# AQUACROSS Case Study 2 at the Intercontinental Biosphere Reserve of the Mediterranean: Andalusia (Spain) – Morocco

## Summary for Local Stakeholders

The interdisciplinary research project AQUACROSS[1] supports European efforts to protect biodiversity in Europe's lakes, rivers, coasts and oceans. These aquatic ecosystems provide numerous economic and societal benefits to Europe – but they are at risk of irreversible damage from human activities. To counter this and to support achievement of the EU Biodiversity Strategy to 2020 targets, AQUACROSS has developed practical guidance on identifying threats to biodiversity, understanding links between ecosystems and the services they provide, data management, modelling and scenario development, and policy analysis, which fit together as parts of the integrated AQUACROSS Assessment Framework for ecosystem-based management of aquatic ecosystems[2]. We have developed, tested, and applied this research in eight case studies across Europe to solve local biodiversity challenges. This brief summarises our work in **Case Study 2**, and makes recommendations for local policy.

### Case study context – What is the challenge?

The Intercontinental Biosphere Reserve of the Mediterranean – Andalusia (Spain) Morocco (IBRM) contains several remarkable protected sites, high biodiversity richness and an important cultural heritage. However, pressures from human activities in the area are threatening these distinct values. The IBRM also offers high potential for sustainable economic development.

Figure 1: Strait of Gibraltar, view from the Spanish side. (Credit: Alejandro Iglesias-Campos)

Green and Blue Infrastructure (GBI) is a strategically planned network of natural and semi-natural landscape made up of "green" (land) and "blue" (water) elements with other environmental features designed and managed to deliver a wide range of ecosystem services. The GBI concept is about maintaining, strengthening and restoring ecosystems and the services they provide. All this makes GBI a useful tool for integrative spatial planning of the IBRM that addresses the conservation and societal goals existing in the Reserve.

### Assessing the current state of the Socio-Ecological system (SES)

The case study at the IBRM Andalusia (Spain) and Morocco contains nine different realms and five biotic groups. In addition, fifteen ecosystem services have been assessed, including provisioning,

[1] AQUACROSS (Knowledge, Assessment, and Management for AQUAtic Biodiversity and Ecosystem Services aCROSS EU policies), 2015-2018, has received funding from the European Union's Horizon 2020 Programme for Research, Technological Development and Demonstration under Grant Agreement no. 642317. More information: aquacross.eu
[2] All AQUACROSS guidance and outputs are freely available online at https://aquacross.eu/outputs

**Human activities and pressures in the IBRM**

Urban dwelling and commercial development related activities cause the highest pressures on coastal ecosystems in the case study area, while agriculture (both crops and livestock) is the main activity affecting freshwater ecosystem components. Marine activities, such as shipping, in-situ aquaculture, boating and yachting water sports, place high pressures in both coastal and marine waters within and outside of the Reserve. The activities are responsible for a variety of pressures types such as the disturbance of species, change of habitat structure/morphology, introduction of microbial pathogens, introduction of synthetic and non-synthetic compounds and the introduction of litter.

regulation and maintenance and cultural services. The sublittoral sediment, deep-sea bed, infralittoral, circalittoral rocks, surface standing and running waters are the most exposed habitats to multiple activity-pressure combinations. Regarding the supply of ecosystem services, sublittoral sediment, infralittoral rock and hard subtract, as well as surface standing waters, are identified as key ecosystems.

## Ecosystem-based management (EBM) solutions proposed

Due to the benefits that GBI provide against habitat loss and fragmentation, as well as against climate change and natural disasters, GBI per se is considered an ecosystem-based solution, since it offers a natural alternative to solve these environmental problems in contrast to purely technical solutions. On the other hand, by means of EBM restoration measures applied within the GBI, we might improve the GBI, maintaining healthy ecosystems, reconnecting fragmented habitats and restoring degraded ecosystems, so they can provide society with more and better goods and services. Particularly, our EBM approach aims to reach the EU Biodiversity Strategy 2020 target 2 (i.e., restoring at least 15% of degraded ecosystems by 2020).

## Design of the solutions

The multi-function nature of the GBI is achieved through the designation of multiple zones with specific management objectives within the GBI. Specifically, we considered four different GBI management zones including two with conservation aims (the core zone and conservation zone), one to manage trade-offs between biodiversity conservation and maintenance of compatible and incompatible ecosystem services (the sustainable use zone), and a fourth zone that implements the EBM restoration objectives (the EBM restoration zone).

## Most efficient allocation of investments in restoration measures

To optimally spatially distribute GBI across CS2, the following "conservation features" were considered in an analysis using Marxan with Zones software: the area covered by protected sites as well as by different habitat types at different ecosystem conditions, the averaged value of ecosystem services across CS2, and a set of selected sites to be restored.

Specifically, Marxan with Zones provided cost-effective spatial solutions based on the minimum area covered by a GBI, achieving specific conservation targets (in terms of “conservation features”), and on EBM restoration action costs, by an optimal spatial allocation of the conservation features. The cost-effective spatial solutions also took into account the connectivity patterns, as expected in the design of the GBI.

## Stakeholder participation

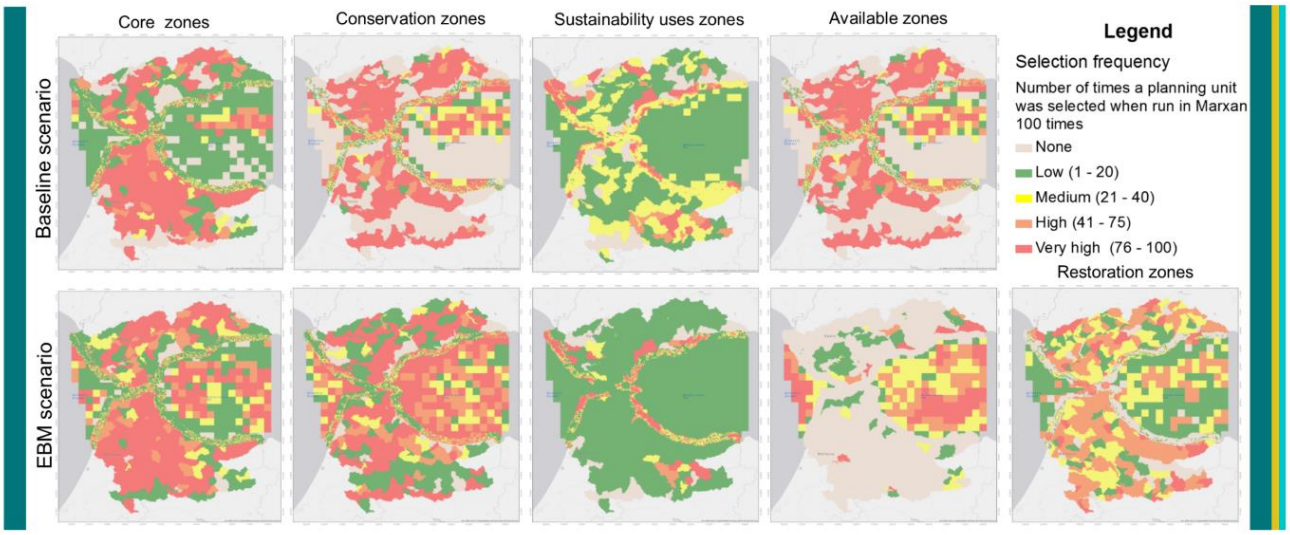
The allocation approach used in the GBI design allows the integration of several conservation and exploitation objectives expressed by different stakeholders in the CS2 area. CS2 key stakeholders are representatives from the regional and local governments of Andalusia and Kingdom of Morocco, from UNESCO Man and Biosphere Program and the Biosphere Reserve Network, from protected sites within the IBRM, and representatives of the main sustainable economic activities developed in the study area, namely farmers, livestock producers, manufacturers, as well as local non-profit organisations devoted to nature conservation and restoration.

### Final local policy recommendations

GBI is shown as a useful spatial management tool at the IBRM and its area of influence. The implementation of the designed GBI by its integration in the multiple local and regional policies related to spatial planning as well as to sustainable development in the CS2, may contribute to enhance connectivity, and to promote the biodiversity and the ecosystem services provided across the different IBRM aquatic ecosystems. Finally, the EBM approach implemented within the GBI may also contribute to reach the EU Biodiversity Strategy 2020 target 2.

## Specific recommendations and conclusions: implications for policy

The CS2 framework be also useful in guiding the investments on GBI at regional level and its integration in different policies at EU level and international/global level. Specifically, the results obtained may guide the different policies in the area and contribute to identify spatial planning priorities (Biodiversity Strategies, National Marine Strategies, Coastal Management Plans, National Plans for Watershed Management and Directives for restoration as well as sustainable tourism strategies and strategies for the development of marine aquaculture




Green and Blue Infrastructure: possible solutions (selection frequency)

Our results are applicable to both marine and terrestrial conservation planning across three different realms – freshwater, coastal, and marine – allowing for a transboundary and comprehensive management of the study area. The proposed planning solution delivers an EBM outcome that balances conservation, ecosystem condition and ES.

**Want to learn more? Visit the CS 2 story map tool at ibrm.aquacross.eu, see data/information at the AQUACROSS Information Platform. A full case study report is available online or from a.iglesias-campos@unesco.org.**