

Modelling Ocean Connectivity

Elise Johansen and Margherita Paola Poto

UiT The Arctic University of Norway

Abstract

Regulatory coherence is crucial to effectively respond to the growing pressures that our oceans are facing. Applying the interpretative lens of ocean connectivity to ocean governance can help address the challenges from a material, epistemic, and geopolitical viewpoint. This special issue intends to uncover various understandings of ocean connectivity taking into account the complex biocultural interactions happening in the marine environment. The research aim is divided into two objectives: (1) to explore the various conceptualizations of ocean connectivity; and (2) to provide a critical analysis on how the law (of the sea) considers or disregards ocean connectivity. Our research methodology combines a literature review and a mapping technique that examines the models of connectivity. The mapping technique has been developed by adopting the ‘one-pager approach’, where the authors have been asked to answer two research questions, aligned with our research objectives. We structured the work into an introductory section and three main articles. The understanding of ocean connectivity is key to developing international marine policy and suggesting legal tools for the protection of the marine environment. Moving from this angle towards an understanding of connectivity which includes bio-centric elements, Indigenous cosmo-visions, and anthropocentric connectivity, we identified three models of connectivity and explored their suitability to address the systemic challenges.

Keywords: *ocean governance, challenges, connectivity, models, mapping, legal implications*

The ocean ecosystem is facing challenges that can be classified as *material* (connected to climate change, ocean acidification, overfishing, increased shipping traffic), *epistemic* (linked to the fragmentation and the dichotomy of the current regulatory framework, due to the emergence of ecological models versus sovereignty models), and *geopolitical* (driven by environmental changes and state practices). Legal researchers are interrogating themselves on the need to explore and develop responsible approaches to such challenges. Therefore, this article examines how to provide a common framework to address such challenges, from a law of the sea and ocean governance¹ perspective. Our research aims to investigate and explore ocean connectivity to gain a broader understanding that calls into question

the problematic, mainstream narrative based on oceanic divisions. Such a narrative is reflected in the *epistemic* regulatory fragmentation and the *geopolitical* logic of state sovereignty over the sea (as foregrounded in the UN Convention on the Law of the Sea). It does not enable the system to be effectively responsive to the current *material* challenges that the oceans face. Outlining a conceptual framework of ocean connectivity will help achieve two major objectives: (1) to build a knowledge-base on ocean connectivity and its biological, ecological, socio-economic, and ultimately regulatory implications; (2) to provide a critical review of how the law (of the sea) and governance consider or disregard ocean connectivity. Our methodology involves exploratory and secondary research, which informs our conceptual framework. We have conducted a literature review of the marine sciences and the law relevant to our subject matter and performed an analysis of the researcher-participant (and coauthors of this contribution) in-depth interviews, deeming this practice the “one-pager approach”. The researcher-participants were asked to answer questions that aligned with our research objectives. The format in which the research findings were reported and recorded formed the conceptual framework’s building blocks. We have mapped the outcomes of the one-pager interviews to produce a critical matrix (still in its exploratory phase) of the different ocean connectivity models relevant to tackling the current ocean governance challenges. In our conceptual framework, we have identified three models of ocean connectivity relevant to design responses to the material, epistemic, and geopolitical challenges that the law of the sea is facing. We use the term “model” here to refer to a systematic categorization of processes, orders, patterns and value-sets that can be used as a basis for understanding, interpreting and offering concrete responses to the described (material, epistemic and geopolitical) challenges. Each model contains an overview of its distinct characteristics and has been critically appraised to show the benefits and downfalls respectively.

The first model of connectivity is related to the marine-biology centric definition (Model 1). It relies on the concept of migratory connectivity from the natural sciences to inform area-based management approaches and governance. This model is useful when reflecting on climate actions and strategies, the effectiveness of an ecosystem, and the governance of areas beyond national jurisdiction. Many examples from this first model are provided in the subsections of Article 1. Exploring the applicability of this first model of connectivity sheds light on how to respond to the *material* challenges posed by climate change, ocean acidification, overfishing, and increased shipping traffic through the marine ecosystem. It is noteworthy that the inclusion of this model as a response to the material challenges is already part of the debate regarding the ecosystem approach to ocean management, area-based management approaches and governance beyond national jurisdictions.

The second ocean connectivity model draws on Indigenous worldviews² and emphasizes marine-biological connectivity elements parallel to Model 1 (Model 2). The observations on the interconnectedness of land, sea, peoples, and animals

inform the value-sets, laws, and ruling principles of the Indigenous communities that directly depend on the marine environment for their survival. Examples of the Indigenous connectivity model from different regions of the world (Oceania and the Arctic) are found in the subsections of Article 2. Exploring such connectivity can contribute to developing a regulatory framework that is inclusive of the marine people's worldviews, oriented to the protection and stewardship of the oceans, and recasts the relationship between humans and the natural world in terms of symbiosis rather than domination and sovereignty. For these reasons, in our view, Model 2 helps address the *material*, *epistemic* and *geopolitical* challenges (especially from the viewpoint of ocean justice) that the law of the sea and ocean governance are currently facing.

The third model of connectivity still implicitly presupposes that connectivity based on human activities at sea is a key consideration when addressing ocean challenges (Model 3). In this third model, connectivity relies on values and principles, contributing to the development of law, for example, by providing definitions to contested terms of human socio-economic interactions within maritime security. Examples from the analysis of places of refuge, energy law, and regulation of shipping in the Arctic enrich the overall model's description in the subsections of Article 3. In the final subsection of Article 3, the authors reflect on how the narrative of anthropocentric connectivity may help re-imagine the way to address some of the systemic challenges. For instance, acknowledging the existence of competing and converging approaches in the human-built and human-conceived connectivity model helps address *geopolitical* challenges in the law of the sea and encourages reflection on the relationship between sovereignty and connectivity.

The three articles follow the same structure: a short introduction of the model's characteristics, followed by an application of the model on selected law of the sea issues, and ending with some concluding remarks and observations. By following the same structure and by asking the same research questions, the three articles provide a coherent overview of the various conceptualizations of ocean connectivity and a critical analysis of how the law (of the sea) considers or disregards ocean connectivity.

Our findings suggest that there is a need for accommodating ocean connectivity not only in the interpretation and implementation of the existing law (of the sea), but also in its further development. Facing the systemic challenges of the ocean ecosystems requires a coherent international legal framework that acknowledges the scientific imperative of ocean connectivity, greater recognition of Indigenous peoples' knowledge, and a systematization of best practices of human connectivity. An inclusive regulatory approach that integrates the scientific knowledge on ocean connectivity and the Indigenous peoples' holistic views of the marine space, can help fill regulatory gaps and address systemic challenges. The same argument can be made for a broader understanding of the concept of anthropocentric connectivity. The three articles agree on a common observation regarding ocean connectivity: its

exclusion or disregard in ocean decision-making is detrimental to both oceans and people.

This unprecedented effort to systematize the expertise of the law of the sea through the lens of ocean connectivity has the merit to develop a knowledge base for future research towards integrated and coherent regulatory solutions to the systemic challenges, beneficial to both oceans and people.

NOTES

1. The law of the sea and ocean governance are here used interchangeably.
2. We are aware that this “human-built” or “human-perceived” model has commonalities with the third model. Even though we acknowledge the human component in the second model, we keep the two models separate for now, noting how they follow different processes to reach an understanding of connectivity and develop societal rules around this understanding. The way that Indigenous peoples “live” ocean connectivity and depend profoundly on it, economically, spiritually, and culturally, is difficult to capture in theoretical abstractions and in the scientific approaches of the other models.