IMPACTS OF SEA-LEVEL RISE ON EUROPEAN COASTAL WATERS WITH RESTRICTED EXCHANGE

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AIMS

This study aimed to estimate any impacts by *climate change-induced sea-level rise* in coastal areas of restricted exchange (embayments, lagoons and sealochs) in Scotland and Norway using *Geographic Information System* (***GIS***). Ecological, physical and economic features of these areas were studied. Furthermore, the area of loss due to sea level rise was calculated and the predicted affected habitats determined.

Embayments are numerical scarce but scattered along the Scottish coastline. They are restricted to the ocean by narrow inlets, are generally shallow and often dominated by tidal regimes,that determine their ecology.

Coastal lagoons are numerous but spatially relatively small, very shallow (<10 m) basins with a barrier at their inlet which can lead to temporary enclosure. The density of lagoons is the highest at the Scottish islands including Orkney.

Fjords/Sealochs are predominant on the west coast of Scotland, the Shetland Islands and along the Norwegian coast with glacially formed deep basins and sills at their mouth. They often have a saline gradient due to associated rivers.

USED FUTURE PREDICTIONS OF SEA-LEVEL RISE

Predictions for	low emission	medium emission	high emission
Edinburgh, Scotland	23.4 cm	30.5 cm	39.2 cm
Trondheim, Norway	22 cm	42 cm	77 cm

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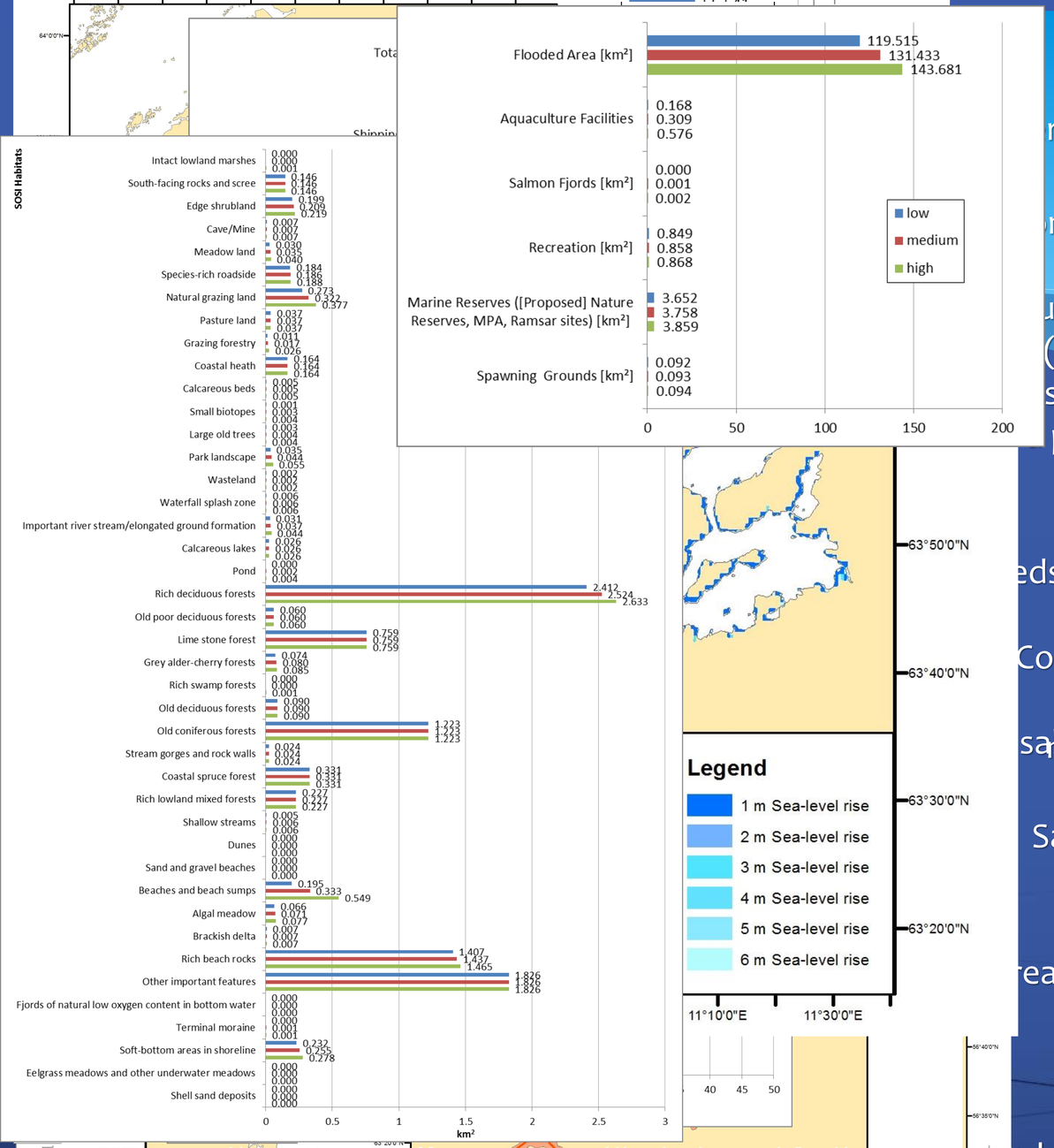
Scotland's Orkney Islands



Economic and ecological features and habitats which are predicted to be affected by the flooded areas at the Trondheim Fjord system

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Conclusion

The area which is predicted to be flooded includes intertidal habitats which will likely no longer be free of saline water at low tide. This can be crucial at places like Montrose Basin, tide influenced lagoons in the Orkney Islands and shallow areas around sealochs and fjords.
Additional stresses will result from the increased depth of some basins which has influences on light irradiation and therefore the seabed flora.
In the basins with a saline gradient like Montrose Basin and the fjords/sealochs with their associated rivers, the increased salinity is predicted to affect the biodiversity.

As most of the coastal waters and the shore profile evolved by sea-level changes thousands of years ago, the natural movement of the coastal waters landwards by sediment shifts would be expected. For example, the lagoons in Orkney are very shallow, any sedimentation might lead to a filling whereas at other places new lagoons could evolve by barrier development.

Nevertheless, this natural movement will be restricted by pre-existing structures associated with urban development. Additional threats like promoted erosion of land and beaches should be considered for preservation measurements which should be applied soon to avoid higher costs by the rising sea-level.

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