ACCESS
Arctic Climate Change
Economy and Society

Project no. 265863

ACCESS

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Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	X
CO	Confidential, only for members of the consortium (including the Commission Services)	

What is MSP

Marine spatial planning is a process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process. Characteristics of marine spatial planning include systems that are ecosystem-based, area-based, integrated, adaptive, strategic and participatory.

Marine spatial planning is not an end in itself, but a practical way to create and establish a more rational use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way.

Marine spatial planning is not a substitute for single-sector planning and management. Strategic and operational plans for fisheries, transportation, energy, recreation, and conservation, for example, will continue even when integrated MSP is put into practice. Integrated MSP can provide a guide to single-sector management. MSP should increase compatibilities and reduce conflicts across sectors, balance development and conservation interests, increase institutional effectiveness and efficiency, and address the cumulative effects of multiple human uses of marine space.

Marine spatial planning is not a one-time plan. The context for planning is constantly changing. Science contributes new knowledge. Monitoring and evaluation adds new information about the effectiveness, efficiency, and equity of alternative management measures. Technology improves. Social, economic, and political conditions change over time. Plans should be updated periodically to reflect these changing conditions.

Marine spatial planning is not only conservation planning. While a network of marine protected areas might be one outcome of MSP, it seeks to balance economic development and environmental conservation, and not focus only on the goals of conservation or protection.

Marine spatial planning is not ocean zoning. Marine space has been zoned for individual human uses for decades. Fisheries have been opened or closed in particular areas or zones. Marine transportation has been managed within designated lanes or zones especially in intensively-used areas. Rights to explore or exploit energy or mineral resources have been leased on an area basis. Marine protected areas have been designated in many places in the world. However, these zones and others have usually been planned on a single-sector basis.

The marine spatial planning process can help develop a comprehensive plan or vision for a marine region. Marine spatial planning is one element of ocean or sea use management; zoning plans and regulations are one of a set of management measures for implementing marine spatial planning. Zoning plans can then guide the granting or denial of individual permits for the use of marine space.

Planning is only one element of the marine spatial management process. This process includes additional elements of implementation, enforcement, monitoring, evaluation, research, public participation, and financing—all of which must be present to carry out effective management over time. [1]

What is its aim within ACCESS

The Arctic Ocean is bordered by five coast states, each with a long-established maritime history. Man's use of the Arctic Ocean has developed considerably over the years. Fishing activity has evolved from artisanal Inuit fisheries, supporting local indigenous populations to multinational fishing fleets. Improvements in shipping

construction have led to a greater number of large vessels using the Arctic Ocean. In addition, novel methods for the exploration and exploitation of hydrocarbons over the last 50 years have transformed access to offshore resources. The increasing area of ice-free ocean in the Arctic due to climate change will inevitably lead to further change in all these activities in the Arctic Ocean.

Regulatory regimes have also evolved in response to changing man's use of the marine environment. Some of the regulatory regimes have introduced a spatial dimension in the management of activities, by defining areas where particular activities may be either promoted or controlled.

Regulatory processes have tended to be related to particular sectors, such as oil and gas, transport, energy, fishing or navigation. There is, often little coordinated planning between them. There has been little effort to control the overlapping and cumulative effects of different activities, or to account for the value in ecosystem services in relation to other resources..

There is no single 'planning authority' for the sea. By contrast, on land, a planning authority plans and regulates different demands on resources, but at sea there is little or no coordination. MSP provides a tool which facilitates both integration and spatial development to be implemented effectively and efficiently..

There are six maritime areas in which coastal states can exercise their jurisdiction: 1) internal waters, 2) archipelagic waters, 3) territorial seas, 4) contiguous zones, 5) exclusive economic zones and 6) the continental shelf. Different rules apply in each of these areas. In some parts of oceans and seas, national or transboundary cooperation is hampered by unresolved delimitations of maritime boundaries.

Internationally recognised conventions, such as the UNCLOS (United Nations Convention on the Law of the Sea) and the OSPAR (Oslo-Paris Commission, provide some standardisation on how states manage marine areas. However, even with these highly regarded frameworks, not all Artic Ocean coastal states are party to these conventions, and as such cannot be bound by their rules.

To evaluate the effectiveness of regulatory instruments in the Arctic Ocean a detailed understanding of how marine space in the Arctic is used. To do this, information from each of the economic activities being addressed by ACCESS (Transport and Tourism, Fisheries and Resource Extraction) needs be incorporated into a Marine Spatial Planning (MSP) and visualisation tool. The MSP element of ACCESS Work Pack 5 brings together the multi-faceted regulatory, scientific, socio-economic and environmental parameters, including how they will change in relation to long-term climate change in the Arctic Ocean. This will enable direct and integrated analyses of the impact of climate change and effective planning.

Outputs will include, for example, how climate change will affect shipping lanes and potential increasing pollution effects (Work Pack 2), changes in fish migratory

patterns and biomass (Work Pack 3) and the socio-economic impacts of increasing hydrocarbon exploitation and its potential effect on the marine environment (Work Pack 4). Incorporating such data into the MSP will provide an efficient way of observing changes in marine space use and recognition of areas of potential conflict of use. ACCESS Work Pack 5 will use the MSP as a tool to conduct an integrated ocean management assessment, where strategic options for promoting the conservation and sustainable use of the marine environment can be developed.

How does it work

The MSP will employ a Geographical Information System (GIS), based on ArcGIS, to store, manage, interrogate and access the regulatory, spatial and temporal information outputs from the four theme areas. Users will be able to visualise the various uses of marine space. Where overlapping activities in the marine space are identified in the MSP, for instance, easy access to the regulation impacting on each sector can be accessed as hyperlinks. Where future potential developments are envisaged, the MSP highlights the context and, identifies the parameters of significance to the development and allows a prediction of any challenges to the development.

Figure 1 illustrates a schema which reflects the types of information that might be incorporated in the MSP, and how these will be organised within the GIS. All data used to generate the GIS shape files will be accessible in their raw format, so that exporting into other software will be possible. Hyperlinks from shape files will provide additional information relating to the selected layer. Visualising the spatial extent of sectoral activity and how these overlap provides a means of better managing of those areas, and where environmentally sensitive areas are impacted by the four sectors, the MSP can provide a means of planning the usage of those areas.

ACCESS MSP Schema

ACCESS MSP

Work Pack 1

Data

Sea ice

extent	Know current extent of sea ice extent
thickness	Sea Ice thickness

Weather

fog/mist	Areas affected by weather due to changing climate

Oceanography

current	ocean currents

Work Pack 2

Data

Shipping routes

current	Current volume of shipping activity
expected	Estimated extent of increased shipping

Pollution

CO_2	Gridded data of pollution caused by shipping

Work Pack 3

Data

Fishing areas

Species	Extent of current biomass
Migration	Possible changes in species location

Work Pack 4

Data

Resource Extraction

Installations	Location of rigs, pipelines etc
Oil and gas fields	Know hydrocarbon fields
Future prospects	Potential areas for exploitation

Maritime Zones

Data
National Boundaries

TS, CZ, EEZ, CS	Extent of all national maritime zones in the Arctic

Environmental Zones

OSPAR	Extent of the OSPAR Acrtic region
EBSA	Location of proposed EBSAs

National projects

Existing MSP	State's own MSP areas
Marine Protected Areas	Areas defined as protected under national legislation

Hyperlinks

Containing regulatory and legislative text and image files

ACCESS MSP	Final version of the GIS

FEATURES	Shapefile	Layer
Points		
Lines		
Polygons		
Grids		
Table		
Group		

National Oceanography Centre
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ACCESS Arctic Climate Change Economy and Society

Figure 1 GIS Schema illustrating potential MSP content

To provide a schematic illustration of how the MSP will function specifically for ACCESS, Figure 2 shows 8 plates representing different types of information. The four plates along the top illustrate the different maritime zone and regimes including the spatial extent of state sovereignty and of large marine ecosystems (LMEs). . The legislative and regulatory documents have been incorporated into the developing MSP and will be accessed via the web and hyperlinks, providing an accessible library of all relevant regulations for ACCESS partners.

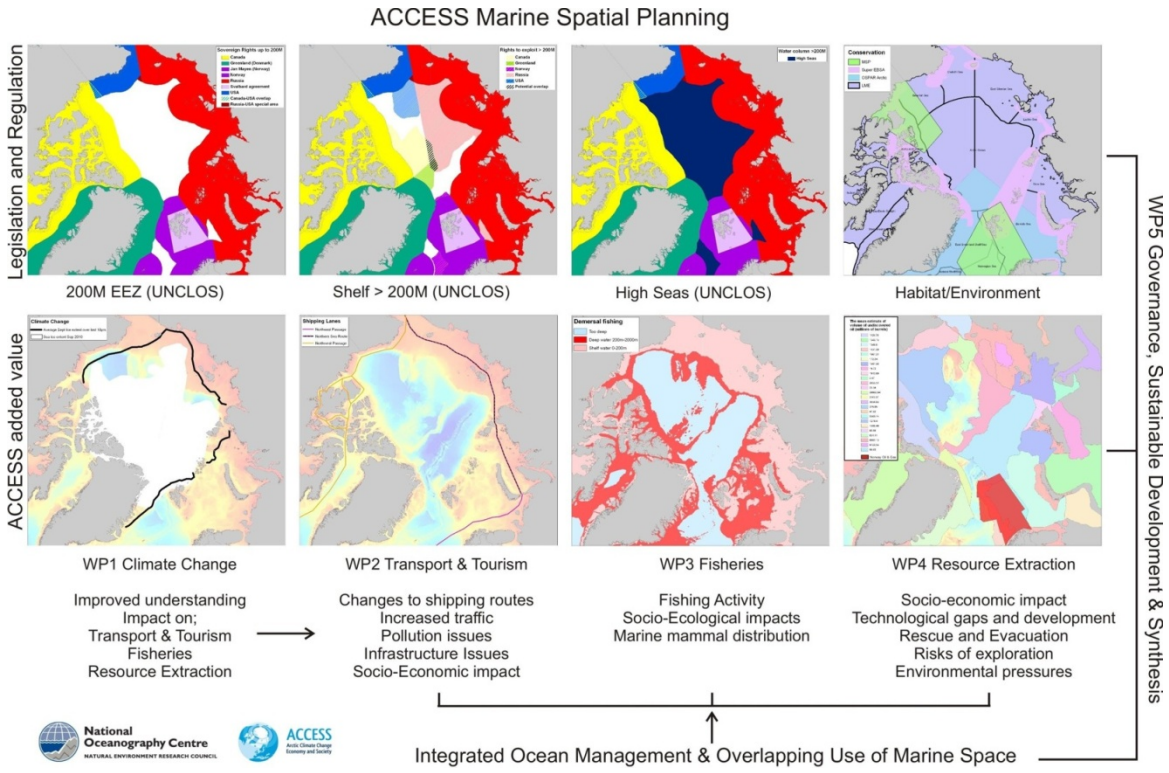

Figure 2 Schematic of how ACCESS information will be incorporated into a MSP

The four plates along the bottom represent the four work pack theme areas within ACCESS. By populating each of these with spatial data outputs from ACCESS and combining them with the regulatory information, a comprehensive tool can be developed which can be used to manage the potential future use of the marine space. These are initial examples of the types of information that might be available from each of the work packages, qnd these different parameters will be established as some of the many layers which will populate the GIS and serve the MSP. By the end of the ACCESS project we would expect there to be numerous different types of layers, or images (?), in the MSP, with a particular focus on how activities in each

sector might change in relation to climate change. This latter element - the potential temporal variability of the parameters over the 30-year time period targetted by the ACCESS - is one which is vital to the utility of the MSP tool. The MSP will, as far as possible, underpin the need to predict the way regulatory instruments will become stressed with the effects of climate change on the Arctic Ocean over time.

An example of how information from ACCESS can be utilised within the MSP is seen in Figure 3. The left panel shows the sea ice extent during September 2010, as well as the average sea ice extent over the past 10 years. Also shown is the current Northern Sea route, simplified water depth and areas of potential hydrocarbon exploitation. The window on the right shows how these parameters could be impacted by a, hypothetical, retreat of the sea ice.

We can see that with retreating sea-ice larger areas of shallow shelf seas become accessible for demersal fishing. Information of the impacts on fisheries, such as species migration, will be provided by WP3. We see also an increase in the areas of potential hydrocarbon resource extraction. WP4 will provide more detailed data relating to the expansion of infrastructure and the socio-economic impacts of increasing hydrocarbon exploitation. The right window also shows a hypothetical change to the Northern Sea route. WP2 will evaluate how realistic such a scenario is as well as providing detail of the increasing pollution impacts caused by the increase in traffic.

From this simple example it is evident that all three industries would have an interest in exploiting this particular area following a retreat of the sea ice. The MSP would not only provide spatial insight, but also a means of understanding the regulations that exist for each industry. Such regulations may already have elements of environmental protection, for example, included for a particular industry, but maybe not for the others. Having such detail readily available via the GIS in an illustrative way as well as hyper-linking to the regulatory documents makes it an efficient and relatively easy way of providing policy makers the information required to make decisions on how best to manage the area in the future.

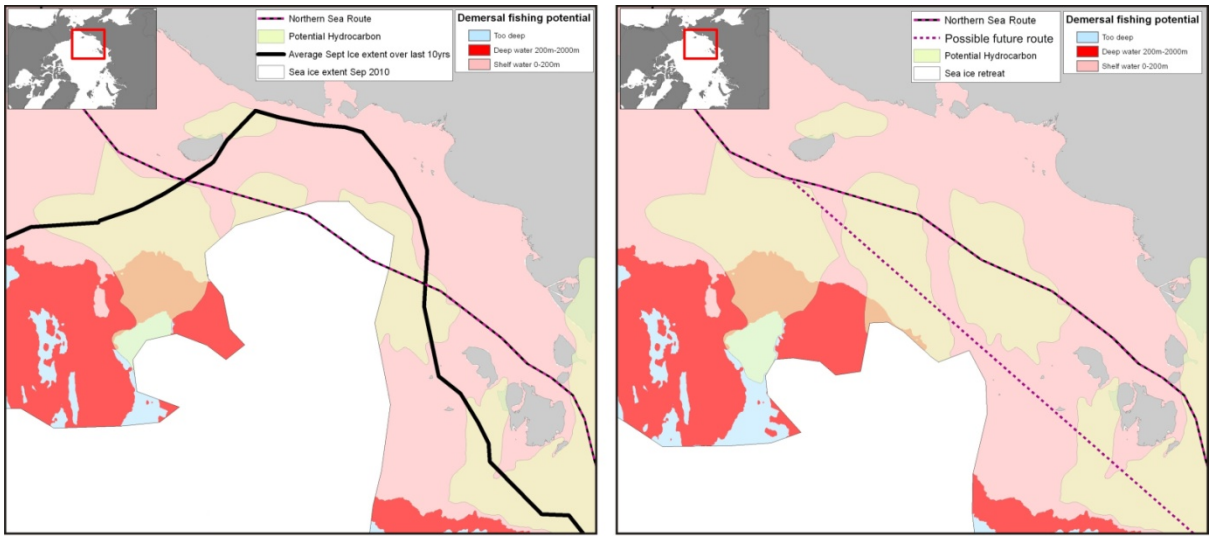

Figure 3 Example of how the MSP can be used to visualise potential impacts caused by sea ice retreat

It is inevitable also that with increasing, and overlapping, use of the marine space, the potential for environmental damage to the marine ecosystem increases. Partners in WP5, the Beijer Institute, will provide an integrated ocean management plan, where potential environmental impacts caused by such activities will be assessed and how these can be balanced against the societal needs and benefits from future exploitation, that becomes possible with increasing areas of marine space becoming accessible due to the changes in the arctic caused by climate change.

Information providers

Two databases have been setup to support the ACCESS project. Met.no, Norway, have the responsibility to ensure that all climate data outputs from ACCESS are stored and managed and made available for exposure. A second database has been setup by the NOC, UK. All non-climate data from the ACCESS project should be uploaded to here, and will be stored and managed and made available for exposure. As a part of the data management responsibility, metadata information will be generated and using this information WP5 will identify what data can be used in the MSP. It will be the responsibility of WP5 to ensure that all data that can be used is identified and manipulated into a format that can be used in the GIS, however this relies on other WP contributing their data.