# Combining offshore wind farms, nature conservation and seafood: Lessons from a Dutch community of practice

Nathalie A. Steins [a],[*], Jeroen A. Veraart [b], Judith E.M. Klostermann [b], Marnix Poelman [a]

[a] *Wageningen Marine Research, PO Box 77, 4400 AA Yerseke, The Netherlands*
[b] *Wageningen Environmental Research, PO Box 47, 6700 AA Wageningen, The Netherlands*

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A B S T R A C T

Large-scale development of offshore wind farms implies an increase in marine resource use conflicts. Managing potential impacts on marine ecosystems and on resource access for traditional and prospective users is key. Multi-use scenarios are a solution but are often approached as a 'design question' that can be settled through Marine Spatial Planning. In practice, regulatory, technical and socio-economic factors often hinder multi-use. Over-coming such barriers requires active collaboration between all stakeholders, yet meaningful participation in MSP processes often is a challenge. This paper explores the role of Communities of Practice as a participatory tool for developing multi-use. The Netherlands set up a 'Community of Practice North Sea' to stimulate the development of multi-use pilots by bringing interested parties together, sharing experiences and learning from each other in a context of existing and developing spatial and social claims. This development is part of the government's strategy aimed at finding a balance between offshore wind energy development, nature conservation and seafood production. The paper shows that by (partly) decoupling policy from practice and creating a positive learning environment, Communities of Practice have potential as a participatory tool for encouraging cooperation between stakeholders in an informal setting and facilitating a transition towards multi-use of marine resources. The paper proposes ten guidelines for using Communities of Practices as an action-oriented tool for salient multi-use practices.

## 1. Introduction

In the global effort to reduce greenhouse gas emissions and dependency on fossil fuels, eyes increasingly turn to the sea. The development of offshore wind farms (OWFs) is gaining momentum as a source of renewable energy. The European Union (EU) has become a global leader, being responsible for about 90% of global newly finished OWF projects [1]. Offshore renewable energy production has been on its political agenda since 2008, when the European Commission (EC) issued a communication to promote its development [2]. It has now become an integral part of the EU Blue Growth Strategy. Since its adoption, the traditional blue economy landscape [1] has been changing. The installation of OWFs, particularly in the shallow waters of the EU's northern seas, has witnessed an explosive growth [1,3]. OWFs now account for 3% of jobs in the maritime sector [1]. According to the EC, moving wind energy from land to sea is attractive for two reasons. First, wind at sea is steadier, resulting in a higher average capacity factor. Second, OWFs

result in "less threats to cherished landscapes" [1].

The development of OWFs implies challenges. A first is that areas used for OWFs can in principle no longer be used by other users. Fisheries experience direct impacts if OWFs are in their fishing grounds [4–6], but spatial competition may also occur with other traditional uses such as aquaculture, shipping, mineral extraction, oil and gas production, and tourism [6–9]. A second issue are potential effects on the ecosystem, through impacts on seabirds and bats [10–15], fish populations [16], marine mammals [17], displacement effects of fisheries [18], and contamination by chemical emissions and organic compounds [19]. A third concern is that the scaling up of OWFs may result in physical effects: changed wind patterns can, in theory, have major consequences for the stratification of the water column and ultimately marine ecology [20].

While competing spatial claims, ecological and physical impacts have been acknowledged as potential downsides of the scaling up of OWFs, their development also offers opportunities. First, OWFs could

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play a role in nature conservation, providing artificial reef structures for benthic invertebrates and shelter for fish [21–23], and therefore are increasingly promoted as ideal (closed) locations for habitat development [6,11,24–26]. Second, OWFs may be combined with aquaculture [6,27] as an additional supply of seafood for a growing global population [28]. Aquaculture in OWFs could also be an alternative to land based feed production and onshore fossil fuel energy supply, whereby it is assumed that both can be achieved at sea with a lower carbon footprint [29].

In a setting where competition for sea space between multiple uses is an issue, combining wind farms with nature conservation and aquaculture makes for a sound argument [6,7,11,21]. But multi-use [9] appears to be easier said than done, for regulatory, technical and socio-economic reasons [7,8,30–33]. Marine Spatial Planning (MSP) - generally considered to be the mechanism to allocate access to (scarce) marine space by different and often conflicting users within ecologically sustainable boundaries [7,9,34,35] - on its own, seems to fall short of organizing multi-use in practice. One explanation is that MSP deals with problems that can be defined as "wicked" [34]. They involve many different and high stakes, are characterised by different underlying values, have no definitive or objective solutions or answers, and call for trade-offs [36]. Jentoft & Knol [34] argue that "wicked problems can at best be tamed", which involves participation of those affected, cooperation and negotiating solutions. In this sense, MSP in itself is a wicked problem [34]. After all, activities and actions by one user group will directly affect activities and actions of other users, as multiple uses of the same resource are closely interconnected [37]. This leads to the question how in MSP settings, multi-use can be fostered through active stakeholder involvement.

This paper argues that so-called Communities of Practice (COPs) offer a potential way forward. COPs are defined as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" [38]. COPs are informal, self-organising and based on trust, and hence differ from other organisational structures [39] (see Section 2). Based on a case study of the Dutch Community of Practice North Sea [40] (COPNS), it examines the potential contribution of COPs as a tool for stimulating multi-use by balancing multiple interests and initiating pilots and learning. The paper is structured as follows. Section 2 discusses the relevance of social learning in marine multi-use settings and introduces the concept of COPs. Section 3 describes the methodology. Section 4 presents the COPNS case study. Section 5 discusses the findings, followed by conclusions and recommendations in Section 6.

## 2. Fostering multi-use through social learning in COPs

In multi-use scenarios either two or more activities are developed together, or an activity is added to existing activities. Multi-use can be developed by one single user or by several different ones [8]. Schupp et al. [9] developed a typology of four forms of multi-use. The first, multi-purpose or multi-functional use, is characterised by the highest level of connectivity. Different users take place in the same area, at the same time, with shared infrastructure and services. In the second, symbiotic use, users also operate in the same area at the same time, but only share peripheral services and infrastructure. The third form is co-existence or co-location, where users only share the same space at the same time. The fourth form, subsequent use or repurposing, has the weakest connectivity. Uses takes place in the same area but in subsequent order.

Multi-use of marine space is often propagated as a 'technological fix' to a resource allocation problem. From this perspective, the resource allocation issue is approached as a 'design question' that can (at least

partly) be addressed through a planning process, for example by organising efficient and combined use of space. In practice, regulatory and socio-economic hurdles, but also technical challenges, often hinder the implementation of multi-use [7,8,30,31]. Overcoming such barriers requires cooperation between parties involved, not only to negotiate about resource use but also to collectively work towards shared definitions of issues and resolving these together [37]. This implies that multi-use development is not a technocratic but a social process (cf. [32,41]). While MSP approaches are diverse in nature [35], it is commonly recognized that stakeholder participation is an important aspect of organising resource use to realize ecological and socio-economic objectives. This participation often leaves much to be desired. In many cases, participatory processes in MSP are limited to consultation meetings, are dominated by active or elite stakeholders, lack inclusiveness altogether, or are set up post-political decision-making [32,34,42]. In such situations, stakeholder participation is associated with the objective of legitimising management measures and policy decisions rather than jointly working towards salient solutions for (multi-use) resource use allocation. The latter requires active and inclusive cooperation [32,37]. In this process, collaborative or social learning plays a key role [37,43,44]. Glasbergen [45] defines social learning as "a process that can be encouraged by lifting barriers to communication and by encouraging interaction between the parties involved in policy issues. The core idea is that parties can learn from each other by more open and responsive communication".

Social learning is also core to Communities of Practice [46]. Such COPs have three characteristics:

(1) *the domain*: the identity of the COP is defined by a shared interest,
(2) *the community*: members of the COP pursue their interest in the domain through joint activities and discussions, help each other and share information, and
(3) *the practice*: members are practitioners who develop a shared practice [38].

COPs differ from other organisational structures because they are informal and self-organising, and are based on trust. They set their own agenda, establish their own leadership, and have self-selected membership, meaning that people in COPs tend to know if and when they should participate [39]. The practice of such a community is hence a dynamic one and entails learning by everyone [38]. Wenger [46] describes how learning is an interplay between social competence and personal experience. It is a dynamic, two-way relationship between people and the social learning system in which they participate. Participants in COPs learn from and with each other, they do so through formal and informal activities, and they learn from sources both outside and inside the community [47].

Wenger et al. [47] distinguish seven types of activities COPs engage in: (1) exchanges, (2) productive enquiries, (3) building shared understanding, (4) producing assets, (5) creating standards, (6) formal access to knowledge, and (7) visits. Fig. 1 gives a schematic overview of learning processes and (attributes of) activities within COPs. This paper uses the three characteristics and the seven types of activities of COPs (Fig. 1) for the analysis of the case study of the Dutch COPNS (Section 4), and subsequent discussion of the potential contribution of COPs as a participatory tool in working towards multi-use in MSP settings.

## 3. Methodology

The authors carried out a rapid appraisal (RA) [48] into the possibilities for more nature-inclusive OWFs [31]. The RA was commissioned by the Dutch government and involved a combination of a desk study,
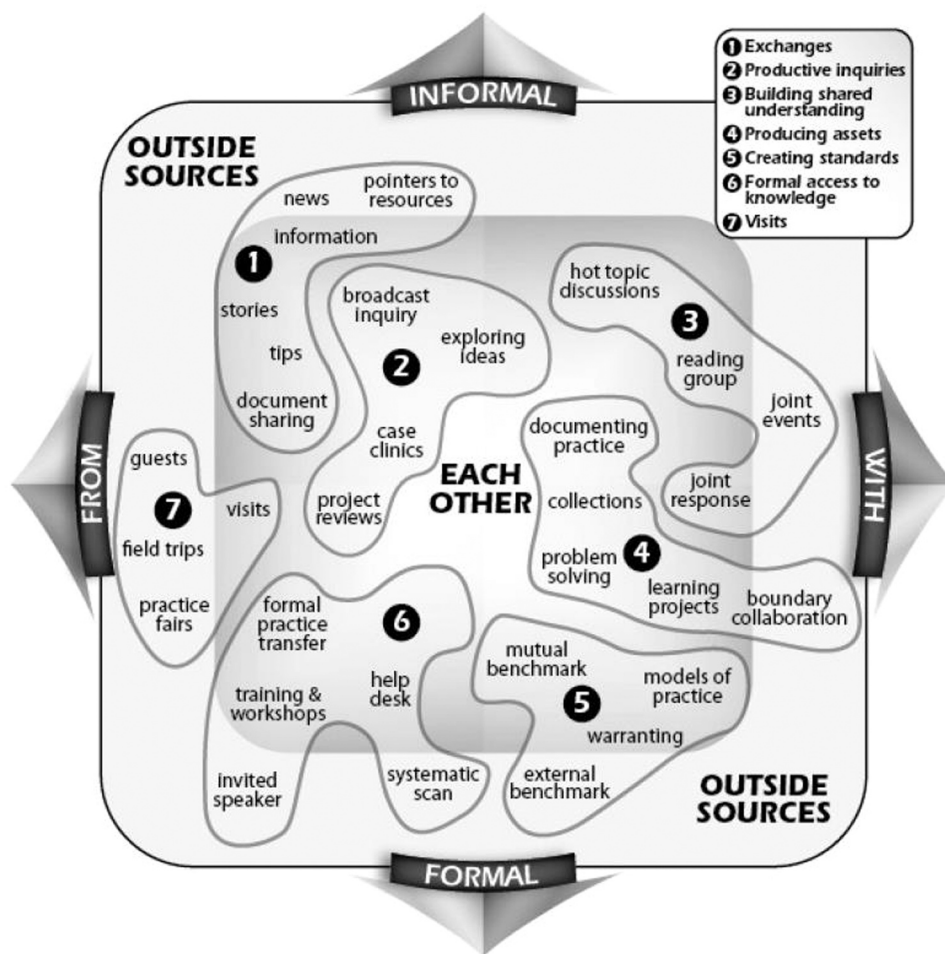
**Fig. 1.** Learning through joint activities in communities of Practice [47].

**Table 1**
Overview of key informant interviews and questionnaire respondents.

| Sector | RA interviews (2017, 2018) | COPNS evaluation (2019), questionnaire (39)[a] |
|---|---|---|
| Energy | 4 | 5 |
| Environmental Non-Governmental Organisations | 2 | 2 |
| Fisheries and aquaculture | 2 | 2 |
| Funding (public, private) | 2 | 3 |
| Maritime contractors | 2 | – |
| Pilot initiatives | 1 | – |
| Policy and regulation | 6 | 8 |
| Recreation and tourism | 1 | 3 |
| Research & consultancy | – | 13 |
| Other | – | 3 |

[a] Distribution list: 320 addresses.

open-ended key informant interviews and a workshop. The literature review [31] and mapping of initiated (multi-use) pilots in the North Sea [49] resulted in an overview of the most important publications on nature-inclusive OWFs, and in a list of opportunities and barriers. In parallel, 20 interviews were conducted (Table 1). Interviews lasted between 30 min and one hour, and results were summarised. All summaries were checked with the informants. During the annual Dutch North Sea Days conference (2017), a workshop was held. Participants explored the possible strategies to cope with the identified barriers and

to valorise the opportunities of multi-use in OWFs.

Following up on the RA, the government initiated the COPNS [40] (originally called Community of Practice Blue Innovation North Sea 2030). The authors were involved in all 7 COPNS meetings taking place in the period 2018–2019. They assisted in preparing, facilitating and reporting of workshops, and presented research findings. The authors' role in the COPNS could be described as participant observation [50] with an active membership [51]. As part of an evaluation and planning of its future agenda, the authors held a survey amongst the COPNS members. An online questionnaire was sent to 320 COPNS members and resulted in 39 responses (Table 1). Almost half of the respondents (48%) had participated in three or more COPNS meetings and 5% in all of them; 37% had participated in less than three meetings, while 10% said they had not yet attended a COPNS meeting. While a total response rate of 12% is too low for statistical analysis [52], results can be used for indicative qualitative analysis and discussion. Findings were shared and discussed during the COPNS meeting of November 2019.

The RA, participant observation during the COPNS, the evaluation of the COPNS combined with Wenger, White & Smith's framework for learning in COPs [47] introduced in the previous section, form the methodological basis for the case study analysis.

## 4. Case study: Dutch Community of Practice North Sea

The Dutch part of the North Sea is one of the busiest marine areas in the EU. The government is planning large-scale OWF development as part of its climate change strategy, with a potential space requirement of

17–26% of its waters by 2050 [53]. The country must also comply with objectives from EU nature conservation regulations and seeks to develop the potential of seafood production. The government's North Sea 2030 strategy aims to find a balance between these objectives [54]. While the government, seafood producers, energy companies and environmental Non-Governmental Organisations (eNGOs) are willing to cooperate in realizing multi-use OWFs, most OWFS are still monofunctional [31]. The COPNS has been set up to share knowledge and experiences in relation to innovations and multi-use pilots. The government is actively providing support to the COPNS to develop more adaptive policies within the framework of its North Sea 2030 strategy.

### 4.1. OWFs in the Dutch North Sea: development and concerns

In 2006 and 2007, the first Dutch OWFs were constructed. Initially, concerns about potential impacts focussed on birds and mammals and were mostly voiced by eNGOs. A first monitoring project commissioned by the government developed into a comprehensive, ongoing programme [55]. In 2013, under supervision of the Dutch Social and Economic Council, the Energy Agreement for Sustainable Growth was signed by 47 stakeholder organisations. They agreed that by 2023, 16% of the Dutch energy supply would be sourced sustainably. This included scaling up OWFs from 957MW in 2017 to 4.5GW by 2023 [56]. In 2017, the government decided to increase OWF capacity to 11.5GW by 2030 as part of a further reduction of $CO_2$ emissions [57]. OWF expansion to 60GW by 2050 was laid down in the Dutch climate agreement of 2018 [29]. By then, concerns about the planned expansion of OWFs were paramount. The fishing industry especially is concerned about socio-economic impacts, due to loss of fishing grounds to OWFs [cf. 4], or as a fisher put it: *"We are being driven away from the North Sea like the Native Americans were from their prairies"* [58].

The government acknowledged concerns of eNGOs and the fishing industry about the potential impacts of large scale OWF development. Particularly ecological impacts are a key agenda item, as The Netherlands are bound to EU nature conservation objectives. If negative impacts would occur and cannot be mitigated, further growth of OWFs is not possible. In addition, the government recognised that the North Sea is an important source of food production for a growing population. With a reduction of available space for fishing, alternative sources of seafood production should be developed. This gave rise to the development of the North Sea 2030 strategy, which aims at balancing the triangle of sustainable energy, resilient ecosystems and future-proof food production [53,54,59] (Fig. 2). As part of this development, the concept of constructing nature inclusive OWFs was introduced.
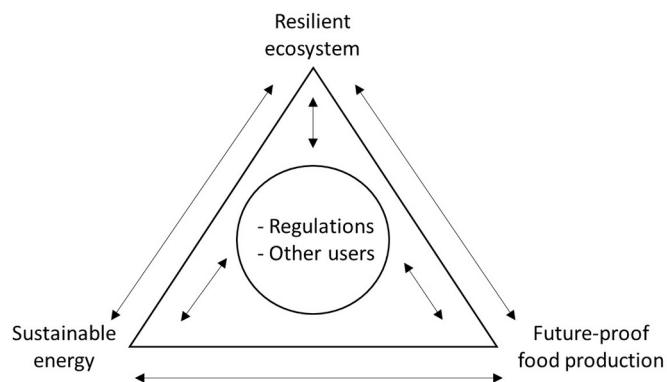


**Fig. 2.** North Sea 2030 strategy triangle.
Adapted from IDON [54].

### 4.2. Nature-inclusive offshore windfarms: opportunities and constraints

A literature review as part of the RA (see Section 2) identified several opportunities and constraints for nature inclusive OWFs (Table 2). These were confirmed in interviews with stakeholders and a workshop (see Section 2). The notion of nature inclusive OWFs resonated with most, but not all, stakeholders. In addition, stakeholders experienced additional barriers preventing concrete steps towards such innovations (Table 2). From the interviews and workshop, it also became evident stakeholders had clear ideas on tackling (a part of) these barriers. For example, all stakeholders agreed that it was time for a Living Lab approach [60]. This would entail an innovative pilot focusing on nature-inclusive design.

The RA resulted in three recommendations. First, the government should explore alternatives for the current so-called 'effort obligation' in the current tendering procedure to trigger more ambitious nature-inclusive design, and use the next OWF tender as a case study to experiment with such alternatives. Second, one or two concrete pilots on nature-inclusive design should be started by aligning current initiatives and making funding available. The third recommendation was to set up a COP to stimulate nature-inclusive OWF pilots [31].

### 4.3. The COP North Sea

The RA identified 30 multi-use initiatives in the Dutch continental shelf, of which 4 were ideas, 8 were in the design phase, 7 were about to start and 11 were in operation; 12 initiatives were located in planned OWFs [49]. For example, the North Sea Farm Foundation experimented with combining seaweed and mussel farming [61]. Several eNGOs worked on separate flat oyster (*Ostrea edulis*) restoration projects within OWFs [26,62]. The Topsector Energy [63] opened a first call to fund public-private partnerships for innovative projects aimed improving the ecological value of OWFs and multi-use OFWs.

The Ministry of Agriculture, Nature and Food Quality (hereafter, the MinANFQ), being strongly involved in the development of the North Sea 2030 strategy, realised that practice was overtaking policy discussions on multi-use. They also felt that coordination and exchange of experience was needed. This resulted in a decision to start the COPNS, or as one policy-maker said: *"bringing a group of people and organisations together who see the urgency and want to achieve results in relation to the North Sea 2030 triangle"* (Fig. 2). The Netherlands Enterprise Agency (RVO) was tasked with its organisation.

In September 2018, the COPNS met for the first time. Over 50 participants attended the first meeting, mainly from the maritime sector, economic branch organisations and research institutes. In the opening address, the government made clear that *"the COP evolves around pilots that experiment with multi-use and investigate the conditions that are necessary to make these pilots work. The objective is to share experiences, discuss potential solutions to barriers, and work together on resolving issues"*. The first meeting focused on how to support entrepreneurs involved in or interested in multi-use pilots, so that needs could be addressed in subsequent COPNS meetings. Three practical examples in relation to setting up multi-use pilots were presented by their initiators. Discussions identified that support was needed to address the constraints related to policy and regulations, funding and risk management outlined in Table 2. Participants pleaded for *"the establishment of a regulation-free innovation zone, a field lab where pilots can be carried out without the cumbersome licensing procedures with various government departments"*. Participants asked for clear direction from the government, prevention of fragmentation, and bundling and focussing efforts.

Seven more COPNS meetings were held until the end of 2019. Fig. 3 provides an overview of COPNS meeting topics. Plenary sessions addressed wider interests, such as OWF and multi-use (Fig. 3, black), policy and regulations (Fig. 3, white), and funding (Fig. 3, diagonal). Parallel workshops had a thematic focus and attracted a more focused group of participants (Fig. 3, dots and horizontal). Some COPNS topics

**Table 2**
Opportunities and constraints of nature inclusive OWFs.

| Opportunities | Constraints |
| --- | --- |
| **Catalyst for nature recovery** | **Current policies and regulations** |
| - monopiles form hard substrates for settlement of sea life [25,61,62] <br> - design scour protection and pipeline constructions can increase biodiversity [24,61,62] <br> - artificial reefs can be established as they are safe from bottom-trawling [7,24,25,61,63,64] | - no vision and encouragement of nature-inclusive construction of OWFs [7,61,65] <br> - no cost-benefits weighing for nature [65] <br> - different perceptions on policy instruments to stimulate multi-use[a] <br> - weak incentive for nature-inclusive measures in tendering procedure for OWF licenses[a] <br> - no clear North Sea nature development goals[a] |
| **Shelter for marine life** | - tension between short-term technological and long-term governance solutions[a] |
| - include resting platforms for seals [61] | **Funding** |
| **Physical border** | |
| - construction of OWFs around nature conservation areas, to form a physical border as trawling and passage of ships over 24 m is not allowed in Dutch OWFs [66] | - lack of funding for pilots [27,61,64] <br> - lack of clarity on distribution of investment costs (energy companies vs others)[a] <br> - lack of clarity about distribution of maintenance and monitoring costs[a] |
| **Multi-use with food production** | **Risk management** |
| - seafood production, potentially in combination with under-water habitat restoration [27,61]. | - safety issues [7,8,61] <br> - liability in case of incidents [7,8,61] |
| | **Challenges related to biodiversity increase** |
| | - marine species attracted to nature-inclusive OWFs are barrier for maintenance [18,61] <br> - risk of introduction of invasive species when developing new reef structures [25] |
| | **Knowledge gaps** |
| | - ecosystem complexity hinders benefits assessment [27,61,64] <br> - economic costs versus ecological benefits[a] |

[a] Findings from literature review indicated between square brackets, additional findings from interviews and workshop indicated with asterisk.
Source: Veraart et al. [31].

recurred over multiple meetings, such as progress in relation to the North Sea 2030 strategy. An important policy development for the COPNS in respect to this strategy was the establishment of a formal North Sea Dialogue (*Noordzee Overleg*) by the Minister for Infrastructure and Water Management. Under supervision of former state secretary Jacques Wallage, the government set out to reach a so-called North Sea Agreement with the main economic users affected by OFW development and eNGOs. The North Sea Agreement should settle a balance between energy production, nature and food production including spatial allocation [59]. It will be the basis for the future policy spatial framework within which users in the North Sea, and thus the COPNS, will have to operate.

COPNs meetings had a steady attendance of between 50 and 70 participants. More than half of the participants were regular attendees, with increasing involvement of eNGOs (personal observations). Depending on the agenda, new participants joined. While organisation and communications were handed over to RVO, the MinANFQ stayed involved, and kept seeking active involvement of colleagues from other ministries and stakeholders and participated in setting the agenda. It also supplied dedicated funding for research addressing knowledge needs of the COPNS [5,11,64–67].

When the COPNS had run for a year, RVO and MinANFQ felt the need to evaluate and discuss future agenda setting. For this evaluation, the authors carried out a questionnaire (Section 2). Most of the respondents (n = 39) valued the meetings as good (51%) or excellent (12%), while 20% scored the meetings as satisfactory; 5% was not satisfied and 10% had no opinion. More importantly, 92% of the respondents felt that the meetings met their needs very well (32%) or well (59%). The questionnaire included a list of all plenary and workshop topics addressed by meetings, and respondents were asked to indicate which topics they found most useful in relation to their daily work. Responses were clustered in five categories (Fig. 3).

Topics about enabling multi-use in OWF, both in terms of the regulatory framework and funding opportunities were considered the most interesting. In relation to multi-use opportunities, restoration of shellfish beds for nature conservation was considered most relevant. Food production topics were scored relatively low except for seaweed

production. However, stakeholders related to food production (fisheries, aquaculture) were less represented amongst the respondents, indicating a potential bias in outcomes.

Government, offshore energy companies and research had strong representation in the questionnaire responses, which could explain why the regulatory framework and funding opportunities for multi-use scored high as useful topics. Most respondents also felt that government representatives were overrepresented, while the private sector (energy companies, fishing industry, water sports and the financial sector) were underrepresented. Educational organisations were mentioned as missing from the public sector.

Respondents had two general motives for attending the COPNS: (1) collaborating, and (2) exploring. Collaborating included networking, bringing one's own interests under the attention of a larger group, influencing the future of the North Sea and related policy, and looking for cooperation with others. Exploring included learning from each other, getting to know the playing field, hearing perspectives of other stakeholders, getting inspiration and ideas from others, and investigating new business opportunities. Half of the respondents considered the emphasis on informing and networking to be useful for the first phase of the COPNS, but for the future felt there should be more focus on matchmaking (targeted networking) towards concrete pilots and interactive sessions with room for sharing of experiences and joint learning on developing multi-use in practice. 70% of the respondents indicated they wanted an active role in the agenda setting and content provision of future meetings.

Respondents suggested a total of 80 topics they would like to see addressed in future COPNS meetings. When clustering these in the five categories used in Fig. 3, policy and regulation stand out as the subject most in demand. Many relevant future topics are like the ones already addressed in past meetings. Also new topics were included within existing categories, such as the carrying capacity of the ecosystem for new uses, cumulative effects of OWFs, how to protect the cultural heritage associated with fisheries, and innovations towards more sustainable and 'animal-friendly' fisheries. Two additional categories emerged. The first, 'infrastructure', included most new topics, such as semi-autonomous vessels (research, monitoring, maintenance),
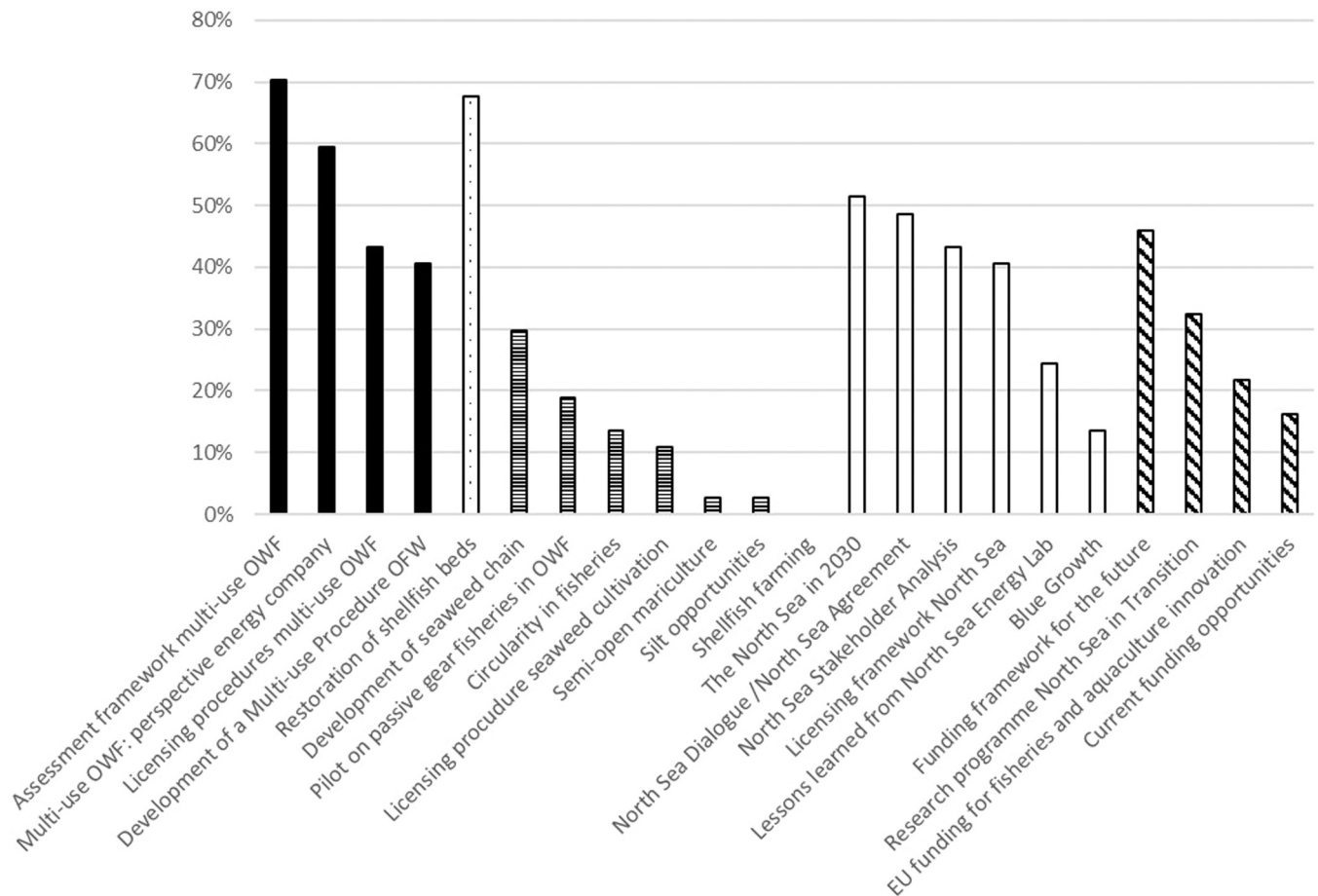
**Fig. 3.** COPNS topics in 2018 and 2019 in relation to applicability to respondents' profession (n = 37). Colours refer to general topic: black = OWF and multi-use; black dots = nature conservation and development; horizontal lines = food production; white = policy and regulations; diagonal lines = funding for research and innovation. Restoration of shellfish beds (green) was on the agenda of three meetings, but for analysis merged into one.

multifunctional energy and food production islands, shared infrastructure for oil and gas industry and renewable energy sector, and an airport in the North Sea. The second, 'renewable energy other than OWFs', includes solar energy at sea and energy from sea water.

As the COPNS agenda had so far been dominated by topics the different participating ministries found interesting in relation to the North Sea 2030 strategy (with a strong focus on OWFs), it is not surprising that stakeholders from the maritime and energy sectors expressed a need for addressing other aspects of energy production, such as other forms of renewables and infrastructure development: *"do not exclude topics from the agenda because it is politically inconvenient"* and *"also include smaller interests on the agenda instead of only those of the large players"*. Respondents also urged the COPNS organisers to *"maintain the energy level in the COP by ensuring there are tangible results"*.

The results of the questionnaire were presented and discussed in subgroups during a COPNS meeting (2019). Most members felt that multi-use is urgently needed to deal with the different challenges in the North Sea 2030 strategy. However, many perceived that policy discussions, including the North Sea Agreement negotiations, steer towards single use including further segregation of activities through zoning. In this context, the COPNS was perceived as a platform to generate ideas and guide concrete multi-use pilots. However, there were concerns that support for the COP would dwindle if these ideas were not put into practice.

Some members felt strongly that the COPNS should actively influence policy decisions, which was the reason why they were participating in the COPNS. One participant, for example, proposed that *"the COP should prepare a motion on sustainable energy regulations for parliament"*.

Contrastingly, others felt that the COP should stay away from lobbying activities, or as one participant noted: *"we are a community of practice, not a community of policy"*; instead the COP's activities should inform policy in terms of lessons learnt from practice, proposals for lifting regulatory

**Table 3**
Seven type of COP activities identified by Wenger et al. [47] in relation to the COPNS.

| Activities | COPNS evaluation |
|---|---|
| 1. Exchanges | Valued by both founders (MinANFQ, RVO) and COPNS participants. |
| 2. Productive enquiries | Ideas were explored, and case clinics have been organised, but many participants also recommend strengthening these types of activities. |
| 3. Building shared understanding | Hot topic discussions have taken place, joint events have been organized. Efforts to build shared understanding have been observed. No observations yet of joint responses towards MSP. |
| 4. Producing assets | Networking is the most important asset. Some boundary collaborations in early development stages (e.g. Multi-Use Procedure [75]). Documenting of practice may occur but is not necessarily shared (see 6). Stronger focus on learning projects is requested by participants. |
| 5. Creating standards | Not observed. |
| 6. Formal access to knowledge | All participants have access to policy support research commissioned by the government. Helpdesk for participants set up. Not all knowledge from the multi-use pilots is accessible to all participants (see 4) as some projects are privately funded and results are precompetitive. |
| 7. Visits | Participants value these types of activities and want to play an active role. |

barriers and developing incentives for blue innovations. In a response to these opposing views a government representative emphasised that *"the COP's role in relation to policy is about exercising influence through experiences from practice and is not about lobbying"*. Subsequent discussions concluded that for the success of the COPNS, it is important that members are on the same page in terms of its objectives. In terms of concrete achievements, members would be happy if by the end of 2020, government would have agreed on a concrete policy framework for organising and supporting multi-use, and the COPNS activities had further encouraged multi-use practices through new pilots in OWFs, new participants to the COPNS, and upscaling of existing multi-use pilots. In identifying these objectives, the COPNS decoupled its own role (fostering practice) from the role of government (enabling policy).

Participants concluded that, while networking is important, the COPNS should act as a platform for fostering pilots towards multi-use OWFs. These aims require room for experimentation, adaptive policies and regulations, funding, and knowledge.

## 5. Discussion

The COPNS was set up to support multi-use pilots (some of which had already secured funding), learn from each other, and resolve issues. As such, it meets the three characteristics of a Community of Practice: domain, community and practice [38]. The 'practice' component has, however, not yet fully blossomed. When analysing the learning processes in relation to the seven joint activities defined by Wenger et al. [47] (Fig. 1; Table 3), it becomes clear that the COPNS predominantly focussed on two activities: (1) 'exchanges', and (2) 'productive inquiries'. To some extent, it was also involved in 'building shared understanding' (3) and 'formal access to knowledge' (6). 'Producing assets' (4), 'creating standards' (5) and 'visits' (6) had not (yet) been an active part of the agenda. This can be expected, considering the COPNS only started in September 2018. Also, the different motivations for participants to get involved influence the types of activities undertaken. While policy-makers and pilot initiators have shared goals (e.g., create a level playing field for pilots), they also have individual goals (e.g., speed up the number of pilots to meet government objectives versus learning from practical experience of other pilot initiators). At this stage, the COPNS is therefore more like a hybrid of a boundary organisation [68] for policy-makers and pilot-practitioners, and a Community of Practice [38,47]. This hybrid approach is valued by the COPNS participants, but the evaluation also shows that there is energy amongst the participants to work towards a full-fletched COP.

Learning processes in the COPNS have not so much been driven by learning from within [47], but have relied on the use of outside sources, such as presentations of research commissioned by the government, explanation of funding opportunities and invited speakers. Learning from within is mainly characterised by informal processes, for example, in one-on-one conversations during breaks. While parallel workshops generally focus on sharing ideas and information, these tend to follow a 'send-receive model', i.e., there is not much sharing of experiences or discussing joint issues and how these may be resolved. A first explanation for why learning mainly relies on outside sources is the way the parallel sessions are set up (i.e., large group of participants who are not necessarily involved in pilots themselves, lack of clear focus on mutual exchange). A second explanation may be competing interests, i.e., sharing information on approaches, methods, pitfalls and solutions is seen as giving away the competitive advantage. Illustrative are the prestigious and mediagenic oyster restoration pilots, where hardly any experiences are shared between the various consortia. Thus, establishing trust between different members involved is essential. This requires time and is not easy, particularly when in other contexts, the different parties do not have a history of cooperation. Some even have faced each other in lawsuits (fisheries and eNGOs), so they likely are suspicious of each other's motives or see each other as a threat to their own activities.

A third explanation why learning in the COPNS has been mainly

informal and externally driven lies in its leadership. Leadership is an essential element of any COP [47]. In the COPNS, formal leadership is exercised by the MinANFQ and RVO. They organise the meetings and are responsible for the agenda. The agenda has been dominated by themes the government finds interesting in relation to realising its North Sea 2030 strategy, with only a limited number of workshops initiated by economic sectors or eNGOs. This also explains why activities such as 'producing assets', including learning projects, problem solving and documenting practice, and 'creating standards', including models of practice, have not really been articulated (Table 3). If the COPNS is to meet its potential as part of the government's ambition to accelerate multi-use pilots, a shift is needed towards more formal learning from inside the community. This demands a more active role of participants and may require working with more focussed subgroups that share a similar interest, with an increased focus on activities around 'producing assets' and 'creating standards'. An example is the development of a Multi-Use Procedure (MUP), initiated by North Sea Farm Foundation. The MUP aims at clarifying the steps towards safe multi-use OWFs to facilitate multi-use license applications [69]. Future field trips, visits, and practice fairs ('visits'; Table 3) could support this shift in organising the learning processes. There seems to be enough appetite to make this happen, given the outcomes of the questionnaire: a large majority of respondents indicated they want to play an active role in agenda setting, and a significant number of future COPNS topics was suggested. Much will depend on the leadership role by the government, and particularly their willingness and capability to devolve leadership to other members. This could be done by an organising committee of COP members, and by identifying and working with informal leaders amongst the members. An example of such an informal leader is the North Sea Farm Foundation. While one may argue that the MUP they developed is directly in their own interest, they actively involve the COPNS by seeking its input next to interacting with the government in developing the procedure. Considering that regulations and licensing for multi-use is still a major barrier, the joint development of the MUP is important for the implementation of multi-use practices. At the same time, this activity will assist the COPNS' further evolution towards learning from and with each other, through formal and informal activities, and from sources outside and inside the community [47].

A further evolution of learning processes within the COPNS is needed to fulfil its potential in fostering multi-use in practice. Yet, its success will also depend on the extent to which the government succeeds in enabling multi-use in its MSP policies. Current regulations allow for symbiotic multi-use and for co-existence or co-location [9]. Examples include shipping access for vessels smaller than 24 m to the 500 m safety zones and within OWFs, permission for recreational rod and line fisheries in OWFs, and allowing certain fishing methods in nature conservation areas. However, realising the highest level of connectivity, multi-functional or multi-purpose use [9], which all parties consider to be urgently needed, remains an issue within the current regulatory framework. In the tendering procedures for OWFs, (allowing) multi-use is neither compulsory nor is it incentivised by giving it significant credits in the scoring and assessment system for tenders. While the government correctly points out that licenses for multi-use activities within OWFs can be granted, in practice many OWF companies, investors and insurers are hesitant to allow it [8], with the exception of nature restoration projects on the seabed. Combined use of OWFs and other uses that require (fixed) sea space or significant human activity such as shipping and labour, are considered to involve high risks in relation to health and safety, and liability in cases where multi-use interferes with OWF production capacity. The MUP [69] developed in the context of the COPNS and a recently developed framework for risk assessment of multi-use at sea by Van Hoof et al. [8], may facilitate future multi-use policies and regulations.

Finally, the wider MSP context will influence the success of the COPNS in supporting the government's multi-use ambitions [cf. [70]]. Although stakeholders were consulted as part of the North Sea 2030

strategy, the government's decision for large scale development of OWFs, affecting the future seascape of the North Sea, was unidirectional and likely heavily influenced by dominant players in the OWF industry [32]. The fishing industry feels alienated [58]. As fishing rights are expressed in catch quotas that are not linked to specific fishing grounds, it remains difficult to legally substantiate their vested interests in a North Sea where an increasing number of new resource users do require fixed spaces [71]. In 2020, the majority of the fishers said nay to the final North Sea Agreement that lays down spatial allocations for additional nature conservation areas and OWFs, closure of all existing nature conservation areas for bottom-trawling, and a 200mln euro Transition Fund [72]. While the government responded by reiterating its commitment to assisting the fisheries in their transition towards fishing in a changing sea scape and sought ways for keeping a minority group of the fishing industry involved in the North Sea Dialogue [73,74], the fishing industry has since united and left the policy-oriented Dialogue [75]. In this context, it is likely multi-use conflicts involving fisheries will exacerbate. There is no indication yet that the industry intends to refrain from participating in the separate practice-oriented COPNS.

Continued development of monofunctional OWFs would imply that not only the North Sea 2030 objective in relation to sustainable seafood production will be affected but also fisheries as Dutch cultural heritage [34,76]. Such developments would have significant consequences for the willingness and commitment of stakeholders to continue cooperation towards sustainable resource multi-use. In this case, the business as usual model will be 'symbiotic' and 'co-existence' forms of multi-use [9]; it is unlikely that the aspired 'multi-functional or multi-purpose use' will really fly. Instead, the prediction is that the weakest form of multi-use, 'subsequent use or repurposing' [9], will prevail with fishing grounds and nature conservation areas being repurposed for OFWs, as is the case for the Dogger Bank [5,77]. In this scenario, the development of a blue economy [78] could be framed as a form of blue grabbing, where current policies recast control over blue resources with major impacts on existing users, while large scale capital-intensive uses continue [79]. This could potentially undermine participants' support for the COPNS.

The COPNS can play an important future role as a practitioner's platform in support of multi-use and 'multi-functional use', and hence in fostering a sustainable North Sea economy. The focus on joint learning and resolving issues through sharing practices is a strong premise. Moreover, it enables members with a range of diverging and sometimes conflicting interests to work together in a non-political environment where participants are invited and encouraged to work together and not defend their own stake at the expense of others. This positive learning environment is particularly relevant in the context of MSP, where participatory processes are often dominated by a few key players, are limited to consultation meetings and are generally organised post-political decision-making [32,34,42]. While the latter has also been the case for the North Sea 2030 strategy, the COPNS implicitly regards the political decision as given, i.e. it has internalised the multi-use problem, decoupling it from policy. While individual members externally continue with lobbying and defending their own stakes, within the COPNS participants focus on resolving practical implications. From this perspective, the COP can be regarded as a social innovation, which can be understood as "a change in the attitudes, behaviour or perceptions of a group of people joined in a network of aligned interests that, in relation to the group's horizon of experiences, leads to new and improved ways of collaborative action in the group and beyond" [41]. In the context of MSP and fostering a blue economy, such a social innovation is essential for governing sustainable, shared and fair access to marine resources; this is "not only about spatial allocation of activities, but about coordinating discrepancies of societal systems needed across systems to support the ongoing developments" [32].

## 6. Conclusion

With the current speed in development of OFWs in the EU and beyond, managing potential impacts on the ecosystem and conflicts between existing and prospective users is essential. Multi-use, and especially multi-functional use [9], is advocated as the way forward but is often approached as a design question that can be solved through MSP rather than through a social process. Finding a balance between different stakes requires meaningful participation of all parties involved, which in MSP processes is often a challenge [32,34,42].

This paper argues that Communities of Practice [38] can play a positive role as a tool for encouraging a culture of cooperation around marine multi-use between stakeholders in an informal setting. Through decoupling of policy and practice, Communities of Practice create a positive learning environment where participants can focus on practical challenges, gaining experience, and developing working relationships. Indirectly, in due time, COPs may play a positive role in conflict resolution around resource use as they encourage relationship building and cooperation. The COPNS presented in this paper is not (yet) a COP in the classic meaning [47], but is a hybrid of a boundary organisation with characteristics and activities that apply to a COP. Nevertheless, the COPNS has demonstrated its potential as a participatory tool for MSP in practice. By internalising the (political) multi-use problems associated with OFW expansion, the COPNS can help participants to focus on working on practical ideas and solutions for multi-use in the Dutch North Sea.

The case study in this paper suggests that by creating a positive learning environment and decoupling politics and policy from practice, the COP approach has potential as a participatory action-oriented tool towards salient resource multi-use practices. Ten guidelines could aid this process: (i) focus on practice; (ii) make sure participants share a joint definition of what the COP is about; (iii) allow for sufficient time for participants to get to know each other and build trust; (iv) make sure the agenda is not dominated by the interests of a few; (v) providing information is important but do not turn meetings into a send-receive format; (vi) in the exchange of experiences, ensure a balance between learning from within and learning from outside sources; (vii) encourage informal leadership in organising sessions; (viii) be transparent about activities and communicate internally and externally; (ix) celebrate successes together; and (x) use the COP learning framework developed by Wenger et al. [47] (Fig. 1) to regularly reflect on each other's roles and on progress.

## CRediT authorship contribution statement

**Nathalie A. Steins**: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing - original draft. **Jeroen A. Veraart**: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Supervision, Writing - review & editing. **Judith E.M. Klostermann**: Investigation, Formal analysis, Writing - review & editing. **Marnix Poelman**: Investigation, Writing - review & editing.

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## Declaration of interest

The authors state that they do not have any conflicts of interest to declare.

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