

## Editorial

# Pressures and impacts on structure, functioning and services in marine, terrestrial, and transitional ecosystems

Fausto Manes<sup>1</sup>, Salvatrice Vizzini<sup>2</sup>, Elvira Buonocore<sup>3</sup>, Monia Renzi<sup>4,5</sup>, Pier Paolo Franzese<sup>\*3</sup>

<sup>1</sup> Department of Environmental Biology, Sapienza University of Rome, Italy.

<sup>2</sup> Department of Earth and Marine Sciences, University of Palermo, Palermo, Italy.

<sup>3</sup> UNESCO Chair on “Environment, Resources and Sustainable Development”, Department of Science and Technology, Parthenope University of Naples, Naples, Italy.

<sup>4</sup> Bioscience Research Center, Orbetello, Italy.

<sup>5</sup> Department of Life Science, University of Trieste, Trieste, Italy.

\*Corresponding author e-mail: [pierpaolo.franzese@uniparthenope.it](mailto:pierpaolo.franzese@uniparthenope.it)

---

### 1. Introduction

Healthy, resilient, and diverse ecosystems are capable of generating the biotic and abiotic components of natural capital, providing a bundle of ecosystem services vital for human well-being (Buonocore et al., 2018, 2019; Marando et al., 2019; Vihervaara et al., 2019). Natural capital stocks and ecosystem services flows directly and indirectly support socio-economic systems, while their exploitation by human activities releases waste and emissions in the environment. Increasing pressures and impacts of human activities cause habitat degradation, biodiversity loss, and local and global changes in natural ecosystems, seriously threatening their capacity to provide benefits to humans (Cardinale et al., 2012; De Marco et al., 2019; Franzese et al., 2018; Martínez-Crego et al., 2020; Pauna et al., 2019; Ulgiati et al., 2010).

The interaction between natural and socio-economic systems has been discussed through the concept of “ecosystem services cascade” (Potschin-Young et al., 2018), showing how ecological structures and functioning are linked to societal values. Integrated approaches capa-

ble of assessing ecological and socio-economic aspects are much needed to sustainably exploit natural capital stocks, ensuring the delivery of ecosystem services in the long run (Folke, 2006; Franzese et al., 2008, 2020; Picone et al., 2020; Skaf et al., 2019, 2020).

Over the past decade, there have been increasing research efforts to assess the biophysical and economic value of natural capital and ecosystem services in natural and human-dominated ecosystems, also exploring how these values can be addressed into decision making (Blasi et al., 2017; Buonocore et al., 2020a,b; Franzese et al., 2017; Pauna et al., 2018; Picone et al., 2017).

The implementation of sustainable management strategies requires the assessment of environmental costs, impacts, and benefits associated with the exploitation of natural ecosystems (Franzese et al., 2015; Häyhä and Franzese, 2014). In this regard, the implementation of multicriteria assessment frameworks capable of assessing pressures and impacts on natural capital and ecosystem services will support managers and policy makers towards an adaptive management approach.

## 2. Goal of the special issue

Given this premise, the special issue will gather theoretical, methodological, and applied papers focusing on the assessment of pressures and impacts on structure, functioning and services in marine, terrestrial, and transitional ecosystems.

## 3. Papers presented in the special issue

Most of the articles included in this special issue were presented at the XXIX Congress of the Italian Society of Ecology (SIte) in 2019. The special issue includes 8 articles, summarized as follows.

Mangoni et al. (2020) focused on the ecosystem services generated by transitional waters and investigated the effects of the freshwater input of the Po river on primary production processes in a coastal area influenced by the plume dispersion. Pepi et al. (2020) assessed the production of methylmercury by sulphate-reducing bacteria in sediments from a coastal lagoon in presence of high macroalgal loads. Rendina et al. (2020) provided a quantitative assessment of the anthropic pressures due to marine litter and lost fishing gears in six sites off the Campania Coast (Tyrrhenian Sea) characterized by different rhodolith covers. Donnarumma et al. (2020) evaluated the bathymetrical and temporal variations in soft-bottom molluscan assemblages in a polluted coastal area of the Gulf of Naples (Southern Italy). Buonocore et al. (2020c) used a biophysical and trophodynamic model based on the emergy accounting method to assess the value of natural capital stocks for a set of Italian marine protected areas. Signa et al. (2020) investigated macroalgae transplant to detect the occurrence of anthropogenic nutrients in seawater of highly tourist beaches in Mediterranean islands. Bevilacqua et al. (2020) investigated the putative impact of a thermal effluent from one of the largest European coal-fired coastal power plants on sessile assemblages of subtidal rocky reefs. Finally, Galychyn et al. (2020) explored the global scientific literature on urban metabolism to identify knowledge gaps and emerging research areas over the last decades.

## 4. Concluding Remarks

The Guest Editors hope that this volume will contribute to increase the interdisciplinary knowledge on pressures and impacts on structure, functioning and services in marine, terrestrial, and transitional ecosystems.

## Acknowledgement

A special thank is due to all the Reviewers who contributed their time and valuable effort. Without their work and scientific support this special issue would not have been possible.

## References

- Bevilacqua, S., Samsa, C., Terlizzi, A., 2020. The impact assessment of thermal pollution on subtidal sessile assemblages: a case study from Mediterranean rocky reefs. *Ecological Questions* 31(4), 101-110.
- Blasi, C., Capotorti, G., Alós Ortí, M. M., Anzellotti, I., Attorre, F., Azzella, M. M., et al., 2017. Ecosystem mapping for the implementation of the european biodiversity strategy at the national level: The case of Italy. *Environmental Science and Policy*, 78, 173-184.
- Buonocore, E., Picone, F., Russo, G.F., Franzese, P.P., 2018. The scientific research on Natural Capital: A bibliometric network analysis. *J. Environ. Account. Manag.* 6, 381-391.
- Buonocore, E., Picone, F., Donnarumma, L., Russo, G.F., Franzese, P.P., 2019. Modeling matter and energy flows in marine ecosystems using emergy and eco-emergy methods to account for natural capital value. *Ecol. Modell.* 392, 137-146.
- Buonocore, E., Appolloni, L., Russo, G.F., Franzese, P.P., 2020a. Assessing natural capital value in marine ecosystems through an environmental accounting model: A case study in Southern Italy. *Ecological Modelling*, 419, 108958.
- Buonocore, E., Donnarumma, L., Appolloni, L., Miccio, A., Russo, G.F., Franzese, P.P., 2020b. Marine natural capital and ecosystem services: An environmental accounting model. *Ecological Modelling*, 424, 109029.
- Buonocore, E., Russo, G.F., Franzese P.P., 2020c. Assessing natural capital value in the network of Italian marine protected areas: a comparative approach. *Ecological Questions* 31 (4), 67-76.
- Cardinale, B., Duffy, J., Gonzalez, A. et al., 2012. Biodiversity loss and its impact on humanity. *Nature* 486, 59-67.
- De Marco, A., Proietti, C., Anav, A., Ciancarella, L., D'Elia, I., Fares, S., et al., 2019. Impacts of air pollution on human and ecosystem health, and implications for the national emission ceilings directive: Insights from Italy. *Environment International*, 125, 320-333.
- Donnarumma, L., Sandulli, R., Appolloni, L., Ferrigno, F., Rendina, F., Di Stefano, F., Russo G.F., 2020. Bathymetrical and temporal variations in soft-bottom molluscan assemblages in the coastal area facing the Sarno

- River mouth (Mediterranean Sea, Gulf of Naples). *Ecological Questions* 31(4), 53-65.
- Folke, C., 2006. Resilience: The emergence of a perspective for social-ecological systems analyses. *Glob. Environ. Chang.* 16, 253-267.
- Franzese, P.P., Russo, G.F., Ulgiati, S., 2008. Modelling the interplay of environment, economy and resources in Marine Protected Areas. A case study in Southern Italy. *Ecological Questions* 10, 91-97.
- Franzese, P.P., Buonocore, E., Paoli, C., Massa, F., Stefano, D., Fanciulli, G., et al., 2015. Environmental Accounting in Marine Protected Areas: the EAMPA Project. *Journal of Environmental Accounting and Management* 3(4), 324-332.
- Franzese, P.P., Buonocore, E., Donnarumma, L., Russo, G.F., 2017. Natural capital accounting in marine protected areas: The case of the Islands of Ventotene and S. Stefano (Central Italy). *Ecol. Modell.* 360, 290-299.
- Franzese, P.P., Maisto, G., Mangoni, O., Buonocore, E., 2018. Foreword: Biodiversity, ecosystems, and global change. *Ecological Questions*, 29(3).
- Franzese, P. P., Manes, F., Scardi, M., Riccio, A., 2020. Modelling matter and energy flows in the biosphere and human economy. *Ecological Modelling*, 422, 108984.
- Galychyn, O., Buonocore, E., Franzese, P.P., 2020. Exploring the global scientific literature on urban metabolism. *Ecological Questions* 31(4), 89-99.
- Häyhä T., Franzese P.P., 2014. Ecosystem services assessment: A review under an ecological-economic and systems perspective. *Ecological Modelling* 289, 124-132.
- Mangoni, O., Bolinesi, F., Saggiomo, V., Saggiomo M., 2020. Photosynthetic rate and size structure of the phytoplankton community in transitional waters of the Northern Adriatic Sea. *Ecological Questions* 31(4), 11-20.
- Marando, F., Salvatori, E., Sebastiani, A., Fusaro, L., Manes, F., 2019. Regulating ecosystem services and green infrastructure: Assessment of urban heat island effect mitigation in the municipality of Rome, Italy. *Ecological Modelling*, 392, 92-102.
- Martínez-Crego, B., Vizzini, S., Califano, G., Massa-Gallucci, A., Andolina, C., Gambi, M. C., Santos, R., 2020. Resistance of seagrass habitats to ocean acidification via altered interactions in a tri-trophic chain. *Scientific Reports*, 10(1).
- Pauna, V.H., Picone, F., Le Guyader, G., Buonocore, E., Franzese, P.P., 2018. The scientific research on ecosystem services: A bibliometric analysis. *Ecol. Quest.* 29, 1.
- Pauna, V.H., Buonocore, E., Renzi, M., Russo, G.F., Franzese, P.P., 2019. The issue of microplastics in marine ecosystems: A bibliometric network analysis. *Marine Pollution Bulletin* 149, 110612.
- Pepi, M., Leonzio, C., Focardi, S.E., Renzi, M., 2020. Production of methylmercury by sulphate-reducing bacteria in sediments from the orbetello lagoon in presence of high macroalgal loads. *Ecological Questions* 31(4), 21-40.
- Picone, F., Buonocore, E., D'Agostaro, R., Donati, S., Chemello, R., Franzese, P. P., 2017. Integrating natural capital assessment and marine spatial planning: A case study in the Mediterranean sea. *Ecological Modelling*, 361, 1-13.
- Picone, F., Buonocore, E., Claudet, J., Chemello, R., Russo, G.F., Franzese, P.P., 2020. Marine protected areas overall success evaluation (MOSE): A novel integrated framework for assessing management performance and social-ecological benefits of MPAs. *Ocean Coast. Manag.* 198, 105370.
- Potschin-Young, M., Haines-Young, R., Görg, C., Heink, U., Jax, K., Schleyer, C., 2018. Understanding the role of conceptual frameworks: Reading the ecosystem service cascade. *Ecosystem Services*, 29, Part C, 428-440.
- Rendina, F., Ferrigno, F., Appolloni, L., Donnarumma, L., Sandulli, R., Russo, G.F., 2020. Anthropogenic pressure due to lost fishing gears and marine litter on different rhodolith beds off the Campania Coast (Tyrrhenian Sea, Italy). *Ecological Questions* 31(4), 41-51.
- Signa, G., Andolina, C., Mazzola, A., Vizzini, S., 2020. Macroalgae transplant to detect the occurrence of anthropogenic nutrients in seawater of highly tourist beaches in Mediterranean islands. *Ecological Questions* 31(4), 77-88.
- Skaf, L., Buonocore, E., Dumontet, S., Capone, R., Franzese, P. P., 2020. Applying network analysis to explore the global scientific literature on food security. *Ecological Informatics*, 56, 101062.
- Skaf, L., Buonocore, E., Dumontet, S., Capone, R., Franzese, P. P., 2019. Food security and sustainable agriculture in Lebanon: An environmental accounting framework. *Journal of Cleaner Production*, 209, 1025-1032.
- Smith, A.C., Harrison, P.A., Soba, M.P., Archaux, F., Blicharska, M., Egoh, B.N., 2017. How natural capital delivers ecosystem services: A typology derived from a systematic review. *Ecosystem services* 26, 111-126.
- Ulgiati S., Ascione M., Bargigli S., Cherubini F., Federici M., Franzese P.P., et al., 2010. Multi-Method and Multi-Scale analysis of energy and resource conversion and use. In: Barbir, F. and Ulgiati, S. (Eds.), *Energy Options Impacts on Regional Security*. NATO Science for Peace and Security Series – C: Environmental Security, pp. 1-36, Springer. (ISBN: 978-90-481-9567-1; ISSN 1874-6519).
- Vihervaara, P., Franzese, P.P., Buonocore, E., 2019. Information, energy, and eco-exergy as indicators of ecosystem complexity. *Ecological Modelling* 395, 23-27.