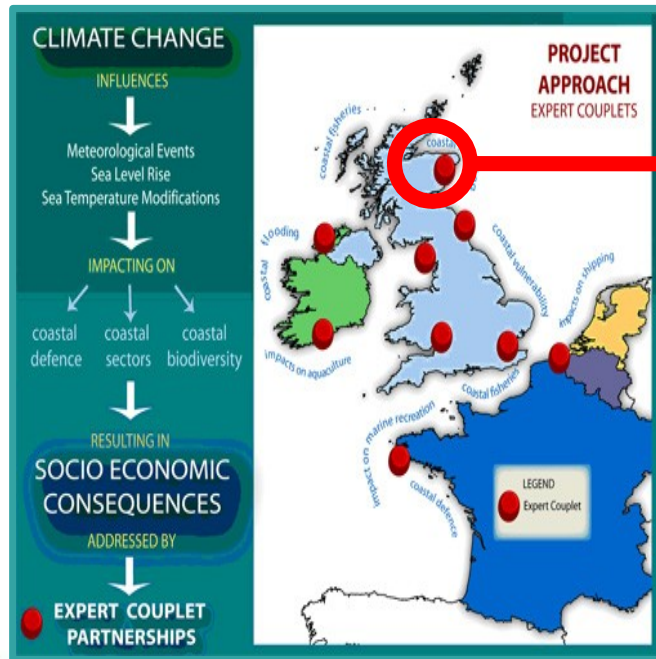


IMCORE

- IMCORE = Innovative Management for Europe's Changing Coastal Resource
- Funded under the EU Interreg IVB programme (www.nweurope.eu) - North West Europe
- Project goal is to promote a **trans-national, innovative and sustainable approach** to reducing the Ecological, Social and Economic impacts of climate change on the coastal resources of North West Europe.
- Partners composed of **expert couplets** from different countries in NW Europe (UK, Ireland, France, and Belgium)



EXPERT COUPLER NODES (ECNs)



UNIVERSITY OF ABERDEEN & ABERDEEN CITY COUNCIL:

Each ECN to (a) Identify **Climate Change Issues**, (b) **Develop Scenarios**, and (c) work towards an **Adaptation Strategy** for the ECN area

GIS SUPPORT & TOOLS

- ECN to develop a series of **Workshops** to interface with stakeholders

Three Workshops:

- Climate Change and Coastal Communities – Awareness and Education
- Climate Change Scenarios Workshop – Generate CC Scenario(s)
- Coastal Adaptation Strategy Workshop – Generate CC Adaptation Strategy

- University of Aberdeen – GIS and GeoVisualisation Support and Tools

- GIS and Visualisation – a recurring theme throughout IMCORE



WORKSHOP 1 - CLIMATE CHANGE & COASTAL COMMUNITIES

- The aim of this workshop was to provide an introduction to climate change and the potential issues it will create in the future
- What does Climate Change mean to you and your job?
- What are the major issues concerning Climate Change affecting you and your job?
- What are you and your organisation doing about Climate Change?



SUMMARY OF POSSIBLE LOCAL IMPACTS

- Increased temperatures from 2° to 3.5° C by 2080
- Increase in winter rainfall by 25%
- More intense storms
- Less snowfall by 90%
- Greater incidence of strong winds and larger waves
- Increased flood risks from rivers and seas, as well as possible sea level rise of 61cm
- Water temperature increase may affect geographical distribution of marine species and thus abundance of commercial species and marine mammals



UK Climate
Impacts Programme

(Source UK Climate Projections 09)

WORKSHOP 2 - SCENARIOS

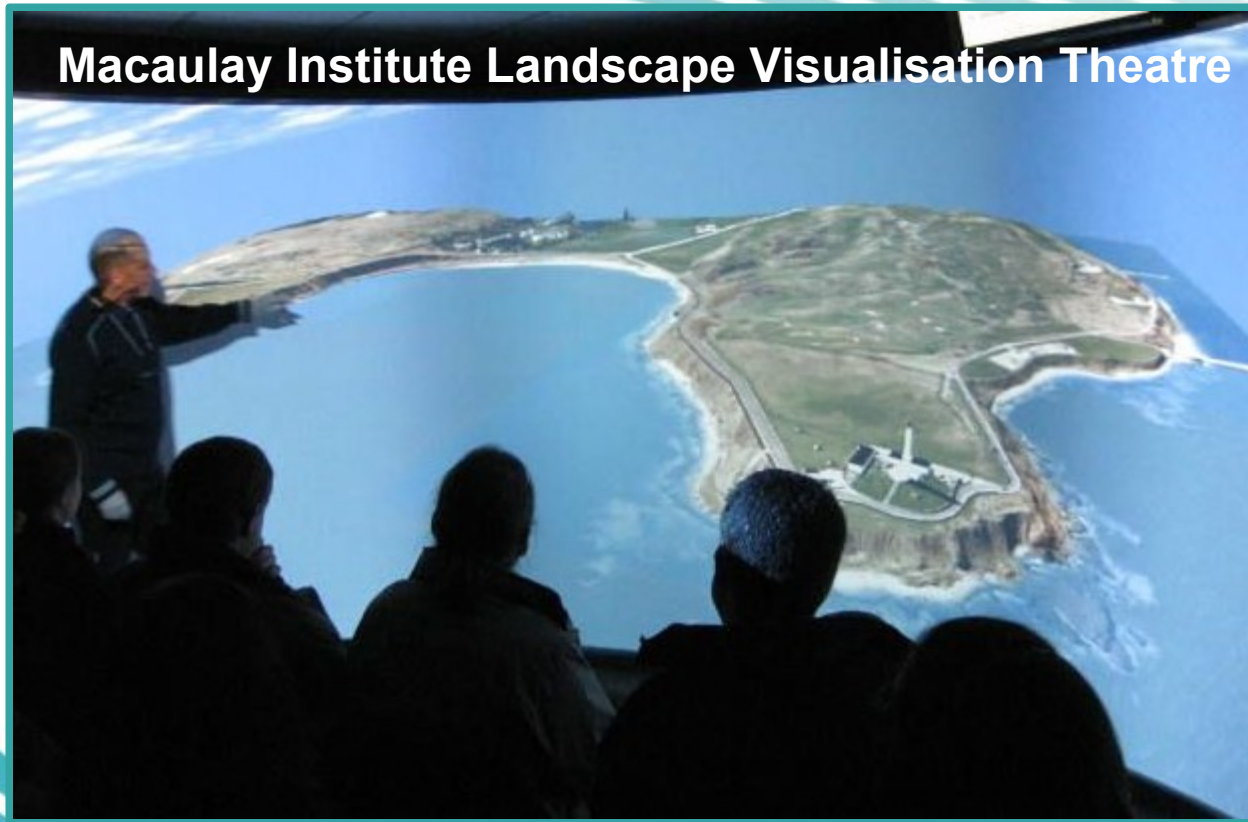
WORKSHOP

● The aim of this workshop was to raise awareness about the Impact of Climate Change on **Flooding in Coastal Communities** in Aberdeen and Aberdeenshire. Delegates were given the opportunity to investigate some potential effects of Climate Change on flooding scenarios. They used **spatial datasets, GIS technology and other tools to visualize** the flooding scenarios

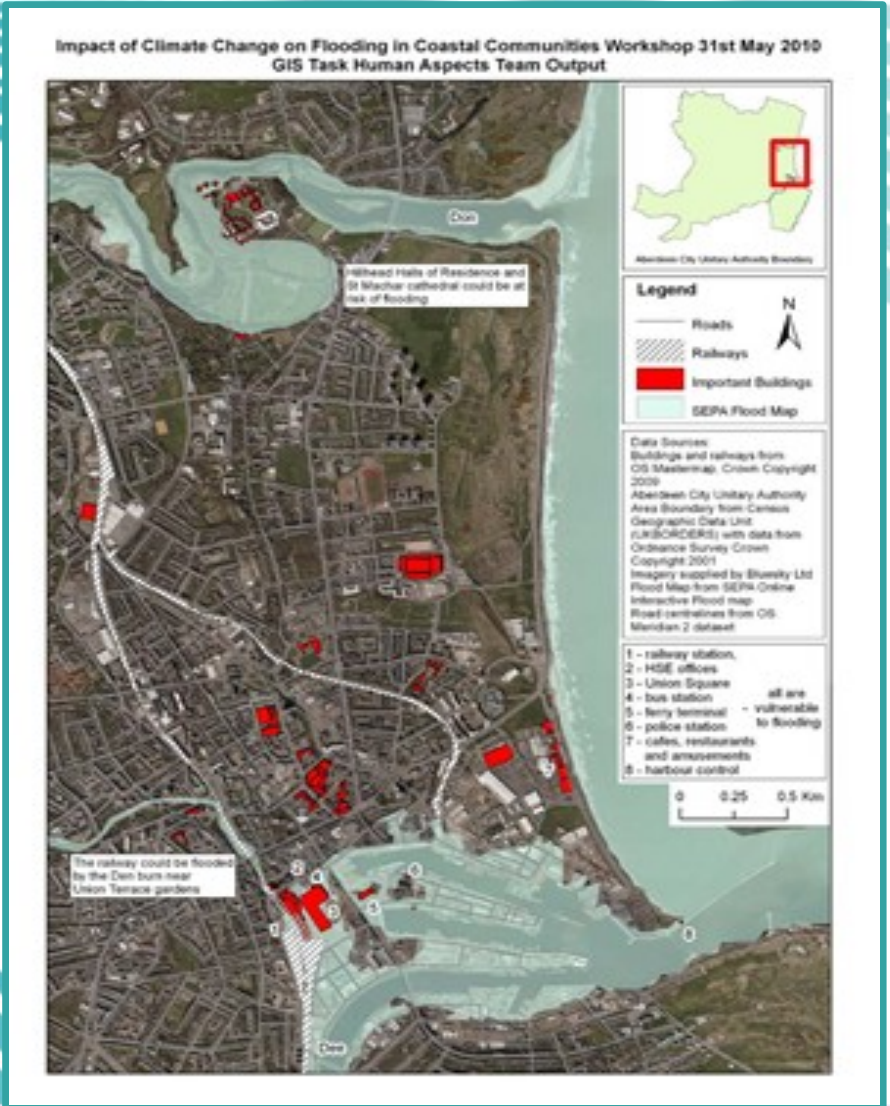
- Introduction
- Presentation
- Quiz
- Games
- Team work
- Physical and human aspects



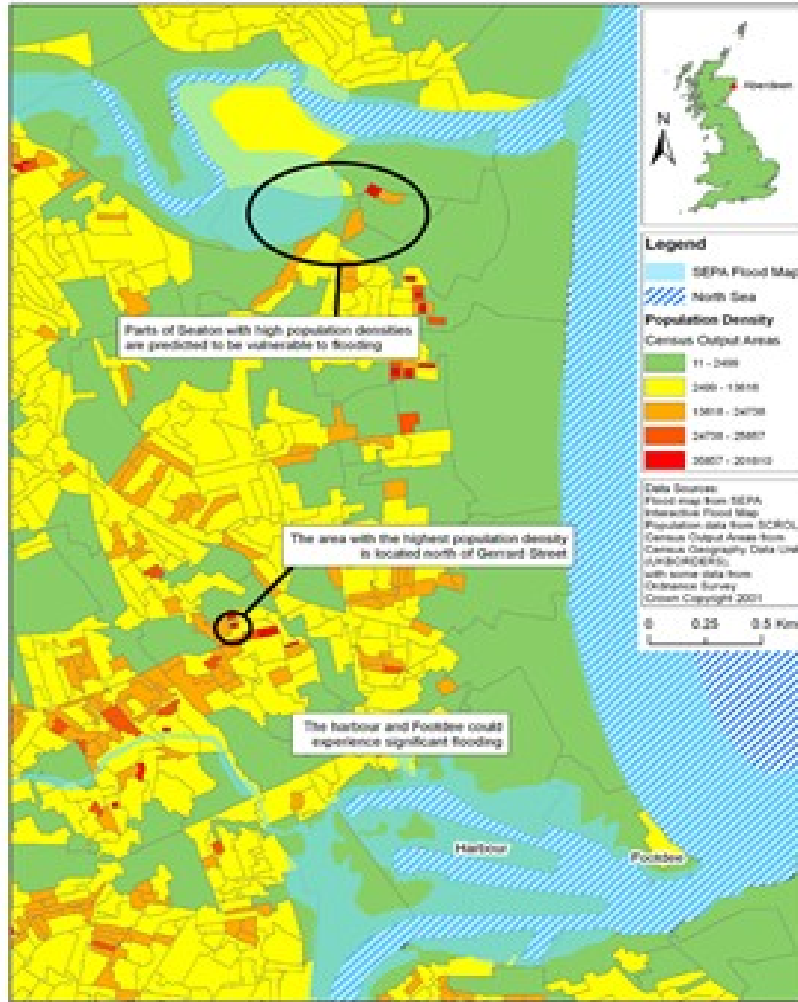
VISUALISATION



GIS



Impact of Climate Change on Flooding in Coastal Communities Workshop 31st May 2010
GIS Task Human Aspects Team Output



GIS

1 4 9 5



UNIVERSITY OF ABERDEEN



INNOVATIVE MANAGEMENT FOR EUROPE'S CHANGING COASTAL RESOURCE

Investing in Opportunities



The project has received European Regional Development funding through INTERREG IV B

INTERREG IV B



ABERDEEN CITY COUNCIL

WORKSHOP 3 - COASTAL ADAPTATION STRATEGY

- Developing a **Coastal Adaptation Strategy** for Aberdeen and Aberdeenshire
- Use **PESTLE analysis** and **Backcasting Scenario techniques** to develop the strategy
- Learn from the **good practice** and experience of two other **IMCORE Partners: Belgium and the East of England**



ADAPTATION STRATEGY GUIDELINES



Guide for the development of climate change adaptation strategies

Methodology for IMCORE ECN areas

November 2010

DRAFT – IMCORE internal use only



WP 4.2 and 4.3



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UNIVERSITY
OF ABERDEEN



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ABERDEEN
CITY COUNCIL

PESTLE ANALYSIS

- **Selected scenario:** Coastal flooding in Aberdeen and Stonehaven is predicted to increase in the future and the aim is to reduce the socio-economic impact caused by this flooding to a minimum
- Use **PESTLE** analysis: Political, Economic, Social, Technological, Legal and Environmental analysis



PESTLE ANALYSIS

Political

- Politicians aware of coastal issues and problems.
- Ensure participation of NGO's and community organizations in development of political initiatives (10).
- Regional policy developments closely linked to evidence-base and mainstream strategies (1).

Economic

- Coherent working between regional organisations leading to integrated and consistent regional approach (6, 10).
- Optimal economic development of coastal opportunities (11).
- Resourcing adequate to avoid short-term reactive planning (7, 9).

Social

- Community Based Organisations (CBO's) are active in coastal decision making.
- Local community and CBO representatives formally involved in regional management architecture.
- Support for entrepreneurship of coastal businesses that assist with sustainable development (11).

Technology

- Data collection and monitoring strategies coherent across the region - minimal gaps and minimal overlap (1).
- Integrated regional data storage and management with public access facility (1, 8).
- Appropriate technology in place to maintain high environmental quality, especially in terms of pollution (8).

Legal

PESTLE ANALYSIS

- Clear leadership from EU and national policies.
 - Integrated regional subsidiarity and implementation of national / international laws and policies (10, 12).
 - Awareness of relevant laws and policies within community and NGO sectors.
- Environmental**
- Evidence base used to provide long-term view of environmental change (4).
 - Communities aware of coastal change and potential impacts (6, 9).
 - Active local participation in adaptation response such as habitat creation.

BACKCASTING SCENARIO

- Fundamental to the overall process is to start this analysis from the preferred future and then work backwards to identify actions that will connect the future to the present
- Backcasting asks: *"if we want to attain a certain goal, what actions must be taken to get there?"*
- Backcasting elucidates the steps necessary to move back from the future to the present day and decide what is required to happen to make it happen.



GROUP WORK

Group work: Brainstorming, Final analysis and PPT Presentation

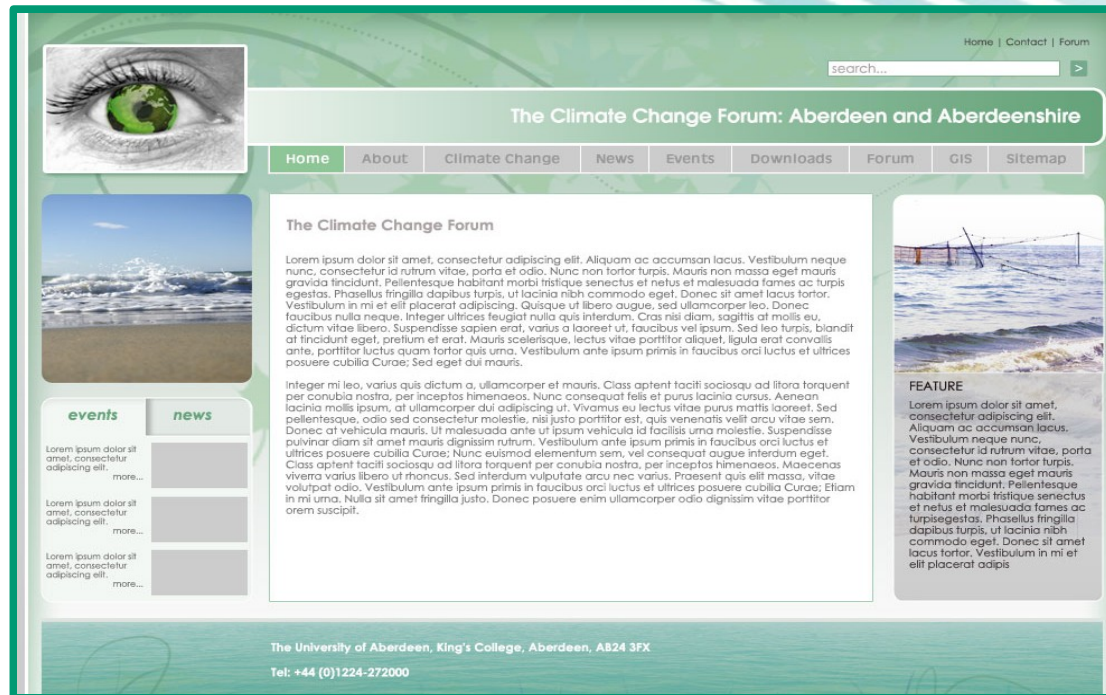


FUTURE?

- The IMCORE Project finishes at the end of October 2011
- How will the results of IMCORE be of value?
- How will the role of the ECN continue?
- Criteria of Interreg Projects – Lasting Impact on Society



ABERDEEN CLIMATE CHANGE WEBSITE





The screenshot shows a website interface for 'The Climate Change Forum: Aberdeen and Aberdeenshire'. At the top right, there are links for 'Home | Contact | Forum' and a search bar. The main navigation menu includes 'Home', 'About', 'Climate Change', 'News', 'Events', 'Downloads', 'Forum', 'GIS', and 'Sitemap'. The central content area features a large image of a green eye with a globe as the iris, a search bar, and a section titled 'The Climate Change Forum' with placeholder text. To the left, there are 'events' and 'news' sections with placeholder text. To the right, there is a 'FEATURE' section with a photo of a beach and placeholder text. The footer contains the address 'The University of Aberdeen, King's College, Aberdeen, AB24 3FX' and the phone number 'Tel: +44 (0)1224-272000'.

www.aberdeencclimatechange.net



RAISING AWARENESS - LEAFLET

<p>Aberdeen Climate Change Action Plan</p> <p>The Action Plan was written by Aberdeen City Council on the basis of what we can do practically in Aberdeen in line with international and national advice on climate change. It indicates actions already underway by various services within the Council or in partnership with other agencies. The Five actions centre around:</p> <ul style="list-style-type: none"> Climate change community awareness Climate change business awareness Climate change and education Climate change and energy use in the home Climate change and energy use in the business centre 	<p>What is IMCORE?</p> <p>IMCORE (Innovative Management for Europe's Changing Coastal Resource) stands to promote an innovative and sustainable approach to reducing the impacts of climate change on coastal areas in North West Europe. It is not so much about predicting effects but offering suggestions of how we can all adapt to change. IMCORE recognizes the need for adaptations within coastal sectors such as fisheries, aquaculture, ports, shipping, marine recreation and coastal defence. The scientists and practitioners involved in IMCORE span Ireland, the UK, France, Belgium and the Netherlands. There is a regional working partnership of IMCORE here in Aberdeen, working on coastal regeneration projects.</p>	 <p>CLIMATE CHANGE</p> 
<p>What can you do?</p> <p>Energy use: Use a greater proportion of energy from renewable sources such as wind, water and biomass. Reduce the number of 'heating' days in our office buildings</p> <p>Flooding: Update your existing emergency flood plan in conjunction with the emergency services</p> <p>Land management: Develop water storage systems to prevent summer droughts</p> <p>Transportation: Reduce staff travel to work by car and reduce car business mileage</p> <p>Waste: A new 'attitude' to waste reduction and a commitment to recycling</p> <p>Lobbying: Make MSPs and MEPs aware of the need for changing in policy at national and international level</p> <p>Education: Enable children to make wise decisions about the environment and resource use</p>	<p>Sources of further information</p> <p>IMCORE: http://www.imcore.eu</p> <p>Department of Environment, Food and Rural Affairs. This site gives details of the Government's policies on climate change. http://www.defra.gov.uk/</p> <p>The Hadley Centre. Gives details of the latest climate change predictions http://www.met-office.gov.uk/research/hadleycentre</p> <p>UK Climate Impacts Programme. Government help for organisations to assess and adapt to climate change. http://www.ukcip.org.uk/</p> <p>Energy Efficiency Best Practice. UK Government advice on how to cut their energy bills by 10-20%. http://www.energy-efficiency.gov.uk/</p> <p>Energy Saving Trust. Provides many tips on how to save energy around the home. http://www.est.org.uk/</p> <p>Climate change. An interactive website for school children and young people aged between 7 and 16. http://www.defra.gov.uk/environment/climate-change/chose/index.htm</p> <p>With thanks to:</p>	<p>in a coastal context</p>  <p>A resource for the local people of Aberdeenshire</p>



What is climate change?

Climate change is a natural phenomena but one that can also be speeded up by human activities. The extent to which temperature change over the last 100 years is due to human activities has been studied by looking at patterns of change across the earth's surface, and in the atmosphere and the ocean. The contributions of natural effects e.g. variations in the sun's output and volcanoes, have also been studied. Natural effects were found to be unable to account for all the observed warming. Only when greenhouse gases emitted by human activities are included can the warming be explained.

What are the drivers and the impacts?

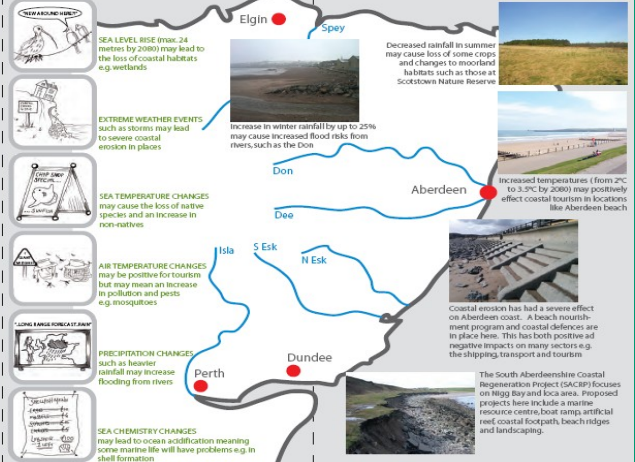
Natural drivers include: changes in the earth's orbit, changes in sun intensity, volcanic eruptions (emitting greenhouse gases) and oceanic and atmospheric circulation patterns. Anthropogenic drivers include: greenhouse gas emissions from burning fossil fuels and land use (cover changes (e.g. deforestation)).

In the coastal zone northwest Europe, the main impacts include: sea level rise, extreme weather events, sea temperature and chemistry changes, air temperature changes and changes in precipitation (rainfall and snowfall). The following map and series of illustrations are used to explain what these impacts might really mean for coastal communities.

Climate change in a coastal context

Many people living in Aberdeenshire, particularly in the coastal zone, have questions about climate change that they don't have answers to or might be worried about the possible impacts. This leaflet aims to explain the most likely coastal impacts of climate change based on the knowledge experts have so far. Aside from the possible problems, here are presented some practical examples of what is being done to combat climate change problems and positive ways in which everybody can get involved in the solutions.

Regional impacts



- SEA LEVEL RISE:** (max. 2d metres by 2080) may lead to the loss of coastal habitats e.g. wetlands
- EXTREME WEATHER EVENTS:** such as storms may lead to severe coastal erosion in places.
- SEA TEMPERATURE CHANGES:** may cause the loss of native species and an increase in non-natives
- AIR TEMPERATURE CHANGES:** may be positive for tourism, but may mean an increase in pollution and pests e.g. mosquitoes
- PRECIPITATION CHANGES:** such as heavier rainfall may increase flooding from rivers
- SEA CHEMISTRY CHANGES:** may lead to ocean acidification meaning some marine life will have problems e.g. in shell formation

Local coastal examples

- Decreased rainfall in summer may cause loss of some crops and changes to moorland habitats such as those at Scootstown Nature Reserve.
- Increase in winter rainfall by up to 25% may cause increased flood risks from rivers, such as the Don.
- Increased temperatures (from 2°C to 3.5°C by 2080) may positively affect coastal tourism in locations like Aberdeen beach.
- Coastal erosion has had a severe effect on Aberdeen coast. A beach nourishment program and coastal defences are in place here. This has both positive and negative impacts on many sectors e.g. the shipping, transport and tourism.
- The South Aberdeenshire Coastal Regeneration Project (SACRP) focuses on Higg Bay and Locha area. Proposed projects here include a marine resource centre, boat ramp, artificial reef, coastal footpaths, beach ridges and landscaping.



GIS VIDEO TUTORIALS

The screenshot shows the Aberdeen Climate Change Forum website. At the top right, there are links for Home, Contact, and Forum, along with a search bar. The main header reads "Aberdeen Climate Change Forum" with the tagline "climate change and your community". A navigation menu includes Home, About, Climate Change, News, Events, Downloads, Forum, GIS (highlighted), Gallery, and Sitemap. On the left, there is a sidebar with a large eye graphic containing a globe, and two news items: "Aberdeen IMCORE - Pictures" dated 20 December 2010, and "Aberdeen ECN to host IMCORE project meeting 2 - 4 November" dated 26 October 2010. The main content area is titled "GIS" and "Video tutorials". It contains a paragraph introducing the series, followed by two sections: "Video Tutorial 1 - Evaluation of population vulnerable to flooding" with a list of three steps (Navigating ArcGIS, Opening and displaying map layers, Analysis of map layers), and "Video Tutorial 2- Finding the highest and lowest elevations in an area" with a similar list of three steps. On the right, there is a "GIS" section with a photo of a coastal area and text stating: "To learn more about ArcGIS and database you can download the following training plan: ArcGIS and Database - Tutorial links".

RAISING AWARENESS - ADVERTISING CAMPAIGN



MEDIA & PRESS RELEASES

WEATHER WATCH: David Green at Stonehaven yesterday, with Berville Brass in the background. Photograph Kerry Ehrck.

Scientists consider impact of climate change on coast

EUROPEAN PROJECT TO DEVELOP UNIFIED APPROACH TO SAFEGUARDING VULNERABLE AREAS

SCIENTISTS from across Europe gathered in Aberdeen yesterday to consider the potential impact of climate change on the north-east coastline.

More than 30 delegates took part in a field trip which started at Aberdeen harbour and ended at the Berville Brass, Stonehaven, where landrises caused homes to be evacuated earlier this year.

The two-day visit, which began on Tuesday, brought together representatives from 15 countries which are collaborating under the Innovative Management for Europe's Changing Coastal Resource (Imcore) project.

The initiative, which is being funded by a £10million EU grant, aims to develop a unified approach to safeguarding the future of European coastlines and will include strategies for flood defense and erosion prevention.

David Green, of Aberdeen University's Institute for Coastal Science and Management, which is leading the project in cooperation with Aberdeen City Council, said it was important to increase awareness of environmental issues.

"The idea is that we will be able to use the experiences here to advise people and raise awareness in other parts of the world where similar situations might exist.

"Rising sea levels, higher waves, increased storms and rainfall are a reality which we may well be facing.

"It is therefore paramount we ensure the correct approaches are put in place to safeguard coastal areas in the north-east already identified as vulnerable.

"Acting now to protect these areas could save them from the potentially far-reaching consequences of climate change in the future."

Gordon McIntosh, director of enterprise, planning and infrastructure at the city council, added: "It is essential we get local people interested and involved in this initiative because they have so much to lose or gain from the erosion or protection of the coastline.

"The important focus on climate challenges will help us attract European attention to the north-east coastline and the need to both conserve and enhance it."

← Press & Journal - Newspaper



↑ STV News - TV



EDUCATION - FIELDTRIPS & WORKSHOPS



LESSONS LEARNED

- Getting *'their'* attention
- Getting the *'right'* people involved
- Bringing *'climate change people'* together
- *'Raising awareness'* at a level beyond that of the *'media/press'*
- *'Convincing people'* that climate change is important
- Getting *'Priorities'* right – at a time when other *'issues'* e.g. the local economy, energy are deemed to be/perceived to be more important
- *'Educating'* – the future generations – fitting CC to the school curriculum
- Keeping the *'momentum'* going *'after'* the project ends
- Devising a *'do-able'* strategy
- *'Packaging'* up what has been done here – and output from other projects e.g. **CoastAdapt (<http://www.coastadapt.org/>)** into something *'usable'* e.g. tools

Thank You

Questions?

Further Information

- imcore.eu
- www.aberdeenclimatechange.net



- Built at the mouth of two major Scottish rivers, the Dee and the Don, and covering an area of 188.48 square kilometers (72.76 square miles)
- Traditional industries such as fishing and farming in and around the city but
- Fuelled by the oil and gas industry, earning the city its epithet as 'Oil Capital of Europe'.



<http://imcore.files.wordpress.com/2009/10/ecn-aberdeen5.pdf>

