INFORMATION SHEET

Policy brief: "Planning and managing networks of Marine Protected Areas in a changing climate"

Charlotte Johnston of Crangon Ltd. was contracted on behalf of BiodivERsA by the Royal Belgian Institute of Natural Sciences to produce a policy brief based on the results of the following research projects funded by BiodivERsA: RESERVEBENEFIT and MARFOR (BiodivERsA call 2015-2016), REEF-FUTURES (BiodivERsA call 2017-18) and BUFFER (BiodivERsA call 2011-12).

Knowledge and methodology used

The brief extracts and summarises some key results of the above projects and provides a list of relevant policy recommendations linked to current EU policy processes.

The brief was drafted by Charlotte Johnston in consultation with the BiodivERsA Policy Briefs Working Group and the leaders of each of the research projects. An initial outline brief was provided by the BiodivERsA secretariat including outputs from a workshop with the researchers. The outline included proposed policy recommendations and references to published papers resulting from the research projects and those in the late stages of publication.

Lead researchers from each of the projects identified the list of published papers on which the brief is based, and also which papers supported the key messages in particular.

Quality control

An initial and advanced draft of the brief was reviewed by the Policy Briefs Working Group and the research partners; and comments and suggestions made were addressed.

BiodivERsA funded research project contacts

RESERVEBENEFIT: Evaluating and managing connectivity in a network of Marine Protected Areas to maintain genetic diversity and deliver fish beyond protected limits

Contact : Stephanie MANEL – Ecole Pratique des Hautes Etudes, PSL, Centre d'Ecologie Fonctionnelle & Evolutive, Montpellier, France.

MARFOR: Functional variability and dynamics of responses of marine forests to global change.

Contact: Ester SERRAO – University of Algarve, CCMAR, Gambelas, 8005-139 Faro, Portugal.

BUFFER: Partially protected areas as buffers to increase the linked social-ecological resilience

Contact: Joachim Claudet –National Centre for Scientific Research, CRIOBE, Paris, France

REEF-FUTURES: The futures of reef services in the Anthropocene

Contact: David Mouillot – Ecole Pratique des Hautes Etudes, PSL, Centre d'Ecologie Fonctionnelle & Evolutive, Montpellier, France.

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Published results supporting the brief

RESERVEBENEFIT:

Benestan L, Fietz K, Loiseau N, Guerin P-E, Trofimenko EP, Ruehs S, Schmidt C , Rath W, Biastoch A, Pérez-Ruzafa A, Baixauli P, Forcada A, Arcas E, Lenfant P, Mallol S, Goñi R, Velez L, Höppner M, Kininmonth S, Mouillot D, Puebla O & Manel S. 2021 Restricted dispersal in a sea of gene flow. Proceedings of the Royal Society B, 288, 20210458. https://doi.org/10.1098/rspb.2021.0458

Boulanger E, Loiseau N, Valentini A, Arnal V, Boissery P, Dejean T, Deter J, Guellati N, Holon F, Juhel J-B, et al. 2021. Environmental DNA metabarcoding reveals and unpacks a biodiversity conservation paradox in Mediterranean marine reserves. Proceedings of the Royal Society B: Biological Sciences 288:20210112. https://doi.org/10.5061/dryad.18931zcx1

Fietz K, Trofimenko E, Guerin P-E, Arnal V, Torres-Oliva M, Lobréaux S, Pérez-Ruzafa A, Manel, W & Puebla O. 2020 New genomic resources for three exploited Mediterranean fishes. Genomics, 112(6), 4297-4303. https://doi.org/10.1016/j.ygeno.2020.06.041

Kininmonth S, Weeks R, Abesamis RA, Bernardo LPC, Beger M, Treml E, Williamson D, Pressey R. 2019 Strategies in scheduling marine protected area establishment in a network system. Ecological Applications; 29(1). https://doi.org/10.1002/eap.1820

Manel S, Loiseau N, Andrello M, Fietz K, Goñi R, Forcada A, Lenfant P, Kininmonth S, Marcos C, Marques V, Mallol S, Pérez-Ruzafa A, Breusing C, Puebla O & Mouillot D. 2019a Long-Distance Benefits of Marine Reserves: Myth or Reality? Trends in Ecology & Evolution, 34(4), 342-354. https://doi.org/10.1016/j.tree.2019.01.002

Manel S, Loiseau N, Puebla O. 2019b Long-distance marine connectivity: poorly understood but potentially important. Trends in Ecology & Evolution, 34, 688-689. https://doi.org/10.1016/j.tree.2019.05.011

Manel S, Guerin PE , Mouillot D, Blanchet S, Velez L, Albouy C, Pellisser L. 2020 Global determinants of freshwater and marine fish genetic diversity. Nature Communications, 11(1): 692. https://www.nature.com/articles/s41467-020-14409-7

MARFOR:

Assis J, Serrao EA, Coelho N, Tempera F, Valero M, Alberto F. 2018. Past climate changes and strong oceanographic barriers structured low latitude genetic relics for the golden kelp Laminaria ochroleuca. Journal of Biogeography. https://doi.org/10.1111/jbi.13425

Buonomo R, Chefaoui RM, Bermejo Lacida R, Engelen AH, Serrao EA, Airoldi L. 2018 Predicted extinction of unique genetic diversity in marine forests of Cystoseira spp. Marine Environmental Research https://doi.org/10.1016/j.marenvres.2018.04.013

Chefaoui RM, Serebryakova A, Engelen AH, Viard F, Serrao EA. 2019. Integrating reproductive phenology in ecological niche models changed the predicted future ranges of a marine invader. Diversity and Distributions 25:688-700, https://doi.org/10.1111/ddi.12910

Mota CF, Engelen AH, Serrao EA, Coelho MAG, Marba N, Krause-jensen D, Pearson GA. 2018 Differentiation in fitness-related traits in response to elevated temperatures between leading and trailing edge populations of marine macrophytes. PLoS ONE 13(9): e0203666, https://doi.org/10.1371/journal.pone.0203666

BUFFER:

Horta e Costa B, Claudet J, Franco G, Erzini K, Caro A, Goncalves E. 2016. A regulation-based classification system for Marine Protected Areas MPAs. Marine Policy 72, 192-198. https://doi.org/10.1016/j.marpol.2016.06.021

Zupan M, Fragkopoulou E, Claudet K, Erzini K, Horta e Costa B, Goncalves EJ. 2018. Marine partially protected areas: drivers of ecological effectiveness. Frontiers in Ecology and the Environment, 16(7), 381-387. https://doi.org/10.1002/fee.1934

REEF-FUTURES:

Cinner JE, Zamborain-Mason J, Gurney GG et al. 2020. Meeting fisheries, ecosystem function and biodiversity goals in a human-dominated world. Science 368(6488), 307-311. https://science.sciencemag.org/content/368/6488/307

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