



Severn Estuary and Climate Change: State of the Science & Policy Update

SECCRAG meeting, Friday 26th February, 2010
Brunel Boardroom, Empire Museum, Bristol

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Attendance:

Christine Marsh (CM), Severn Estuary Partnership
Jonathan Mullard (JM), Severn Estuary Partnership
Rhoda Ballinger (RB), Cardiff University
Hance Smith (HS), Cardiff University (Chair)
Nick Rodgers (NR), Cardiff University
Wendy Dodds (WD), Cardiff University
Ciara Hovey (CH), Cardiff University
Piers Stanger (PS), Cardiff University
Ken Tatem (KT), Environment Agency Wales
Paul Canning (PC), Atkins
Chris Spencer (CS), University of the West of England
Ros Smith (RS), Bristol University
Guy Schumann (GS), Bristol University
Steve Hall (SH), National Oceanography Centre
Emerald McLoughlin (EM), Plymouth Coastal Observatory
Robin McInnes (RM), Coastal & Geotechnical Services
Hope Stubbings (HSt), Coastal & Geotechnical Services
Allan Williams (AW), Swansea Metropolitan University
Gethin While (GW), University of Glamorgan

Apologies:

Mike Phillips, Swansea Metropolitan University
Graham Quarrier, Environment Agency Wales

Acronyms

BGS	British Geological Survey
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
COMPASS	Coastal Marine Perception Application for Scientific Scholarship
COREPOINT	Coastal Research and Policy Integration
DEFRA	Department for Environment, Fisheries and Rural Affairs
EA	Environment Agency
EDINA	Edinburgh University, National Academic Data Centre
EH	English Heritage
EIA	Environmental Impact Assessment
ESRC	Economic and Social Research Council
EU	European Union
GOSW	Government Office South West
IMCORE	Innovative Management of Europe's Changing Coast
INTERREG	EU Interregional Funding
IPCC	Intergovernmental Panel on Climate Change
LIDAR	Light Detection and Ranging, Remote Sensing Tool
NAO	North Atlantic Oscillation
NERC	Natural Environment Research Council
RCZA	Rapid Coastal Zone Assessment
RSPB	Royal Society for the Protection of Birds
RTPI	Royal Town Planning Institute
SEA	Strategic Environmental Assessment
SECCRAG	Severn Estuary Climate Change Research Advisory Group
SELRG	Severn Estuary Levels Research Group
SEP	Severn Estuary Partnership
SMP2	Shoreline Management Plan (Round 2)
TAN	Technical Advisory Note (Planning)
UKCIP	UK Climate Change Impacts Programme
UKCP	UK Climate Predictions
UWE	University of the West of England
WAG	Welsh Assembly Government

INTRODUCTION TO THE IMCORE PROJECT

Promoting a transnational, innovative & sustainable approach to climate change adaptation along the coasts of North West Europe, this project will run until 31/10/2011. Project partners include Cardiff University, Glamorgan University, Severn Estuary Partnership, University of Aberdeen, Sefton Borough Council, University College Cork, Cork County Council and Donegal County Council. It has five major work strands including: identifying drivers for climate change, developing adaptive management strategies and future scenarios building. More detailed information is available at: <http://www.imcore.eu/>

On the Severn Estuary, the IMCORE project is aiming to facilitate better informed climate change adaptation. Specific work areas on the Severn concern the following five areas:

1. Improving the science/evidence base
 - Through the Severn Estuary Climate Change Research Advisory Group (SECCRAG)
2. Planning review & stocktake
 - Climate change considerations / synergies in the planning system
3. Futures research
 - Investigating 'coastal futures' for the Estuary
4. Education and awareness on coastal climate change
 - Education schools pack
5. Climate change adaptation assessment
 - Based on 1, 2 and 3

SEVERN ESTUARY CLIMATE CHANGE RESEARCH ADVISORY GROUP

Welcome and Introduction

HS (Chair) welcomed participants to the meeting and gave a brief introduction to the themes for the morning and afternoon sessions. The first theme was the 'Science Base' which sought to establish the current state of science knowledge around the estuary and identify where the gaps in understanding were. The second theme was 'Capacity Building' which was aimed at relating the science base information to policy development (planning, coastal management etc). The final theme was the 'Role of SECCRAG' and the way in which it can be used as a forum for pushing forward the objectives of the first two themes.

Matters arising from the last meeting

Two items were reported on as updates from the previous meeting held in May 2009.

a. Citations Database

CH gave a brief verbal update on the current citations database. The purpose of the citations database is to provide a unique reference point for climate change related information across the Severn Estuary. The database is broadly classified into three sub sections of climate change; impacts, adaptation and mitigation. The database serves as a highly useful academic referencing tool. However, the usefulness of this tool for managers and planners at local industry or government level is less certain. One of the key problems is translating the specialist information within academic papers into tangible outcomes and direction for planners and decision makers. CH highlighted four potential options for developing the database further including developing separate tools for planners and scientists, producing summarised reports for the different science themes aimed at non-specialist audiences and linking the database in with the development of the SEP website (State of the Estuary report). The main focus of developing the database has been to input up-to-date research and identify any gaps in the knowledge. Significant theme gaps have been identified as hydrography, recent monitoring trends, storm surges and up-to-date research on sediment dynamics.

b. UKCP09

NR gave a brief verbal update on the UKCP09 projections and scenarios. NR summarised climatic trends to date and gave an overview of the predictions to 2100 (using the medium emissions scenario). The key UKCP09 trends currently identified were highlighted as follows:

- Sea level around the UK has risen by approximately 1mm/yr during the 20th century
- The rate of sea level rise increased during the 1990s and 2000s
- Winter precipitation has increased over the UK, with statistically significant changes in Scotland and northern England
- Heavy rainfall events during winter in all regions have increased
- There is some evidence of more storms over the last 2 decades (but less than the 1920s)

The relevant predictions for the Severn area were then presented (medium emissions scenarios to 2050):

- An increase in winter precipitation of 14-17%
- A decrease in summer precipitation of 16-19%
- Small increase in winter significant wave height and winter maximum wave height
- Small increase in storm surge height (0.8mm/yr)

NR highlighted that there is much greater uncertainty with the marine projections (MCCIP) but as guidance a future sea level rise of around 30cm for the whole estuary by the mid-century, plus storm surge probability, needs to be considered.

Session 1 – STATE OF THE SCIENCE UPDATE

Aim/Content of Session:

This session sought to develop understanding of climate change on the estuary. To achieve this, presentations were given by representatives from key topic areas delivering perspectives on the current state of science on the estuary within their respective fields.

The following presentations were given during this session:

Storm Surge Project, Guy Schumann, Bristol University
Coastal Erosion and Sea Level Rise, Allan Williams, Swansea Metropolitan University
Physical Environment, Chris Spencer, University of the West of England
SEP State of the Severn Report, Jonathan Mullard, Severn Estuary Partnership
Monitoring the South West of England, Emerald McLoughlin, Plymouth Coastal Observatory

A brief discussion session was held at the end of the presentations.

STORM SURGE PROJECT, Guy Schumann, Bristol University

'Validating storm surge methods with satellite imagery'

Key messages coming through:

GS reported on research being conducted by Bristol University and POL (Matt Lewis) on storm surge modelling, using satellite imagery.

GS gave a brief analysis of the following three predictive surge methods: Linear, Events and Totals. Significant variations were reported, particularly overestimation that can occur with the Linear method, along with other advantages and disadvantages associated with the other two models.

Using study site research along the North Somerset coast, it has been shown that the Totals method provides the best storm tide predictions, when compared to the Linear and Events methods. In light of these findings, it has been recommended this method would be best suited for use in future flood risk studies of the Bristol Channel Region.

COASTAL EROSION AND SEA LEVEL RISE, Allan Williams, Swansea Metropolitan University

'An analysis of sea level trends on both sides of the Bristol Channel/Severn Estuary'

Key messages coming through:

Sea level rise around the Severn Estuary

An increase in sea level of around 34cm by 2050 was estimated which, in turn, could cause changes to sediment supply. Sea level rise induces erosion; higher water levels cause waves to break closer to land. Deep water decreases wave refraction thereby increasing longshore transport capacity. In essence, this causes erosion processes to occur further up the beach profile. Maximum sea levels are higher on the northern shore of the Severn rather than on the southern shore. The importance of calibrating tidal current flow modelling was noted.

New research results for sea level change around the Severn Estuary

Tidal monitoring results were presented from data collected at four locations across the Estuary during the period 1993 to 2007; Mumbles and Newport (both northern estuary coast), Ilfracombe and Hinkley Point (both southern estuary coast). On average, the results showed a rising sea level trend of 2.4mm/yr^{-1} . It was estimated that by 2050 the sea level would be 35cm higher, but it was noted these results were based on only 15 years data. Maximum extreme sea level trends at all four locations showed reducing trends whilst minimum extreme sea levels showed rising trends. It was also noted that the North Atlantic Oscillation (NAO) appeared to mirror mean sea level trends at the four locations. Maximum extreme sea levels were reported to be higher on the northern shoreline than at corresponding locations on the south.

Conclusions

- Sea level rise will increase erosion and have a detrimental effect on coastal infrastructure. Protecting the coastline could become an economic burden and there should be more soft engineering solutions working alongside natural coastal processes. To design appropriate mitigating measures, causes should be properly analysed and technical and economic feasibility of such mitigating measures evaluated.
- Difficult decisions will need to be taken irrespective of stakeholder interests and there will be economic consequences.
- Policies will therefore need to reflect the complex inter-relationships of all activities. The use of risk assessments in conjunction with cost-benefit analyses must justify policies of managed retreat where irreversible loss is evident.

PHYSICAL ENVIRONMENT, Chris Spencer, University of the West of England

Key messages coming through:

Understanding physical coastal processes to highlight future impacts of climate change

There are significant gaps in the data/information relating to physical processes across the estuary which leaves gaps in our understanding. It was highlighted that our current level of understanding of physical processes is largely at either a millennial scale and/or sub-annual scales. The importance of understanding at the decadal to century scale in order to fully understand future impacts of climate change was noted. Despite rising sea-levels saltmarsh expansion is present in various parts of the estuary (Sand Bay, Portbury Wharf etc.). This is not yet fully understood and

there could be implications for predictions of habitat changes with climate change. Seaward progression of fine grained dominance changing beach characteristics has also been observed (Sand Bay, Weston-super-Mare, Brean and Berrow) which could cause implications for habitats, geomorphology and future coastal zone management approaches.

Discussion:

RM commented that, in terms of monitoring, there are only a handful of local authorities who have long term records of coastal processes. A project currently being run by the Crown Estate is looking at how historical art can help inform coastal change, which is aimed at engaging public 'trust' and planners. There is a need to understand more about extreme events. AW and HS also noted that historic records of storms can be a great qualitative resource.

SEVERN ESTUARY PARTNERSHIP, State of the Severn Report and links with SECCRAG, Jonathan Mullard

The Severn Estuary Partnership is in the process of developing a live interactive database about the estuary. The SEP is in discussions with IBM concerning this new management system for policy and science guidance and information around the estuary area. GS commented that IBM are very interested in environmental research at present and this is an excellent link to maintain. NR queried where the citations database may fit into the SEP website development and JM responded, encouraging any opportunities there were currently in the IMCORE project to link in with the SEP proposals. In terms of the State of the Severn Report, it was agreed that the overall science-base needs summarising to appeal to both scientists and policy teams. It was agreed that a steering group for the State of the Severn that covers local user groups would be a good idea, supported by a more technical advisory group. The need to steer clear of a purely scientific information overload and then need to engage policy maker's right from the start was noted. JM commented that it was important to identify what datasets were needed to manage the estuary, not to just gather everything and anything. RM suggested looking at the EU Environment Agency reports for suitable headings for the SEP Report.

SOUTH WEST REGIONAL COASTAL MONITORING PROGRAMME, Emerald McLoughlin, Plymouth Coastal Observatory

Key messages coming through:

The South West Regional Coastal Monitoring Programme has been running since 2007 and is 10% Defra funded. It's a partnership between the Environment Agency and the Maritime Local Authorities of the south west. There are six elements to the programme, responsibility for which are divided between the Plymouth Coastal Observatory (PCO), which is the data management centre for the programme and works on behalf of the local authorities, and the Environment Agency. Previously, the approach to monitoring in the south west has been ad-hoc with little consistency in data collection and analysis. The programme has been established, therefore, to provide a standard, repeatable and cost effective method of monitoring the coastal environment. The PCO is responsible for analysing the data as well as managing the contracts for the hydrodynamic data,

topographic surveys and bathymetric surveys. The Environment Agency managed the contracts for the LiDAR, aerial photography and the ecological monitoring.

Originally the programme extended from Portland Bill in Dorset to Sand Point in Somerset, however with the inception of a national network of regional coastal monitoring programmes the programme was extended to Sharpness on the eastern side of the estuary, and from Lydney to Beachley on the western bank of the estuary to link with the boundary of the prospective Welsh coastal monitoring programme. The programme has deployed a network of 10 Datawell directional waverider buoys and 2 wave radar and tide gauges.

As part of the programme specification, all of the beach sites receive a full baseline topographic survey once every five years, with the exception of beach management plan sites which receive an annual baseline. Baseline beach surveys are conducted to a consistent standard at all sites, based on a combination of beach profiles at 50m intervals and continuous spot height data collected using RTK GPS at approximately 1m intervals across the whole beach to the level of MLWS (Mean Low Water Springs). The continuous data includes a feature code for each spot height data point recorded. This allows the creation of sediment distribution maps for most beaches. Most topographic survey sites also receive interim beach profile surveys in both the spring and autumn, although less vulnerable sites may only be surveyed in the spring. These surveys take place along pre-defined profiles down to the level of MLWS and allow for a direct comparison of profiles over time. There is also provision within the programme to survey post storm profiles following major storm events.

Traditionally very few stretches of the near-shore zone in the south west have been regularly monitored by bathymetric survey; a fact which the programme aims to remedy by carrying out baseline bathymetric surveys along the whole of the coast within the programme's remit. Surveys take place on a 5 yearly basis although more vulnerable sites such as the River Teign and the River Exe are surveyed annually. The majority of the surveys are performed using a single beam echosounder, however in Lyme Bay and Mounts Bay, it has been possible to commission swath surveys through a collaboration with the Maritime & Coastguard Agency's Civil Hydrography Programme. The collaboration is the first of its kind and provides a leading example of the way that organisations can work together to avoid duplication of effort and collect high quality data in the most cost effective manner. Surveys extend from MLWN (Mean Low Water Neaps) up to 1km offshore, with profiles being taken at either 50 or 100m intervals.

The programme also conducts regular LiDAR surveys of the region. A baseline survey of the whole coast was carried out in the first year of the programme and will be repeated in the fifth year of the programme. The most vulnerable sites are surveyed more frequently. Surveys extend from offshore to MLWS and are carried out to 1m resolution. The baseline survey has been used to ortho-rectify the aerial photography. The aerial photography is carried out to 10cm resolution and again extends out to MLWS level. There is photography for the entire coast within the programmes boundaries and a second set will be captured in the fifth year of the programme. The photography makes an excellent visual aid in data analysis and can be used in presentations and reports. It also forms the basis of the programme's ecological monitoring.

The south west has unique geology, landforms and wildlife and is the major centre for certain coastal habitats. The habitat mapping module of the coastal monitoring programme is designed to address this by providing accurate GIS maps of coastal habitats and land use around the peninsula. The basic habitat maps will be produced through interpretation of aerial photos. Each

habitat is identified using a national classification system and is defined as an individual polygon in the GIS. Not all habitats can be readily identified from aerial photos, so where there is doubt ground-truthing is carried out. From this we can produce maps of specific areas showing all habitats and land use for that patch, and also individual layers showing the location and extent of each habitat across the region e.g. saltmarsh.

www.channelcoast.org

Monitoring Strategy discussion:

NR commented that a monitoring strategy for Wales was an excellent idea and encouraged the group to consider how this might be taken forward. RB raised the issue of monitoring the socio-economic trends and issues, which can be difficult to translate into what is happening at a regional Severn Estuary scale (there are currently also no future trends scenarios for this sector). GJ added that UKCP09 is vague on socio-economic information and that this data is required for future environmental hazard planning. KT commented that the first draft of the SMP2 Action Plan is made up of about 50% on what data is needed to make better future decisions. SH added that, according to the Marine Science Coordination Committee (MSCC), the government has found a big gap in how to fund long term sustainable observations systems due to expenditure cuts. The socio-economic issues will have much more sway over funding decisions over the next few years and projects will need to show how they feed into the EU Environmental Status objectives and UK Marine Act. With infrastructure such as ports, tidal power capabilities and power stations, the Severn Estuary is in a good position to bid for funding. It would also be very useful to go with a Wikipedia-style information portal as SEP propose; this is being extensively used out in industry and government sectors at present (such as MEDIN and oceannet.org) and the MMO/Defra are beginning to use this widely (managed by the BODC).

Afternoon Session (2): CLIMATE CHANGE AND THE SEVERN ESTUARY: Science & Policy

Aim / Content of Session:

The aim of the morning's session was to provide an update on the state of the science knowledge base on the Severn Estuary. The afternoon session was aimed at capacity building on the science-policy interface and the role SECCRAG could play in the dissemination of Severn Estuary information.

The following presentations were given during this session:

*A Review of the SMP2 and FRM Strategy, Dr Paul Canning, Atkins
IMCORE Planning Workstream (verbal update), Dr Wendy Dodds, Cardiff University
The Climate Change Science needs of Local Government, Dr Robin McInnes OBE, Coastal & Geotechnical Services*

A discussion session was held at the end of the presentations.

A REVIEW OF THE SMP2 AND FRM STRATEGY, Paul Canning, Atkins

Key messages coming through:

The key drivers for both strategies, based on the next 100 years, are sea level rise (approximately 1m predicted by 2105), increased storminess (approximately 10% by 2105), increased typical flood risk and habitat losses from SPA/SA/Ramsar sites (approximately 20% by 2105).

SMP2

The SMP2 has worked on a baseline scenario that denotes change in three key issues; coastal defence performance (reducing significantly in the long term), socio-economic consequences defined (circa. £7b) and habitat loss prediction (20% on average). The draft plan Public Consultation finished in January 2010. There are examples of improvement in the SMP2 compared with the previous SMP1, such as a reduction in advising a Hold the Line policy option for much of the Severn Estuary area (now 50% as opposed to 70% before).

Severn Estuary FRM Strategy

The FRM aims to develop the SMP in more detail and is principally concerned with managing coastal flood and erosion risk, as well as habitats management. There will be a Public Consultation on the draft strategy in summer 2010. As part of the FRM, a Habitat Delivery Plan is being developed. This Plan will aim to identify a list of potential sites with indicative timescales for delivery. Identified habitats will be delivered through the implementation of the SEFRMS and Regional Habitats Creation Programmes. Throughout the lifetime of the Strategy, losses and creation will be reviewed to allow adaptive management.

Common Scientific Basis

- Hydrodynamics (waves, tidal and fluvial climate) – extensive and good quality bathymetry but very limited wave monitoring dataset for the estuary which limits calibration and validation (new Weston-super-Mare wave buoy, 2009 and wave sensor on the Severn bridges, 2010). There is a good tidal record for the estuary (Delft3D and ISIS models). FutureCOAST has provided a consistent dataset but only up to the Noose.
- Joint Probability Analysis –
 - Detailed JOIN-SEA points between Hinkley-Lavernock Point and the Severn Crossing
 - Expanded with Simplified Method JPA points
 - Calibrated by back analysis of surrounding JOIN-SEA data points to generate Correlation Factors
 - Wave-tide combined events well correlated
 - Fluvial-tide combined events very weakly correlated
- Geomorphology – FutureCOAST dataset and Severn Estuary CHaMP (uncertainty in medium to long term results are high). Need for coherent assessment of upper estuary historical evolution.
- Defence performance –
 - NFCDD, visual condition and topographic survey in 2009
 - Design surge based on analysis of recorded extreme events
 - Wave/tide overtopping/weiring (EuroTOP)
 - Damage/breach triggers (calibrated with known failures and video record of near breach event)
 - Very little guidance on breach parameters
- Flooding –
 - TUFLOW model
 - Very dependent on breach triggers and dimensions

IMCORE PLANNING WORKSTREAM – UPDATE FOR SECCRAG, Wendy Dodds, Cardiff University

WD began by highlighting the importance of the conducting research into planning policy on the Severn Estuary. This form of research can be used to understand both current land use, and importantly, future development around the estuary. This knowledge is required to inform effective adaptation to climate change.

WD reported on the progress associated with the IMCORE Severn Estuary Planning Workstream. Phase I of this work encompassed a stocktake of twenty planning bodies around the estuary and thirty-three planning documents for their climate change, FCERM and estuary management-related policy content. This work has highlighted a number of interesting findings concerning policy trends and patterns. Of particular concern was the dropping off of coastal zone-related policies, references to shoreline management and estuary management by planning authorities around the estuary. In light of this, there needs to be a greater profile of the Severn Estuary within the planning community, along with the need for authorities to have planning policies in place that will

allow them to accommodate and adapt to coastal change in light of climate change. A Phase I report has been drafted and will be available on the SEP's website shortly.

The second Phase of work, due to commence in March 2010, will examine:

- what the key issues and concerns for adapting to climate change at the coast for planning bodies;
- what the drivers for action and change within policy formulation and
- how climate change science is influencing policy formulation.

Interviews with planners will be conducted to inform this workstream, along with a conference in June 2010 themed on Severn Estuary Planning Issues that will target local government around the estuary.

THE CLIMATE CHANGE SCIENCE NEEDS OF LOCAL GOVERNMENT, Robin McInnes OBE, Coastal & Geotechnical Services

Key messages coming through:

What kind of science data or information do the different users require?

- COASTAL ENGINEERS require data to support preparation of SMP's, Strategy Studies, schemes and maintenance works
- COASTAL AND ESTUARY MANAGERS require science – based coastal policies to inform coastal zone and estuary planning and management
- PLANNERS need information on coastal change over time epochs, in order to designate 'areas of coastal -change' and roll-back opportunities
- POLITICIANS need clear non-technical information on coastal change for dialogue with their electorate in vulnerable locations

How can local government obtain the data and information it requires?

- INTERNATIONAL / EU LEVEL RESEARCH e.g. FP7, LIFE ENVIRONMENT, INTERREG
- NATIONAL RESEARCH e.g. Defra, EA, UKCP09 research programmes also flood zone maps, coastal erosion risk maps
- REGIONAL / SUB –REGIONAL RESEARCH e.g. Strategic Coastal Monitoring Programmes, Shoreline and Catchment Flood Management Plans, Sediment Transport Pathway Studies, SCOPAC research, research funded by coastal & estuary fora
- LOCAL STUDIES funded by coastal groups, individual local authorities

RM reported that coastal erosion risk maps are currently being rolled out across England and FutureCOAST have been commissioned to get long term coastal change mapped. The

Environment Agency is also working much more closely with Local Authorities on coastal erosion and flooding issues. RM highlighted the difficulties associated with mapping future coastline landslide reactivation potential and trends in cliff line recession based on the current data availability.

Conclusions

- There is as wealth of scientific data and information available but the findings are often poorly disseminated and targeted insufficiently towards local authorities.
- New, increasingly refined data and tools e.g. UKCP09, Strategic Monitoring, SMPs will help to fill some of the data/information gaps.
- Improved identification of climate change coastal hot spots is required e.g. SCOPAC 'ACCESS' Study.
- More research is required in to the impacts of extreme events on cliffs, coastal landslides and low lying flood-prone coastlines.
- A guide to assist local authority staff in locating new research data/information should be prepared nationally and updated continuously.

RM also updated the group on current coastal management in France. In areas of high natural hazard the State prepares a 'Plan for the Prevention of Risks' (PPR). This is a key planning document which is appended to the Local Town Plan (PLU). The PPR identifies the extent of hazards from erosion, landslides and flooding and informs strategic planning and development control. It is a successful and appropriate coastal management practice that could have transferable messages into coastal management in the UK.

Discussion:

NR queried PC as to whether the climate data from the UKCIP02 scenarios had been used as a scientific basis for the SMP2 and FRM Strategy. PC answered that the Defra guidance notes, 2006, had been used and that both are currently going through the UKCP09 switchover. KT also added that they had looked at whether the UKCP09 scenarios would have changed any of the policies within the SMP2 but had decided they would not. It is unlikely that the High++ scenarios will be looked into.

Workshop Discussion

A general discussion of the day's presentations and ensuing outcomes and suggestions for furthering the work of SECCRAG took place. The key points raised are highlighted below.

- It was observed that Defra is getting better at making research available on its website.
- Extreme events – only minimal research has been done in this area.
- The strategic and standardised overview benefits of the Environment Agency are taking over – an excellent source for local research funding.

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- The interview schedule WD is undertaking during March 2010 will provide an excellent insight into the challenges and opportunities faced by the planning community around the Severn Estuary in integrating climate change adaptation into their working practices.
 - 'Hotspot' maps (Access Project – RM) are powerful tools for planners.

Overall vision for the role of SECCRAG

From a strategy perspective, it was viewed that the role of SECCRAG input would be limited. There is a role for research bodies to play in collating and gathering the sources of scientific information available, and interpreting the policy and guidance developments. It would be useful to further the understanding of the historic evolution of the upper Severn Estuary. The role of the SMPs is to take the larger scale processes into account and not get too bogged down in the detail; there is a role here for SECCRAG to analyse the detail and report this in simplified and summarised formats. Overall, SECCRAG could be viewed as an advisory body, facilitated by the development of the SEP wiki-style information base to provide up to date research findings and policy development in an accessible format.