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Agenda item 6: Conservation of sites of particular ecological interest

6.1. Report by the Chair of the Ad hoc Group of Experts for Marine Protected Areas in the Mediterranean (AGEM) on the group's works during the biennial period 2022-2023

Coherence in Mediterranean MPAs: Conditions and Recommendations

UNEP/MAP
SPA/RAC - Tunis, 2023

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Coherence in Mediterranean MPAs: Conditions and Recommendations

Final version: May 2022 (based on the discussions of the third AGEM meeting)

Executive summary

This report is intended to provide the outcomes of a reflection by the working group "WG-Coherence" of the Ad hoc Group of Experts for Marine Protected Areas in the Mediterranean (AGEM) on defining and measuring ecological coherence of marine protected areas (MPA) networks – supported by other effective area-based conservation measures (OECMs) – and providing recommendations for the attention of decision-makers.

It is the result of four meetings, held online, during which literature review, reflections and discussions among participants led to the drafting of this short document whose structure has been deliberately kept schematic for easy reading.

The WG-Coherence was composed of the following AGEM members: Emna Ben Lamine (coordinator), Joachim Claudet, Lovrenc Lipej, Milena Tempesta and Frédéric Ducarme, with the support of Souha El Asmi, responsible for the technical secretariat of AGEM on behalf of SPA/RAC. A workspace on Google Drive was created to share useful documents and working papers in order to give the WG members the opportunity to contribute to the work at everyone's convenience.

The recommendations resulting from the present reflections on coherence are provided at the beginning of the document, instead of being listed at its end.

Recommendations

- The WG-Coherence highlights firstly the need for further scientific studies on connectivity and coherence considering different types of species (including fish) and habitats (including benthic habitats), as well as species genetics, in order to better define the different connectivity types;

More recommendations at MPA, national, MPA system and regional levels are provided below:

At MPA level:

- Put more effort (i) to protect and manage effectively existing protected areas and other area-based conservation measures (MPAs, MCPAs, OECMs, FRAs, Natura 2000, etc.) with fully and highly protected zones, through increasing or enlarging no-take zones, enacting or enforcing relevant laws, and (ii) to monitor and regulate the sustainability of the allowed activities in the multiple-use MPAs;

At national level:

- Put more effort to make existing MPAs and other area-based conservation measures well managed, especially for MPA/OECM/marine Natura 2000 networks at their early setting-up stages;
- Raise the compliance through the engagement of local populations and stakeholders in MPA design, implementation and management;
- Provide socio-economic equity for local populations through MPA/OECM benefit sharing and a win-win approach (tourism, fishing, recreation, artisanal crafting, local knowledge, etc.);

At an MPA system level:

- Apply coherence principles throughout the planning process (example: the use of systematic conservation planning, or spatial planning, etc.);
- Encourage good experiences and best practices sharing from successful MPAs/MPA systems regarding coherence principles;
- Enhance bilateral or multilateral information/experience sharing at the Mediterranean regional level, especially for the planning and design stages;

At regional level:

- Perform a gap analysis at regional level using Mediterranean key habitats and species of the Barcelona Convention's SPA/BD Protocol Annex II "List of Endangered or Threatened Species" (http://rac-spa.org/sites/default/files/spamis_temp/spa_bd_protocol_annexes1_to_3_v_2019_eng.pdf) and the Reference List of Marine Habitat Types in the Mediterranean (http://www.rac-spa.org/sites/default/files/doc_fsd/reference_list_en.pdf), for example, for coralligenous formations, marine caves, as it is the case for *Posidonia oceanica* meadows where ongoing gap analysis are carried out by the Mediterranean Posidonia Network https://medposidonianetwork.com;
- Develop an ecological coherence indicator and define a more scientifically robust conceptual framework (with the support of AGEM / WG-Coherence), considering coherence principles measures;
- The Post-2020 Mediterranean Strategy for MCPAs and OECMs should support more scientific research to specify the role of MPAs, OECMs, FRAs, KBAs and other protected areas and area-based conservation measures in providing connectivity.

I. Context of the WG-Coherence reflections

At the CBD global level, the Contracting Parties are strongly encouraged to take significant action towards achieving Aichi Target 11 in the Mediterranean, including through setting up an effective and equitable management, enhancing ecological representativeness, connectivity and integration of their marine and coastal protected areas and other effective area-based conservation measures into the wider landscape and seascape.

Although measuring MPA coherence and connectivity is not an immediate priority for the region, framework requirements and indicators could be suggested. The common reference to our reflection should consider diverse key factors such as the restriction measures, the governance models, the age, the surveillance, and socio-economic impacts of MPAs, within the regional Mediterranean network. The concept of efficiency/compliance towards commitments might boost the commitment progress at national level and was proven to be an important factor that can enhance MPA effectiveness.

In this sense, conceptualizing these aspects in the design and set-off of coherent MPA networks at national or regional level, and providing insightful guidance to the countries should become a priority.

II. The objective of the report

Providing for decision makers:

(1) Criteria for a MPA system to be coherent and connected; and
(2) Enabling conditions to ensure those criteria are met.

III. Criteria

The existing concept of **coherence** combines a set of ecological criteria that are summarized in Table 1 below.

Table 1. Coherence criteria

Criteria	Definition	Reference
Representativity / representativeness	Representativeness is considered the inclusion of areas that represent the entire suite of "different biogeographical subdivisions of the global oceans and	CBD, 2008; Rees et al., 2018

	regional seas that reasonably reflect the full range of ecosystems, including the biotic and habitat diversity of these marine ecosystems". Representative includes the element of replication to ensure risk is minimized in the event of unforeseen or catastrophic events.	In Meehan et al., 2020
Adequacy / viability	"To fit for purpose", e.g., to contain viable species populations, or other ecosystem components, and to cover a sufficient proportion of the planning region and the features within.	Catchpole, 2012
Replication	To select 'replicating' sites with similar habitats in separate areas of the planning region to ensure resilience against catastrophic loss.	Catchpole, 2012
Connectivity	Ecological Connectivity is the unimpeded movement of species and the flow of natural processes that sustain life on Earth. Connectivity in relation to MPA networks concerns the "linkages whereby protected sites benefit from larval and/or species exchanges, and functional linkages from other network sites".	UN notification, 2019 CBD, 2008

IV. Enabling conditions

To be ecologically coherent and effective, MPAs that are part of a network, need to be at least implemented, if not actively managed (stage of establishment of the MPA Guide, Grorud-Colvert et al., 2021[1]) and fully or highly protected (protection levels of the MPA Guide). Having this in mind, a system (network) of MPAs should also cover with its knots (MPAs) all the biotic and habitat diversity of the marine ecosystems of the biogeographic area, with replication of similar habitats in different sites to assure resilience, contain viable species populations and assure linkage among knots for connectivity.

[1] The 4 Stages of Establishment are summarized as follows: 1. Proposed/Committed: The intent to create an MPA is made public; 2. Designated: The MPA is established or recognized through legal means or other authoritative rulemaking; 3. Implemented: The MPA has transitioned from existence "on paper" to being operational "in the water" with plans for management activated; and 4. Actively Managed: MPA management is ongoing, including monitoring, periodic review, and adjustments made as needed to achieve biodiversity conservation and other ecological and social goals.

IV.1. Enabling conditions over the MPA establishment process

Table 2 below sets the framework to understand key drivers and enabling conditions for MPA systems to deliver ecological and social benefits.

Table 2. Enabling conditions for effective MPAs. These conditions may vary in their importance during the process of achieving each of the four stages of establishment of the MPA (Grorud-Colvert et al., 2021)

Enabling conditions across all stages of establishment	➢ Clearly defined vision and objectives ➢ Long-term political will and commitment ➢ Sustainable financing ➢ Evidence-based decision making ➢ Knowledge integration (e.g., local, indigenous, practitioner domains…) ➢ Coordination with related governance institutions ➢ Collaboration across jurisdiction ➢ Upward and downward accountability to legal mandates and stakeholders ➢ Recognition and support of existing governance by stakeholders and indigenous peoples
Enabling conditions from Proposed/Committed to Designed	All the conditions above, plus: ➢ Ecological design principles: Viability based on size, location, spacing, shape, and permanence Representativeness and replication of habitats Incorporation of habitats and species of unique conservation value Design of connectivity and resilience Precautionary approach considering current and emergent threats Consideration of existent threats and mitigation ➢ Social design principles Inclusion of social objectives for multi-dimensional human well being Recognition of pre-existent rights, tenure, uses: extractive and non-extractive Consideration of pre-existent resource use and economic status Accounting for unequal costs and benefits to different social groups Impact and benefit sharing with distributional fairness

Enabling conditions from Designed to Implemented	All the conditions above, plus: ➢ Sufficient and properly organized staffing and funding ➢ Adequate and appropriate administrative structures and processes ➢ Stakeholder engagement plan ➢ Compliance and enforcement (including graduated sanctioning) ➢ Education and outreach initiatives ➢ Clarity of rules, rights, and boundaries
Enabling conditions from Implemented to Actively Managed	All the conditions above, plus: ➢ Ongoing monitoring, evaluation, and knowledge sharing ➢ Adaptive management ➢ Support for livelihoods, e.g., development programmes, capacity building, hiring ➢ Effective management of broader seascape and external pressures ➢ Ongoing efforts to build trust, string local leadership, partnerships with local users ➢ Local collaboration in monitoring, enforcement, and management ➢ Ongoing consideration of cultural values, traditions, and activities in site management

IV.2. Social considerations: MPAs should be equitably managed

Equitable management highlights the impact and benefit of conservation actions on human well-being and social systems, including the fair distribution of economic benefits and livelihood opportunities (distributional equity); the process for involvement and inclusion of stakeholders in planning, implementing, and administering (procedural equity); and the process of acknowledging and accepting the legitimacy of rights, values, interests, and priorities of different actors and respecting their human dignity (recognitional equity) (Juffe-Bignoli et al., 2014; Schreckenberg et al., 2016).

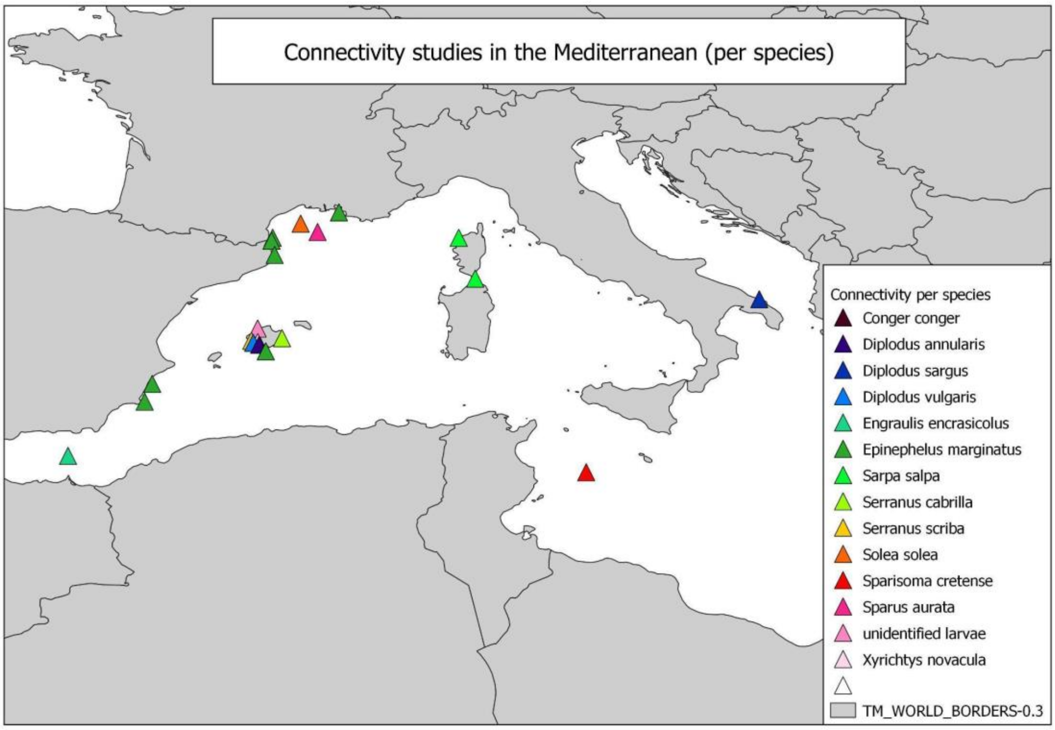
IV.3. Geographic considerations: MPAs should be integrated into wider landscape and seascape

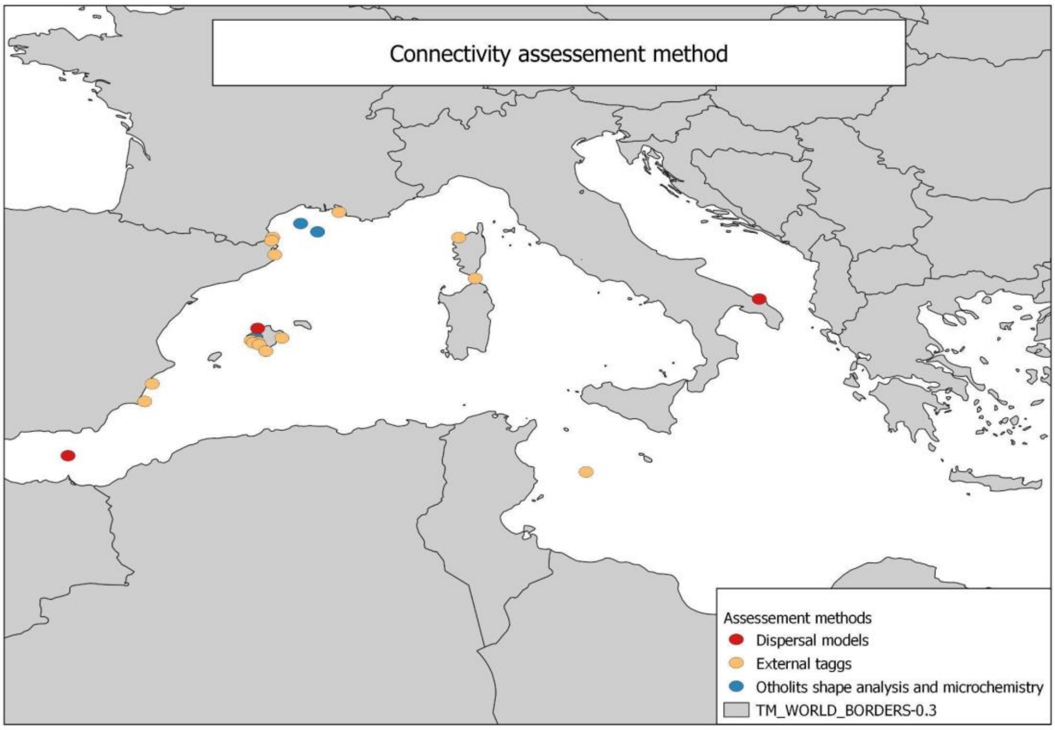
Considering that "Areas of importance" are considered "geographically or oceanographically discrete areas" that provide important biodiversity and ecosystem services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics, or otherwise meet the criteria as identified in annex I to decision IX/20" (CBD, 2008).

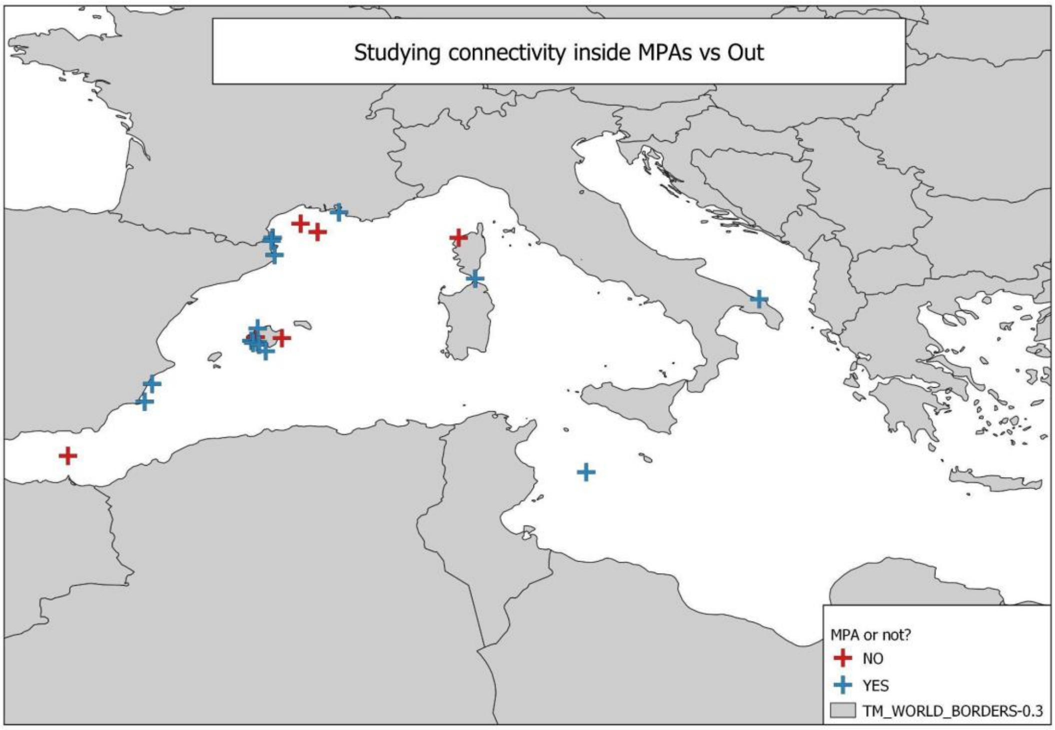
In recognition that protected areas cannot work in isolation, this element identifies the importance of integrating MPAs with other conservation and management tools, such as fisheries management or land use plans for land-based sources of pollution. Other considerations for this element include potential cumulative impacts stemming from climate change, ocean acidification, ocean noise, and pollution (Juffe-Bignoli et al., 2014; Rees et al., 2018).

V. Appendices

Appendix 1. Synthesis of case studies: Connectivity in the Mediterranean Sea






Studying connectivity inside MPAs vs Out
MPA or not?
NO
YES
TM_WORLD_BORDERS-0.3

Appendix 2: Coherence in the Mediterranean region: realizations and gaps

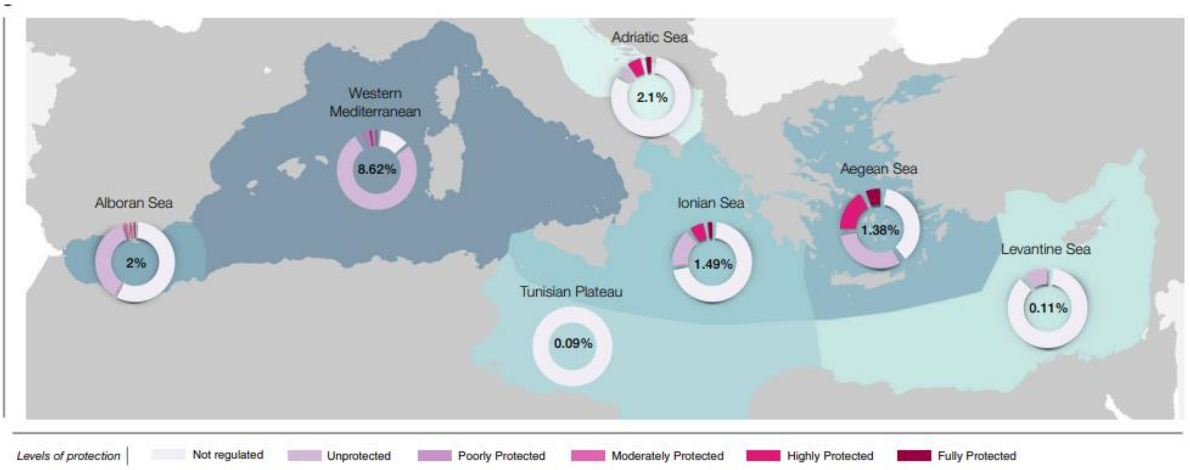
In the Mediterranean Sea

In 2020, 8,33% of the Mediterranean Sea is under protection status. However, 97,33% of the total Mediterranean surface under protection status is located in EU member countries water and the cumulative surface of no-go, no-take or no-fishing area represents only 0,04% of the Mediterranean (sources: MAPAMED, the database of MArine Protected Areas in the MEDiterranean. 2019 edition. © 2020 by SPA/RAC and MedPAN. Licensed under CC BY-NC-SA 4.0. Available at: https://www.mapamed.org/ and The Mediterranean MPA management database. 2021 by MedPAN.). According to the recent gap analysis of Mediterranean protection (Claudet et al., 2020), 6.01% of the Mediterranean is protected. However, in 95% of this area, regulations are not stronger inside than outside MPAs, making only 0.23% of the Mediterranean fully or highly protected. Protection is unevenly distributed across geographical and political boundaries, and eco-regions.

According to WWF MMI (2019), only three habitats, mainly iconic or emblematic to Mediterranean coasts – infralittoral hard substrates (namely on rocky shallow shores), *Posidonia* seagrass meadows, and Mediterranean coralligenous habitats – are well represented. However, these habitats do not reach the 30% threshold of sufficient representativeness and are only represented in the northern part of the basin. All other habitats have low representation.

According to Giakoumi et al. (2013), Information on the distribution of the seagrass *P. oceanica* meadows, coralligenous formations, and partially or totally submerged marine caves was compiled from several source types for the production of distribution maps in the Mediterranean Sea. The distribution maps and the existent MPAs maps were then used to determine whether the Mediterranean MPAs network adequately covers these key habitats or not. The results are presented in each subregion as follows: in red, priority areas by the presence of key habitat but with no implemented MPA, in orange, presence of key habitat and MPA, in blue, MPA but no key habitats and in green, no priority habitats and no MPAs.

By Mediterranean sub-regions



Distribution of the Different Levels of Protection at the ecoregion level (colored pie charts show the distribution of the levels of protection inside each ecoregion and percentages ***connectivity***

In the North-Western Mediterranean part (in MPAs or outside)
Only 13% of habitat types (infralittoral soft and mixed substrates, Mediterranean biocenosis and Mediterranean Posidonia habitat superclass) can be considered well connected (with over 20 connections). Least-connected habitats are abyssal soft and mixed substrates, circalittoral habitat, deep-sea beds and deep-sea hard substrate habitats. Most of the connections between MPAs are in the Northern Mediterranean (Gomei et al., 2019).

By key habitats (Giakoumi et al., 2013)
In the Alboran Sea, the Western Mediterranean and Algero-Provencal Basin and the Tunisian Plateau, 2% more of the area should be protected to cover Posidonia, coralligenous and marine caves, in each of the mentioned areas.
In the Aegean Sea, 9% more of the area should be protected to cover Posidonia, coralligenous and marine caves.
In the Ionian Sea, 12% more of the area should be protected to cover Posidonia, coralligenous and marine caves.
In the Adriatic Sea, 10% more of the area should be protected to cover Posidonia, coralligenous and marine caves.
In the Tyrrhenian Sea, 5% more of the area should be protected to cover Posidonia, coralligenous and marine caves.
In the Levantine Sea, 7% more of the area should be protected to cover Posidonia, coralligenous and marine caves.

Appendix 3: Connectivity in the marine realm and across realms

Connectivity can be defined also as the movement of individuals, among local or subpopulations, provided that the level of exchange is sufficient to impact the demographic rates of the local population(s). Thus, connectivity in marine populations results from the dispersal of eggs and larvae, and from the movement (daily, seasonal and ontogenetic) of juveniles and adults. Another facet of connectivity is the exchange of material (nutrients, sediments, organic matter, etc.) among neighbouring areas, modulated by the multiscale spatial arrangement of (and the degree of connection between) habitat patches (Calo et al., 2013).

Following a more recent policy resolution adopted in 2020 by the Convention on Migratory Species, "Ecological connectivity is the unimpeded movement of species and the flow of natural processes that sustain life on Earth" (CMS, 2020) and should be a key factor in the conservation of management units, including in the marine environment (Lausche et al., 2021).

In this report, we consider spatio-temporal connectivity, which measures the possibility of propagation of species (eggs, larvae, juveniles, adults, seeds…) between different populations through a defined space. A network of MPAs comprises a suite of MPAs that are highly linked to each other by propagule fluxes (connectivity) and also considers the space wherein connectivity takes place (Boero et al., 2017).

In the following section, some connectivity measure techniques in the Mediterranean Sea are listed:

● **Dispersal models** are 'physical' models based on the assumption that fish larvae are passively transported by sea currents and consider the duration of the larval phase as one of the main factors in determining the spatial distribution of fish species. Physical models have been recognized as useful and powerful tools and different works have been made throughout the world with different purposes: to hindcast/forecast the spatial and temporal variability of spawning events and their effect on connectivity among population; to assess the potential impact of global warming on larval dispersal; or to help in the design of MPA networks and in their further management (Calo et al., 2013). The larval dispersal can also be used to define the strategy of designating MPAs (for example, geographical location and size).

Small scale case studies that used dispersal models:
North Alboran Sea: Catalan et al., 2010: developed a small scale model for the North Alboran Sea using the Ichthyop Lagrangian model tool for evaluating the vertical dispersion of the European anchovy (*Engraulis encrasicolus*).
Mallorca: Basterretxea et al. (2012), for example, assessed the larval dispersion of coastal fish in the southern coast of Mallorca, using a three dimensional density-resolving model based on the Princeton Ocean Model (POM) and a particle tracking algorithm. Their objective was to determine the factors that

contribute to a successful recruitment and the level of exchange of individuals inside the network of four MPAs along the coast of Mallorca.
Torre Guaceto MPA (Di Franco et al., 2012) in the SW Adriatic Sea (Italy). They used Lagrangian simulations of dispersal based on an oceanographic model of the region and data on early life-history traits of the white sea bream (*Diplodus sargus sargus*), finding a potential larval dispersal of 100–200 km.

● **Biophysical models** that couple together oceanographic and biological data allowing the assessment of the influence of various parameters on the dispersal pattern of coastal species. Such models are considered to be highly informative and are used to understand the combined effects of the general marine circulation and larval behaviour on dispersal processes. An example for the Mediterranean Sea is available in Nicolle et al. (2009) that used the European anchovy *Engraulis encrasicolus* as a model species for understanding the main factors affecting the transport/retention and distribution processes of this species, in the Gulf of Lion in France.

● **Genetics**: Dispersal distances have been evaluated for a number of species through connectivity studies focusing on adult populations by measuring the rate of gene exchange among distinct groups. The indirect estimation of gene flow relies on the evaluation of the genetic differences among populations under the assumption of equilibrium. Genetic methods present limitations due to the fact that they are based on theoretical models of population structure that sometimes in practice could not be applied on populations in reel, as has been demonstrated for the majority of marine species (Benestan L et al., 2021).

● **Otholits (shape analysis and microchemistry (elements and isotopes))**: The analysis of an otolith section allows researchers to determine growth and ageing, and to estimate the duration of early life stages. In the case of juveniles, it is possible, by back-calculation, to determine the date of spawning, hatching and settlement that is fundamental information for larval dispersal modelling and for investigating connectivity patterns. These potentialities make otoliths one of the most important tools for studying fish biology and ecology. Few studies are available for the Mediterranean Sea:
Mallorca (Spain) (Correia et al., 2011) for *Conger conger* (Congridae) and other 3 locations
Gulf of Lions (France) (Dierking et al., 2012) for *Solea solea* (Soleidae)
Gulf of Lions (France) (Morat et al., 2012) for *Solea solea* (Soleidae)
Gulf of Lions (France) (Mercier et al., 2012) for *Sparus aurata* (Sparidae)
Apulian Adriatic coast (Italy) (Di Franco et al., 2012) for *Diplodus sargus* (Sparidae) (Torre Guaceto MPA).

● **Tracking and tagging the fish**
Natural marks: In the Mediterranean, this procedure has not been applied to the study of bony fishes, except in one case (Lelong, 1999), in which a photo-identification technique of individuals of *Epinephelus*

marginatus by cephalic blotches was tested. Although this methodology has been demonstrated as feasible due to its low interaction effect and its cheap application, it does not seem to be useful for the study of other bony fish species because of the difficulty of finding permanent and identifiable marks.
External tags: for example, acoustic tags. Acoustic monitoring is performed by using acoustic receivers (passive or mobile) which record the presence of fishes previously tagged with an acoustic transmitter. Passive monitoring uses moored receivers that record the presence of the tagged fish within a limited range of detection around the receiver.

Some examples in the Mediterranean Sea:
NW Mediterranean (Mallorca Island, Spain), *Serranus cabrilla* (Serranidae) (Alos et al., 2011)
Palma Bay MPA, Mallorca Island, *Serranus scriba* (Serranidae) (March et al., 2010)
Palma Bay MPA, *Xyrichtys novacula* (Labridae) and *Diplodus vulgaris* (Sparidae) (Alos et al., 2012)
Palma Bay MPA, *Diplodus annularis* (Sparidae) (March et al., 2011)
Corsica, France, *Sarpa salpa* (Sparidae) (Jadot et al., 2002; 2006)
Lampedusa Marine Reserve, Italy, *Sparisoma cretense*, (Scaridae) (La Mesa et al., 2012)
Cerbère-Banyuls Marine Reserve, France, *Epinephelus marginatus* (Serranidae) (Pastor et al., 2009). The smaller individuals moved more than the larger ones but all individuals had their home range inside the MPA.
Mediterranean MPAs: Carry-le-Rouet, Banyuls, Medes, Cabrera, Tabarca, Cabo de Palos, NW Mediterranean Sea (France and Spain), *Epinephelus marginatus* (Serranidae) (Hackradt et al., 2014) (Females present smaller home range than males).

The COHENET project (Achieving coherent networks of marine protected areas: analysis of the situation in the Mediterranean Sea) funded by the European Commission in 2018-19 provided a Coherence Analysis applied to the **MPAs of the Adriatic Sea** as a case study.

Following the European Marine Board (Olsen et al., 2013) the study of connectivity is often stronger focused on key species, ecosystem engineer species and species with explicit legal requirements (e.g., red listed species).

References

Benestan L et al. 2021 Restricted dispersal in a sea of gene flow. Proc. R. Soc. B 288: 20210458. https://doi.org/10.1098/rspb.2021.0458

Boero F., Foglini F., Fraschetti S., Goriup P., Macpherson E., Planes S., Soukissian T., The CoCoNet Consortium (2017). CoCoNet: Towards coast to coast networks of marine protected areas (from the shore to the high and deep sea), coupled with sea-based wind energy potential. SCIRES Vol 6, Supplement (2016), I-II e-ISSN 2239-4303, DOI 10.2423/i22394303v6SpI

Calò, A., Félix-Hackradt, F.C., Garcia, J., Hackradt, C.W., Rocklin, D., Treviño Otón, J., Charton, J.A.G., 2013. A review of methods to assess connectivity and dispersal between fish populations in the Mediterranean Sea. Advances in Oceanography and Limnology 4, 150–175. https://doi.org/10.1080/19475721.2013.840680

Catchpole R. (2012). Ecological Coherence Definitions in Policy and Practice - Final Report. Contract Report to Scottish Natural Heritage, No. 41102

Claudet J., Loiseau C., Sostres M., Zupan M. (2020). Underprotected Marine Protected Areas in a Global Biodiversity Hotspot. One Earth 2, 380–384 April 24, 2020 https://doi.org/10.1016/j.oneear.2020.03.008

Convention on Migratory Species (CMS). 2020. Resolution 12.26 (Rev.13) "Improving Ways of Addressing Connectivity Conservation of Migratory Species" adopted 22 February 2020 by the 13th Conference of the Parties in Gandhinagar, India. https://www.cms.int/sites/default/files/document/cms_cop13_res.12.26_rev.cop13_e.pdf .

Di Franco, A., Coppini, G., Pujolar, J.M., De Leo, G.A., Gatto, M., Lyubartsev, V., Melià, P., Zane, L., Guidetti, P., 2012. Assessing Dispersal Patterns of Fish Propagules from an Effective Mediterranean Marine Protected Area. PLoS ONE 7, e52108. https://doi.org/10.1371/journal.pone.0052108

Juffe-Bignoli D, Brooks TM, Butchart SHM, Jenkins RB, Boe K, Hoffmann M, et al. (2016) Assessing the Cost of Global Biodiversity and Conservation Knowledge. PLoS ONE 11(8): e0160640. doi:10.1371/journal.pone.0160640

Giakoumi, S., Sini, M., Gerovasileiou, V., Mazor, T., Beher, J., Possingham, H.P., Abdulla, A., Çinar, M.E., Dendrinos, P., Gucu, A.C., Karamanlidis, A.A., Rodic, P., Panayotidis, P., Taskin, E., Jaklin, A., Voultsiadou, E., Webster, C., Zenetos, A., Katsanevakis, S. (2013). Ecoregion-Based Conservation Planning in the Mediterranean: Dealing with Large-Scale Heterogeneity. PLoS ONE 8, e76449. https://doi.org/10.1371/journal.pone.0076449

Gomei M., Abdulla A., Schröder C., Yadav S., Sánchez A., Rodríguez D., Abdel Malek D. (2019). Towards 2020: how Mediterranean countries are performing to protect their sea. 38 pages.

Grorud-Colvert, K., Sullivan-Stack, J., Roberts, C., Constant, V., Horta e Costa, B., Pike, E.P., Kingston, N., Laffoley, D., Sala, E., Claudet, J., Friedlander, A.M., Gill, D.A., Lester, S.E., Day, J.C., Gonçalves, E.J., Ahmadia, G.N., Rand, M., Villagomez, A., Ban, N.C., Gurney, G.G., Spalding, A.K., Bennett, N.J., Briggs, J., Morgan, L.E., Moffitt, R., Deguignet, M., Pikitch, E.K., Darling, E.S., Jessen, S., Hameed, S.O., Di Carlo, G., Guidetti, P., Harris, J.M., Torre, J., Kizilkaya, Z., Agardy, T., Cury, P., Shah, N.J., Sack, K., Cao, L., Fernandez, M., Lubchenco, J., 2021. The MPA Guide: A framework to achieve global goals for the ocean. Science 373, eabf0861. https://doi.org/10.1126/science.abf0861

Hackradt, C.W., García-Charton, J.A., Harmelin-Vivien, M., Pérez-Ruzafa, Á., Le Diréach, L., Bayle-Sempere, J., Charbonnel, E., Ody, D., Reñones, O., Sanchez-Jerez, P., Valle, C., 2014. Response of Rocky Reef Top Predators (Serranidae: Epinephelinae) in and Around Marine Protected Areas in the Western Mediterranean Sea. PLoS ONE 9, e98206. https://doi.org/10.1371/journal.pone.0098206

La Mesa, G., Salvati, E., Agnesi, S., Tunesi, L., 2017. Assessment of coastal fish assemblages before the establishment of a new marine protected area in central Mediterranean: its role in formulating zoning proposal. Mediterranean Marine Science 18, 11. https://doi.org/10.12681/mms.1788

Lausche B., Laur A., Collins M. (2021). Marine Connectivity Conservation 'Rules of Thumb' for MPA and MPA Network Design. Version 1.0. IUCN WCPA Connectivity Conservation Specialist Group's Marine Connectivity Working Group.

Lieberknecht, L. M., Mullier, T. W., and Ardron, J. A. (2014) Assessment of the ecological coherence of the UK’s marine protected area network. A report prepared for the Joint Links.

Meehan, M.C., Ban, N.C., Devillers, R., Singh, G.G., Claudet, J., 2020. How far have we come? A review of MPA network performance indicators in reaching qualitative elements of Aichi Target 11. CONSERVATION LETTERS 13. https://doi.org/10.1111/conl.12746

Olsen EM, Johnson D, Weaver P, Goñi R, Ribeiro MC, Rabaut M, Macpherson E, Pelletier D, Fonseca L, Katsanevakis S, Zaharia T (2013). Achieving Ecologically Coherent MPA Networks in Europe: Science Needs and Priorities. Marine Board Position Paper 18. Larkin, KE and McDonough N (Eds.). European Marine Board, Ostend, Belgium.

O’Leary, B.C., Brown, R.L., Johnson, D.E., von Nordheim, H., Ardron, J., Packeiser, T., Roberts, C.M., 2012. The first network of marine protected areas (MPAs) in the high seas: The process, the challenges and where next. Marine Policy 36, 598–605. https://doi.org/10.1016/j.marpol.2011.11.003

Rees, S.E., Pittman, S.J., Foster, N., Langmead, O., Griffiths, C., Fletcher, S., Johnson, D.E., Attrill, M., 2018. Bridging the divide: Social-ecological coherence in Marine Protected Area network design. Aquatic Conserv: Mar Freshw Ecosyst 28, 754–763. https://doi.org/10.1002/aqc.2885

Schreckenberg, K., Franks, P., Martin, A., Lang, B., 2016. Unpacking equity for protected area conservation. PARKS 22, 11–28. https://doi.org/10.2305/IUCN.CH.2016.PARKS-22-2KS.en

United Nations, 2019. Notification to the Parties, Ecological connectivity in the POST-2020 global biodiversity framework . https://www.cms.int/en/news/notifications