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# **Promoting Blue Growth through Ocean Multi-Use: critical insight for governing, steering and managing the Blue Realm**

## **Stream 3 : Governing, Steering and Managing the Blue Realm**

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Defined as the intentional joint use of resources in close geographic proximity by complementary marine uses or users [1,2], ocean multi-use recently emerged as a marine policy concept promoting Blue Growth [3,4]. This novel idea gained popularity over the last decade among scientists and marine planners in Europe. Several projects are currently dedicated to foster multi-use and to streamline it into marine spatial planning policies. Theoretically, combining marine uses is a rationale and integrated approach to maritime spaces' management maximizing economical profits while reducing conflicts and supporting sustainable development. In practice, it mainly supports the development of new ocean uses such as marine renewable energies, offshore aquaculture and fishing-based tourism. Therefore, ocean multi-use not only meets Blue Growth's promise, but also current trends shaping marine spaces' appropriation, occupation and exploitation.

The rise of ocean multi-use in marine policies echoes critical debates about limits to Blue Growth. Even if an emerging substantial body of literature on ocean multi-use already exists, this concept remains doubtful when developed in practice: Is it capable to combine economic, social and environmental goals? Is ocean multi-use increasing or reducing spatial pressures on marine spaces? Who are multi-use winners and losers? etc. This paper aims at contributing to feed a debate still in its infancy with Multi-Frame's preliminary results (systematic review of the scientific literature and bibliometric analysis). This project (2020 – 2023) aims at investigating, assessing and promoting multi-use in a global perspective<sup>1</sup>. Firstly, we will trace the history of this concept, explaining the role of science and marine policies in exploring and promoting synergies between human activities at sea. Secondly, we will analyze multi-use rationale by confronting social, economical, environmental and spatial arguments supporting multi-use with the results of applied research projects. We will discuss ocean multi-use narratives within the broader context of the limits to Blue Growth and their implications for governing, steering and managing the blue realm.

### **1. Ocean multi-use: a European concept promoted by marine policies and research programs**

The idea of combining different human activities at sea was first introduced in the early 2000's by German researchers specialized in offshore aquaculture [5–8]. At that time, the opening up of wind farm projects in the North Sea appeared as an opportunity to develop extensive aquaculture: “the solid groundings of wind turbines could serve as attachment points for the aquaculture and become the key of successful commercial cultivation of any offshore aquatic organism” [8]. Moving aquaculture towards open seas was seen as a means to unlock the potential of this activity by taking advantage of more productive environments and overcoming space scarcity, users conflicts and pollution which limited its expansion in coastal water. Beyond the specific combination of aquaculture and wind energy generation, multi-use – which was also

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1 More information about the project can be found on [Multi-frame's webpage](#).

initially called “multiple use” and “multi-functional use” – was conceived as a heuristic concept “meet[ing] the quest of spatial efficiency” [8].

This notion echoes the multiple use management framework which was implemented in the 1980’s in the Great Barrier Reef Marine, applied to numerous marine protected areas (MPAs) around the world<sup>2</sup> [2] and which fostered Marine Spatial Planning (MSP) development. However, there is no direct filiation between these research fields while they are addressing, albeit quite differently, the same issue: ensuring the sustainable long-term coexistence of intensifying and diversifying uses of maritime spaces and their resources. Compared to multiple-use MPAs and MSP, multi-use has a clear economic focus: it aims at identifying and promoting synergies between complementary activities in order to minimize conflicts and maximize economic benefits.

Ocean multi-use had a favorable reception in Europe from political and scientific institutions which participated in legitimating it as scientific object of study as well as a marine policy concept. It was meeting the objectives of emergent integrated marine policies, especially the Blue Growth Strategy. This is particularly evident in the preliminary report on Blue Growth scenarios and drivers [9] which stated that “maritime economic sectors need[ed] to be combined” and that “synergies are not a luxury, but a pre-condition for future growth and development”. Synergies were understood as “situations where several maritime economic activities combined are likely to produce more growth and jobs than the sum of their parts” and classified into 5 categories: shared suppliers, enabling activities, shared (multipurpose) activities, common use of infrastructures and shared input factors. Even if this report didn’t explicitly mention multi-use, it created a favorable background for its future development. The Blue Growth Strategy added consistency to synergies by identifying 5 “blue growth focus areas”, among which the two sectors identified as possible multi-use drivers: marine renewable energies and aquaculture. Furthermore, it highlighted that aquaculture should “meet the concerns of other users of coastal or sea space – for example, by building cages along with offshore wind farms or by integrating multi-trophic aquaculture” [10]. Surprisingly, multi-use concept was not included into the 2014/88/EU MSP Directive. It is only indirectly mentioned when Maritime Spatial Planning is defined as a means of “identifying and encouraging multi-purpose uses, in accordance with the relevant national policies and legislation”<sup>3</sup>. This reveals the post-political nature of multi-use: it is mainly conceived as an economic concept supposed to achieve political goals (boosting economic growth while reducing conflicts at sea).

If the European Commission has been reluctant to give multi-use political recognition, it actively promoted it through its successive research and innovation framework programs<sup>4</sup>. It funded large scale applied research projects investigating, assessing and promoting multi-use. These projects, which involved researchers, engineers and marine planners from all over the continent, instituted multi-use as an emergent object of study. They approached marine uses combinations in two different perspectives. A first series of projects provided innovative multi-purpose offshore platforms designs. Many were based on marine renewable energies (ORECCA<sup>5</sup>, MARINA<sup>6</sup>, H2Ocean<sup>7</sup>, etc.), although a few one included other uses such as aquaculture, tourism and transport (TROPOS<sup>8</sup> and MERMAID<sup>9</sup>). A second series explored potential synergies between co-located

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2 A bibliometric analysis was conducting comparing multiple-use MPAs and multi-use publications. It showed that both research fields are completely distinct in terms of social and institutional networks.

3 Article 19.

4 FP7 (2010 – 2013), Horizon 2020 (2014 – 2020) and Horizon Europe (2021 – 2027).

5 Offshore Renewable Energy Conversion Platforms – Coordination Action (2010 – 2011).

6 Marine Renewable Integrated Application Platform (2010 – 2014).

7 Development of a wind-wave power open sea platform equipped for hydrogen generation with support for multiple users of energy (2012 – 2014).

8 Modular Multi-use Deep Water Offshore Platform Harnessing and Servicing Mediterranean, Subtropical and Tropical Marine and Maritime Resources (2012 – 2015).

9 Innovative Multi-purpose Offshore Platforms (2012 – 2015).

marine uses. MARIBE<sup>10</sup> focused on combinations of the 5 Blue Growth sectors (marine renewable energies, aquaculture, tourism, biotechnology and deep sea mining) and engaging companies in nine experimental business models. MUSES<sup>11</sup> investigated multi-use opportunities and constraints by assessing 7 case studies involving 16 distinct combinations. This particular project included fishing-based tourism – or *pescatourism* – drawing greater attention on a practice which had emerged two decades before in the Mediterranean and was encouraged through the European Maritime and Fisheries Fund [11]. In general terms, it relied on a broad conception of multi-use, characterized as the “intentional joint use of resources in close geographic proximity” [1]. This definition, which is now considered as sound reference by researchers and marine planners [2], transformed multi-use into global concept applicable to any kind of combination between marine activities and any maritime space. This is the case of Multi-Frame project which ambitions to encourage multi-use not only in Europe, but also in the USA, Brazil and Mozambique. Other definitions highlight multi-use’s economic focus. For instance, Van Den Burg et al characterize it as “combining industries and technologies in ocean spaces” [12] and Dalton et al as “any combination of Blue Growth Sectors, or Blue Growth and Blue Economy sectors” [3].

Ocean multi-use now embraces a wide array of activities and relationships between marine uses. This diversity makes this concept difficult to circumscribe and define, especially since different terms exist to describe marine uses combinations, such as multiple use, co-use or co-location [13]. Some researchers distinguish multi-use platforms (MUP) from multi-use of space (MUS) [14,3,4], other “soft” from “hard” multi-use taking respectively into account the absence or presence of infrastructures [15–19]. Schupp et al. proposed a typology classifying the degree of connection between uses according to functional, provisioning, spatial and temporal criteria [15]. Multi-use diversity can also be sorted out by considering the uses involved, their combinations, their spatial relationships, as well as social, economical and environmental objectives. To do so, we analyzed connections between the keywords in scientific publication related to ocean multi-use. The corpus was created using Scopus to identify all peer-reviewed papers including the words “multi-use” or “multiple use” and “ocean”, “marine” or “sea” in their title, abstract and keywords. All documents were manually checked in order to keep only those which were really dealing with ocean multi-use (46). Besides, *pescatourism* publications (4) which were not labelled as “multi-use” were added into the collection. This corpus was analyzed through Bibliometrix, a R tool designed to explore social, conceptual and intellectual structures of scientific investigation [20]. The figure reveals that there are 3 main keywords clusters, corresponding to different multi-use types, distributed around Marine Spatial Planning.

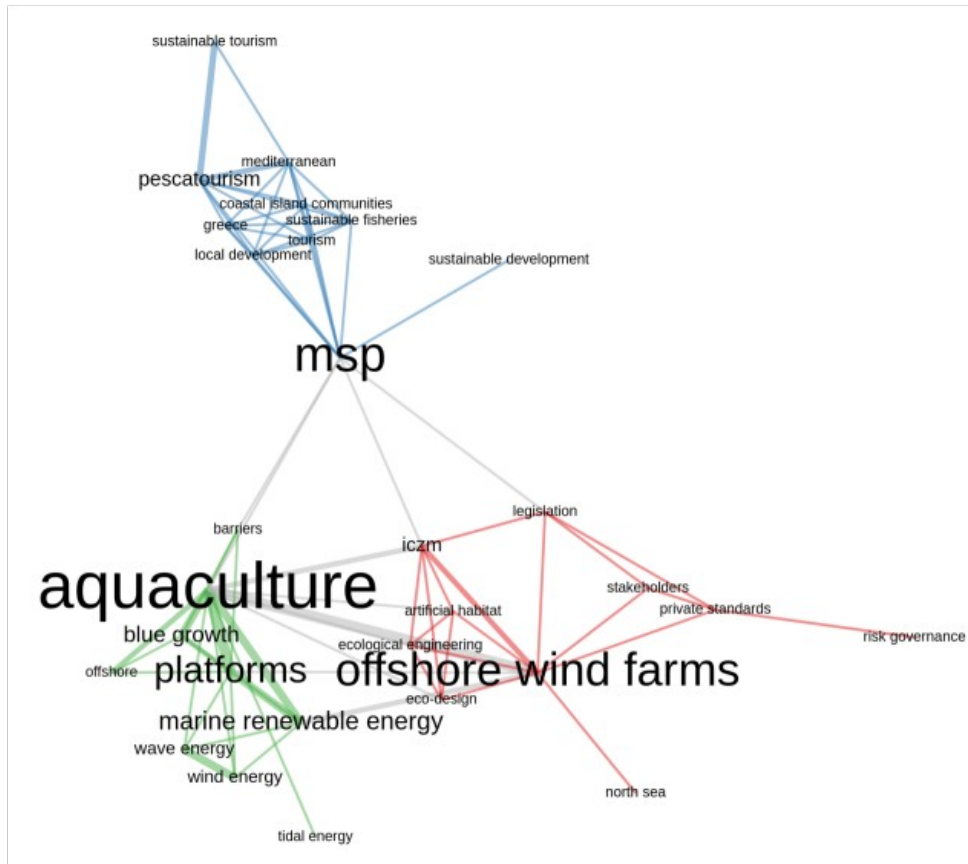
The green cluster is focused on aquaculture, word related to marine renewable energies (wind, wave and tidal), platforms, barriers, the North Sea and blue growth. Following Buck’s pioneering work, researchers study how to unlock aquaculture’s potential by integrating this activity into offshore installations and platforms producing renewable energies. The red cluster, which can be considered as a subtype of the previous one, connects offshore wind farms to eco-design, ecological engineering, integrated coastal zone management, legislation, stakeholders, private standards, etc. It illustrates engineering and management solutions to open wind energy installations to other users. Finally, the blue cluster links *pescatourism*, to sustainable tourism, sustainable fisheries, local development, Mediterranean etc. It highlights the role of tourism as a means to reverse fisheries’ decline and to ensure their sustainable development. This typology corresponds to the two main existing multi-use models in Europe [15]. In the one hand, an industrial multi-use based on marine renewable energies and aquaculture and focused on economic growth which is being developed in the North and Baltic seas, as well as the Northeast Atlantic. In the other hand, a community-based model driven by tourism and oriented towards sustainable development which is common in the Mediterranean and the Southeast Atlantic [19].

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10 Marine Investment for the Blue Economy (2015 – 2016).

11 Multi-use in the European Seas (2016 – 2018).

## AUTHORS KEYWORDS' CO-OCCURRENCE NETWORK SHORT MU COLLECTION



Source : Scopus, 2020

Authors : J. Guyot-Téphany & B. Trouillet (University of Nantes, LETG), Multi-Frame project, 2020

Despite growing scientific interest and political support, ocean multi-use remains, almost two decades after the term was coined, a promise. There are probably more researchers and studies dealing with multi-use than operational cases combining different activities at sea. Therefore, multi-use needs to be considered as a normative concept rather than a descriptive one, supported by socio-political discourses shaped by scientists and marine planners on how to govern and manage maritime spaces. Following this approach, it appears necessary to explore and question its rationale and narratives in order to understand what does it pretend to achieve, how and for who.

## 2. Exploring multi-use economic, social, spatial and environmental rationale

As a marine policy concept, ocean multi-use ambitions to reduce conflicts at sea while boosting economic growth and promoting sustainable environment. After identifying and explaining economic, social, environmental and spatial arguments, we will confront each one with empirical evidences. Even though it is difficult to evaluate something which has proven difficult to translate into reality, experimental and pilots projects already produced results informing multi-use opportunities and challenges. This exercise is extended by a brief discussion on multi-use narratives in the light of critical debates about Blue Growth limits.

Multi-use was encouraged by Blue Growth Policies and economic objectives are critical to this concept. It is very usually stated that multi-use can create new economic opportunities and jobs

by enabling add-on activities (i.e. offshore aquaculture) and supporting the diversification of declining activities (i.e. fishing) [17,4]. At the same time, synergies are very often conceived as a means to achieve economies of scale by sharing common resources, infrastructures, services and knowledge [18], argument which somehow contradicts the previous one. In any case, the lack of robust and systematic economic feasibility studies was identified as a main issue, especially for offshore aquaculture [21] or multi-purpose platforms [3]. In the latter case, Stuver et al revealed that no companies obtained permits and licenses [22] and Dalton et al that there is still no mature business models [3]. Onyango et al conclude that “notions of synergy and efficiency, acknowledged as key benefits of MU, are yet to be sufficiently elaborated, to make the MU concept easier to appreciate and its benefits more explicit [18].

Besides economic benefits, the first reason why scientists and marine planners advocate for multi-use is that combining different activities at sea is a means to reduce user conflicts. The increasing tensions resulting from the diversification and the intensification of human activities at sea are usually considered as a, if not the, great challenge of maritime governance. However, some researchers think competition for space and resources is also “lead[ing] to mutual economic and ecological benefits” [21] and “encourag[ing] innovation and new business models to reduce the potential conflict between resource users and minimize environment impact”[14]. Marine Spatial Planning is often presented as the appropriate framework under which synergies between complementary activities can be identified and promoted [23–25,2,26,4,27]. However, MSP does not systematically consider multi-use as an option which limits its application. To date, member States neither created favorable legal frameworks, except in Italy and Greece where fishing tourism is officially recognized and promoted [11] and the Netherlands where offshore wind companies recently compelled to include other users [32]. Combining different activities does not necessarily lead to cooperation and synergies. Studies already evidenced tensions between or with stakeholders involved in multi-use [23,22,16]. Schupp et al remind that “no management approach can eradicated all conflicts” [2].

The idea that multi-use reduces conflict is often extended by a the assumption that multi-use “represents a radical change from [...] exclusive resource rights to the inclusive sharing of resources by one or more users” [29,2,15,17,18,30]. Unquestionably, the common use of resources is a critical aspect of multi-use concept and projects. However, multi-use systems are usually defined by asymmetric relationships and diverging interests, as reflected by difficulties in creating viable management and governance regimes [22,31]. The ideal of sharing is more doubtful if space is also considered a resource. This is particularly obvious with emergent uses such as offshore wind energy whose expansion usually conflicts with others sectors [4,18] and whose “need [...] to share space or combine on platforms is minimal” [3]. While many researchers state that multi-use is an opportunity to move activities offshore [15,23,32], a study conducted by Van Den Burg et al qualify this statement showing that multi-use potential mainly concentrate within 16 nm from the shore and in waters no deeper than 100 m, that is to say in already crowded spaces [12].

This brief review of literature evidences the potential of multi-use, but also its limits in addressing economic, social, spatial and environmental challenges at sea. Many of these studies are the products of applied research projects led by natural scientists and engineers. They do not fully address socio-political issues related to multi-use implementation: is this concept capable of balancing economic growth and conservation? What kind of interests does it serve? Which stakeholders would benefit and be affected by marine uses combinations? How does it transform the way maritime spaces are appropriated, occupied and used? Etc.

Multi-use has not proven to be really profitable, as reflected by the low number of operational cases. The sectoral and fragmented regional and national legal frameworks have been identified as a major barrier to multi-use. Many researchers and marine planners call for integrated

framework and some for deregulation. So we can wonder what kind of economy does multi-use promotes and to what extent are its objectives compatible with sustainable development. How can space scarcity, conflict users and sustainability can be really addressed if multi-use is mainly looking at unlocking Blue Growth? In many ways, multi-use appears as a means to further intensify and diversify maritime spaces occupation.

It is also important to consider multi-use system within its socio-political and territorial contexts. Many activities involved in multi-use belong to emerging economic sectors (yet powerful) competing for space and resources with established or declining uses such as fisheries. This particularly obvious in Northern Europe where marine renewable energies are developing very quickly. Besides, in many cases multi-use drivers (marine renewable energies, aquaculture or conservation) are fixed activities whose expansion leads to new spatial enclosures, which contradicts multi-use's inclusive and sharing ideal. In this context, multi-use may arise from trade offs between users rather than "win-win" solutions.

## **CONCLUSION**

These questions highlight the need for transdisciplinarity in multi-use studies. Natural and engineering sciences already provided valuable information about bio-physical potential and impacts of combining activities at sea, as well as technical and management solutions to further develop synergies between marine uses and users. In comparison, social sciences have often been limited to investigation techniques such as surveys and interviews. But they are also useful to explore multi-use narratives and their implications for governing, steering and managing the blue realm. Combining disciplines and building bridges between science, policy and society is critical to investigate and promote fair and sustainable forms of synergies between marine uses. The Multi-Frame team tries to implement this approach by developing open source tools to assess, in a global context, stakeholder engagement into multi-use scenarios.

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