Title: Use conflicts in ecosystem-based management – the case of oil versus fisheries

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1. Introduction

The world's coastal and marine areas are under increasing pressure. Issues of concern include depletion of fish stocks, pollution, destruction of habitats, ocean acidification, and biodiversity loss (Halpern et al., 2008; Hoegh-Guldberg and Bruno, 2010; MEA, 2005; Sherman and Hempel, 2008; UNEP, 2006; WBGU, 2013). Ecological changes are predominantly caused by land-based activities and pollution sources, but fishing, shipping, offshore oil and gas development, tourism, and other uses of the ocean are also important stressors.

The increasing diversity and intensity of marine activities affect, on the one hand, the marine ecosystems and place their structure, functioning, and productivity at risk. On the other hand, the activities give rise to potential use conflicts. Users frequently share the same environment and they may have overlapping and mutually exclusive claims to spaces or resources, or their activities may have adverse effects on other stakeholders. These two aspects are closely linked. If the increasing exploitation of marine spaces and resources is not regulated and conflicts reduced, it leads to environmental degradation and resource depletion. If the health of the ecosystems are not maintained, their ability to provide ecosystem services and to support current and future uses will be damaged. Hence, there is an urgent need for management solutions that can meet both sets of challenges, i.e., conflicts between use of the ocean and marine environmental conservation, and conflicts between different forms of use.

The concept of marine ecosystem-based management — also known as the ecosystem approach — aims to include both aspects (Arctic Council, 2013; Curtin and Prellezo, 2010; Ehler and Douvere, 2009; McLeod et al., 2005; Secretariat of the Convention on Biological Diversity, 2004). This concept is based on an understanding of the complex inter-linkages between ecosystem components (including humans) and the interactions between ocean, land, and atmosphere. The fundamental idea is to establish a comprehensive framework that can promote existing and emerging uses of the sea whilst minimising use conflicts and protecting ecosystem integrity and future delivery of valuable ecosystem services. This is to be achieved by the application of the best available scientific knowledge, inter-sectoral cooperation,

systems of monitoring and evaluation, effective enforcement, and a process of continuous learning and adaptation.

There is, however, a discrepancy between ideals and reality. Although the ecosystem approach is meant to provide a holistic framework, it tends to have a more narrow scope when put into practice. As the main concern is to maintain the marine ecosystems in healthy, productive and resilient condition, focus is primarily on the natural ecosystems and the cumulative impact of human influences, not on the regulation of ocean uses, stakeholder conflicts, and the issues of governance. In other words, the environmental aspects dominate whereas the regulatory aspects receive more scant attention. This implies that the root causes of ecosystem deterioration and the challenges associated with handling increasing human activities are dealt with only indirectly or to a limited degree.

In this paper, we address what we regard as the weakest link in the current design and implementation of marine ecosystem-based management. Although there has been an increasing number of research publications on ocean and coastal governance (e.g., Maier, 2014; Ramos et al., 2015; Soma et al., 2015; Van Leeuwen et al., 2014; Van Tatenhove, 2011), only few of them (e.g., Christie et al., 2014; Stepanova, 2015) deal specifically with user conflicts and their management implications. The same holds for a recently published handbook of ocean resources and management (Smith et al., 2015). Our contention is that coordination and harmonisation of the expanding marine activities is not only a significant issue in its own right, but an important condition for safeguarding the environment. In ecosystem-based management, a crucial point is how user conflicts are expressed and translated into coordination efforts. We will illustrate this by a study of the relationship between the fishing industry and the offshore oil and gas industry in Norway and Vietnam, respectively. The two countries are selected because they face many of the same challenges when it comes to coexistence between the two industries, both of which are key users of the sea, but they have handled the conflicts in different ways.

The study is based on various sources. In the case of Norway, the interaction between the fishing industry and the oil and gas industry has been thematised for many years, and we have largely made use of newspaper articles, public plans and documents, and available research literature. Similar information is much harder to obtain in Vietnam, and here we carried out semi-structured personal interviews and informal conversations with representatives of the two industries, eight government agencies, and five research institutions. In total, we interviewed 26 persons in Hanoi, Ho Chi Minh City, Vung Tau, Nha Trang, and Phan Thiet. In addition, two focus group meetings were organised, including 14

people. The data collection mainly took place in 2013 and 2014, with a few supplements in 2015. In the analysis, we focused on how the relationship between the two industries is perceived and what has been done to avoid or resolve conflicts.

The remainder of the paper is organised as follows. We begin by taking a closer look at the main characteristics of ecosystem-based management. We then discuss the concept of conflict and outline different principles of coordination between interdependent actors. In the following two sections we describe the two selected industries in Norway and Vietnam, their interaction, and how the issues of conflict and cooperation have been handled. Finally, we discuss the conditions for balancing and mitigating multi-use conflicts and the implications for marine ecosystem stewardship.

2. Ecosystem-based management

The ecosystem approach has been acknowledged as a milestone in the management of natural resources and is now promoted by all leading international organisations. At the 2002 World Summit on Sustainable Development held in Johannesburg, one of the agreed targets was to introduce an ecosystem approach to marine resource assessment and management by 2010. Over the last decade a number of countries have developed integrated management plans for their coastal and ocean waters (Ekebom, 2013; Foley et al., 2010). Similar work has been undertaken for the large marine ecosystems of the world's regional seas (Sherman and Hempel, 2008).

Ecosystem-based management is an evolving concept, but certain key principles stand out. Unlike conventional types of natural resource management, which address a single sector or issue, ecosystem-based management is about the functioning of the entire ecosystem (Curtin and Prellezo, 2010; Long et al., 2015; Ray, 2010). It aims at the conservation and sustainable use of biological diversity and ecosystem services. The approach is, therefore, place- or area-based, focusing on a specific ecosystem and the range of human activities that influence the health of the ecosystem. Many different handbooks and guidelines have been developed to assist in the implementation of ecosystem-based management (e.g., Ehler and Douvere, 2009; ELI, 2009; FAO, 2012; Tallis et al., 2010; Taylor and DeLauer, 2009).

In general, the activities follow a standard policy cycle. The process begins with a planning phase, which typically includes the assessment of existing ecosystem conditions and human use patterns, mapping of major trends, identification of ecologically and biologically significant areas, and an analysis of the ecosystems' vulnerability to human influences. The next step is the formulation of ecosystem objectives and the evaluation and design of

management strategies. This is followed by the implementation of measures and the adoption of a monitoring system and indicators to measure the state of the ecosystems and the effects of the management actions. Finally, to deal with change and uncertainty, the objectives and management systems are supposed to be revised and improved as more knowledge and experience is gained.

An important tool in ecosystem-based management is marine spatial planning, whereby the principles of land use planning are extended to the sea (Douvere, 2008; Forst, 2009; Gilliland and Laffoley, 2008). To ensure sustainable development, the spatial plans for the marine waters allocate the spatial and temporal distribution of human activities (Ehler and Douvere, 2010). This is achieved by defining the boundaries for the management area and designating different zones for particular uses with accompanying regulations and permits.

The ecosystem approach emphasises the interdependence between human well-being and ecosystem well-being. Attention is directed to the impact of human activities on the ecosystems and to the many benefits that healthy ecosystems provide. Increasing efforts have been made to estimate the value of coastal and marine ecosystem services, which in the Millennium Ecosystem Assessment framework are classified as supporting, regulating, provisioning, and cultural services (MEA, 2005). Nonetheless, a general characteristic of the attempts to advance marine ecosystem-based management is that the ecosystem occupies centre stage, whereas the social and economic aspects are relegated to the background (Ehler and Douvere, 2009; Jay et al., 2012; St. Martin and Hall-Arber, 2008; UNEP and IOC-UNESCO, 2009). Focus is on the ecological attributes that are necessary to maintain or restore functioning and resilient ecosystems. Ecosystem-based management, therefore, is primarily about conservation, with a strong focus on marine protected areas (MPAs) and, in particular, no-take MPAs (Hersoug, 2014). This has led to a large number of small MPAs around the world, but not to the establishment of holistic institutions and management systems that can provide multi-use solutions.

The preoccupation with ecosystems entails several paradoxes. First, at the heart of the concerns for the environment lies the harmful effects that human activity is deemed to have — directly or indirectly — on biodiversity and ecosystem services. What can be governed are only the human activities and influences, not the marine ecosystem as such (McLeod and Leslie, 2009). As pointed out by Foley et al. (2010: 956), marine ecosystem degradation is closely linked to ‘the current patchwork of complex, uncoordinated, and often disjointed rules and regulations governing use of coastal and ocean waters around the world’. Maintaining the marine ecosystems implies that we have to move away from a sector-by-sector and issue-by-

issue management approach and consider the ‘multiple human uses and their compatibility, conflicts, and synergies with each other and with the ecosystem’ (Foley et al., 2010: 956). Consequently, a key issue is how to balance all the interests and priorities that have to be considered within the framework of a comprehensive management approach.

Second, although it is widely acknowledged that more data and knowledge is required about ecosystem properties and dynamics, their spatial and temporal scales, the links between biodiversity and ecosystem services, and the ecosystems’ ability to cope with multiple stressors (Haines-Young and Potschin, 2010), this is ultimately motivated by human needs and expectations. The maintenance of ecosystems and their components can be said to have an intrinsic value, but the very notions of ‘healthy ecosystems’, ‘ecosystem services’, and ‘productive seas and oceans’ have a human and utilitarian dimension. The concepts are related to the achievement of human goals. So even if environmental policies and management strategies have to be informed by ecological knowledge, they can never be derived from ecological principles alone. There are no ecological imperatives that can be unambiguously translated into policy recommendations. Rather, there are always many kinds of trade-offs between different types of benefits associated with alternative development paths and management strategies (Haines-Young and Potschin, 2010). Ultimately, decisions about policy and management will be a matter of societal choice and necessary compromises.

It can be argued that the ecosystem approach takes the socioeconomic aspects into account. In all handbooks and guidelines on ecosystem-based management, stakeholder participation is highlighted as a key (e.g., COBSEA, 2011; Dickinson et al., 2010; FAO, 2012; Pomeroy and Douvere, 2008; Reed, 2008; Secretariat of the Convention on Biological Diversity, 2004). Engaging a broad range of participants in developing management options is recommended. In addition to relevant public bodies, representatives of the private sector, academia, non-government organisations, and civil society should be included. Broad participation is seen as decisive for the generation of relevant information and knowledge, the sharing of visions and understandings, the quality of the decisions, and the acceptance of and compliance with the rules and regulations that are imposed. Yet, the problem is that the literature mainly tells how to select stakeholders and facilitate stakeholder involvement. There appears to be a firm belief in the simple idea that by bringing actors together and ensuring adequate information about the vulnerability of the ecosystems and the many benefits that healthy ecosystems provide, everybody will understand the urgency of conservation measures. What is missing is a discussion of use conflicts and the conditions and mechanisms for avoiding or resolving irreconcilable objectives and interests.

3. Use conflict and coordination

Traditionally, coastal and marine waters have been used mainly for fishing and navigation. Over the last decades, offshore oil and gas development has also emerged as an important industry in many parts of the world.[1] Offshore oil production now accounts for one-third of world crude oil production, and there are more than 2000 offshore oil and gas fields (Fang and Duan, 2014). As experience shows, the coexistence of, notably, fishing and oil can create competition and conflict (Ackah-Baidoo, 2013; Andresen and Underdal, 1983; Churchill, 1989/90; Cicin-Sain and Tiddens, 1989; Cormick and Knaster, 1986; Glazier et al., 2006: Grant, 1978; Hersoug, 2010; Jablonski, 2008; Jones, 1987; Miles and Geselbracht, 1987; Thomé da Silva et al., 2015). Both industries can have harmful effects on the marine environment (e.g., overfishing, destruction of coral reefs, spillage, and pollution). At the same time, they can create negative externalities for each other. The potential conflicts include limited access to valuable areas, damage of gear and pipelines, navigational hazards due to installations and increased traffic congestion, etc. This is typical of conflicts relating to nature. They can be of many types, and they can play out at various levels (Stepanova and Bruckmeier, 2013).

Environmental and resource use conflicts are frequently about the access to and use of natural resources and space and the distribution of the associated benefits and costs. They can also be about the harm that different co-located activities inflict upon each other through operational or ecosystem impact. Moreover, the conflicts can involve both actual and potential users in a broad sense as well as different government agencies, which tend to have a narrow mandate and identification with particular clients and concerns (Cicin-Sain, 1992). As pointed out by Dietz and Engels (2014), conflicts are not just an effect of environmental scarcity but are shaped by the actors' different interests and valuations and the social structures, discourses, and power relationships in which they are embedded.

The concept of 'conflict' is often used rather imprecisely, encompassing all cases where actors are pursuing what are, or appear to be, incompatible goals. In this way, no distinction is made between competition and conflict. According to Werron (2010), competition is basically a constellation where two parties compete for a scarce resource (e.g.,

[1] The term 'offshore' is used differently in the context of oil and gas and fishing. In the petroleum industry, offshore refers to the exploration and exploitation of hydrocarbons beneath the seabed, including inshore waters and lakes. In fisheries, a distinction is made between inshore and offshore fishing. Inshore fishing takes place in shallow water close to the shore, whereas offshore fishing takes place further out in open sea.

customer satisfaction, political attention, recognition by peers, fame). The rivalry is indirect and peaceful. For a conflict to occur, the contending parties must face each other more directly with their opposing demands, which they perceive as a threat to their needs, interests or concerns. Opposition and antagonism usually distinguish conflicts. They have an escalation logic whereby disagreement easily leads to increasing hostility and animosity and, finally, to violent confrontation. Under certain conditions, competition can turn into conflict and vice versa, and both types of rivalry can be replaced by cooperation and consensus. In the latter type of transformations, third-party mediators and facilitators frequently play an important role (Dukes, 2004; Wennersten, 2008). As an effect, the adversaries enter into a dialogue and have to seek the support and legitimacy of a wider audience. New criteria are brought in, the frames of reference are changed, and the parties eventually reach an agreement that solves their principal incompatibilities.

Conflicts are not necessarily a bad thing. They can be considered a natural part of every pluralistic society and they can have a productive function (Coser, 1957; Simmel, 1904). Conflicts spur efforts, mobilise resources, and promote invention and creativity. Contending parties often explore and define their identities and interests as conflicts evolve (Werron, 2010). Conflicts can also be more or less easy to resolve (Cicin-Sain, 1992). If redistribution and compensation is possible, conflicts of interest are generally easier to resolve than value conflicts, and conflicts regarding facts can be resolved more easily than conflicts of interest. However, the basis for conflict is often mixed, and complexity and uncertainty can aggravate conflicts. In the marine realm, conflicts can include opposite values and contradictory interests as well as disputes about facts. As marine areas and their common pool resources are usually publicly owned and managed, it is important that there are mechanisms for tackling the intractable conflicts that might occur. Governments are expected to take conflicts seriously if they threaten health, safety, and the environment, put the viability of the marine ecosystems at risk, lead to significant welfare losses, or endanger other central values.

Governing economic sectors and their interaction can take different forms. The interactions can be modelled as a variety of games (Aumann, 2008), but here we are interested in the extent to which the interactions are purposely coordinated. We then have a few basic modes, as pointed out by Scharpf (1994). First, the interactions can be uncoordinated. In this situation, the actors operate independently and possibly to the detriment of each other. They can anticipate the course of actions of the others and try to counteract or accommodate unilaterally. They can also try to influence the actions of the others. However, there are no conscious efforts at collective coordination. Second, there can

be a hierarchical coordination, which is normally based on rules and regulations imposed by government. In this situation, the targeted actors are confronted with rules that they must adhere to. Each of them adapt to external constraints. Third, the actors can negotiate and coordinate horizontally on a voluntary basis. This can be in the form of what Scharpf (1994) refers to as negative coordination, where the main purpose is to avoid overlap and conflict. Alternatively, there can be a positive coordination, which aims at fostering synergies and new, joint opportunities.

As emphasised by Scharpf (1994), in the real world, there is usually a mix of hierarchical and horizontal coordination. Governments involve various agencies and private and non-government actors in policymaking and implementation, and when interdependent actors try to reach mutually satisfactory agreements on their own terms, it often takes place under 'the shadow of hierarchy'. They know that the state supervises their regulatory efforts and can intervene as the last arbiter.

Such mixed constellations are common in marine management, which represents a multi-objective, multi-actor and multi-level setting. Hence, in this context it is relevant to distinguish between three patterns of coordination. First, management can be based on the old single-sector approach in which each sector is governed separately and the inter-sector interactions and conflicts with other users are not addressed. Second, the interaction among sectors can be addressed, but management is mainly about negative coordination. In marine spatial planning, the zoning of the sea is an example of negative coordination. The core idea is to delineate activities, keep them apart, and prevent interference. The allocation of certain activities to certain areas is implemented to ensure conservation and to avoid use conflicts. Thus, although ecosystem-based management encourages the inclusion of stakeholders, the measures adopted are frequently about exclusion and the apportioning of the sea. Beyond this framework there can also be a positive coordination with higher aspirations. Here it is important that the stakeholders develop mutual understanding and trust and are able to search for novel solutions together. As the ecosystem approach focuses on the conflict between economic development and conservation, positive coordination will most likely occur as an addition to the systems established to perform ecosystem-based management.

Based on this typology, we will now look at the interaction between the fishing and the oil industries in Norway and Vietnam. What characterises the industries and their interaction? How are interdependencies coped with and conflicts resolved?

4. The oil and fishing industries in Vietnam and Norway

Norway and Vietnam are clearly dissimilar in terms of geographical location, climate, size of population, level of economic development, and political system. However, both countries have a long coastline, bordering oceans that are rich in living marine resources, and they are among the largest seafood producers in the world. In 2013, total catches landed by Vietnamese vessels were at 2.8 million tonnes, and the corresponding figure for Norway was 2.2 million tonnes (FAO, 2014). In both countries, fishing takes place all along the coast, although some regions are more fishery-dependent than others. Over the last 40 years, both countries have also become important offshore oil and gas producers and they still hold substantial reserves. Currently, oil and gas are produced in four basins in Vietnam (Cuu Long, Nam Con Son, Song Hong, and Malay-Tho Chu). In 2013, Vietnam produced 17.0 million tonnes of oil and 9.8 billion cubic metres of natural gas (BP, 2014). The Norwegian continental shelf is divided into three provinces (the North Sea, the Norwegian Sea, and the Barents Sea). In 2013, total production was 83.2 million tonnes of oil and 108.7 billion cubic metres of natural gas (BP, 2014). Fisheries, as well as offshore oil and gas, are thus significant industries in the two countries, contributing to food and energy supply, income, employment, and government revenues.

The structure of the fishing industry differs in Vietnam and Norway. In Vietnam, about 750,000 people are directly involved in marine capture fisheries. The fleet consists of 123,000 vessels, mostly wooden boats with simple equipment operating in near-shore waters (Directorate of Fisheries, 2013). Since the late 1990s, the government of Vietnam has run a programme to promote offshore fishing. Investment subsidies and fuel subsidies are provided and the number of fishing vessels fitted with engines of more than 90 hp has increased rapidly. There are many thousand species of fish, crustaceans, and molluscs in Vietnamese waters, and fishing is multi-species and multi-gears, including long-line, gillnet, liftnet, purse seine and trawl. Vessels are normally owned by the fishing families. In Norway, less than 12,000 people are directly engaged in fishing (Directorate of Fisheries, 2015). The number of active registered vessels is about 5,200. There has been a major restructuring and decommissioning of vessels during the last decades. The fishing fleet now consists of efficient vessels with modern fish finding equipment, hydraulics, and navigation electronics. The most important commercial species are cod, herring, mackerel, saithe, haddock, and shrimp, which are harvested by purse seine, gillnet, Danish seine, auto long-line, and trawl. The vessels mainly belong to fishing families, but there are also ties to the processing industry.

When it comes to the oil and gas industry, there are greater similarities between the two countries. The oil industry requires the application of advanced technologies. The sector is capital intensive and dominated by large companies. When Vietnam and Norway built up their own industries they sought assistance from abroad, but their governments were eager to nationalise the industries. Hence, Vietnam National Oil and Gas Group (PetroVietnam) plays a key role in the Vietnamese oil and gas sector. Today, PetroVietnam is a diversified conglomerate and serves as the primary operator. All oil and gas projects in Vietnam are carried out by PetroVietnam's upstream subsidiaries or through joint ventures or production sharing contracts between PetroVietnam and international companies. Similarly, Statoil is the dominant actor on the Norwegian continental shelf and controls more than 70% of Norway's oil and gas production. In Norway, there are currently 78 fields in production operated by 37 companies, whereas the corresponding figures for Vietnam are 20 and 14, respectively. The oil companies and the companies that supply the oil industry generate jobs for about 60,000 people in Vietnam and 150,000 people in Norway (VPBS, 2014; NMPE/NPD, 2014).

The two countries have their own sectoral planning and management systems for the seafood industry and the oil and gas industry, based on international law and cooperation. In Vietnam, the responsibility for fisheries management resides with the Ministry of Agriculture and Rural Development. The Vietnam Fisheries Law sets the legal framework and the Vietnam Directorate of Fisheries serves as the law enforcement agency. The aim is to increase production for both domestic consumption and export and to create new jobs and income opportunities. The Ministry therefore pursues an open access strategy for fisheries, i.e., participants can enter freely, and the same holds for aquaculture. In order to promote sustainable development, destructive fishing methods are banned, inshore fishing is reserved for inshore vessels, and there are some regulations pertaining to minimum mesh size and species that can be fished. Nine marine protected areas have been established. However, there are no restrictions on the amount of fish that can be caught, and there is no overall zoning of the sea for different uses. In aquaculture, steps have been taken towards area planning. The measures also comprise fees for the use of areas in the coastal zone, the regulation of feed and chemicals that can be used, and clarification of the rights and responsibilities of the farmers.

In Norway, the fisheries sector is managed by the newly merged Ministry of Trade, Industry and Fisheries, and is assisted by the Directorate of Fisheries, the Institute of Marine Research, and the Norwegian Coast Guard. Unlike the open access strategy pursued in Vietnam, both fisheries and aquaculture in Norway are highly regulated. A wide range of measures have been adopted for single species fisheries including access limitation, total

allowable catch, vessel quotas, technical measures, and the establishment of marine protected areas. Aquaculture is regulated through a scheme of licensing with detailed provisions. There is also a comprehensive regulatory framework relating to food safety and animal welfare, which applies to all seafood production.

The petroleum sector in Vietnam is managed administratively by the Ministry of Industry and Trade, but all major decisions regarding the oil and gas industry are taken by the Office of the Government. The 1993 Law on Petroleum, amended in 2000 and 2008, is the principal legislative instrument that governs the sector. Licenses are awarded to international or joint venture companies based on their plans for development and operation. The control of the licensees and their activities is conducted by PetroVietnam on behalf of the authorities.

The Norwegian petroleum sector is under the control of the Ministry of Petroleum and Energy, assisted by the Norwegian Petroleum Directorate. The 2006 Act on Petroleum Activities, which replaced the earlier legislation of 1985 and 1996, states that all resources on the seabed or below are vested in the State and should be utilised and managed to the benefit of Norwegian society as a whole. The opening up of new areas for oil and gas development needs approval by Stortinget, the Norwegian parliament. Licenses are granted to prequalified companies that are put together in groups, headed by one operator. There is a comprehensive set of regulations related to health, safety, and environmental issues, and the authorities exercise control both through various supervisory bodies and through their ownership in Statoil and other companies.

Vietnam aims at integrated coastal and ocean management. A new Law on Sea and Island Natural Resources and Environment was adopted in 2015, and a strategy for the collective management of Vietnam's coastal zone until 2020 — with a vision for 2030 — has been announced. However, this approach is still in its infancy. Recently, some experiments of coastal zoning have been carried out in a few provinces (Quang Ninh and Hai Phong), but there is no overall system for ecosystem-based management of the coastal and marine areas. Each sector usually makes its own plans, and there is little input or feedback from other sectors or stakeholders. The level of cooperation and coordination among different sectors and levels of government is generally low (Gam, 2013; Knutsen, 2015). Meanwhile, Norway has already set up integrated management plans for the Barents Sea, the Norwegian Sea and the North Sea (see Knol, 2010; Olsen et al., 2007; Olsen et al., 2015; Ottersen et al., 2011). Norway has also settled all major maritime delimitation issues, whereas the boundaries are still disputed in the case of Vietnam, where China claims parts of Vietnam's exclusive economic zone.

5. Oil versus fisheries

Oil and gas exploration began in the 1960s in both Norway and Vietnam, and the coexistence of the oil industry and the fishing industry soon became a contentious issue. In Norway, the conflicts emerged after production started in the Ekofisk field in the North Sea in 1971. The fishers complained that they lost access to important fishing grounds (e.g., Statfjord A) and had their gear damaged due to debris left on the seabed. They protested and asked for economic compensation. The government responded by introducing a compensation scheme for fishers who suffered economic loss as a result of having fishing grounds occupied by the oil industry, and a campaign was launched for cleaning up the seabed. In the 1985 Act on Petroleum Activities, the oil companies were made responsible for pollution, waste and other steps that could cause damage or economic loss to the fishing industry. Throughout the 1970s, there were heated debates on whether or not oil and gas activities should be extended northwards on the Norwegian continental shelf, off mid- and northern Norway, where the fishing industry has been a mainstay of the economy. Many people were concerned about the possible negative consequences for the fisheries and the environment. The blow-out at the Ekofisk Bravo platform in 1977, which was the first major North Sea oil spill, demonstrated the risks associated with the petroleum operations. Ultimately, the parliament decided to open new areas for oil and gas exploration and exploitation, but stricter legislation was adopted pertaining to health, safety and environmental protection. In addition, a comprehensive oil spill preparedness and response system was established, combining public and private resources.

In Vietnam, the petroleum activity was sporadic until the 1980s when the first oil field came on stream in the Cuu Long basin, close to the coast in southern Vietnam. This is still the primary area for oil production and it is also an important fishing area. The fishers reacted to the entrant industry. They complained about oil spills, litter, and restricted access to their fishing grounds. As in Norway, safety zones of 500 m were established around each platform or emerging structure, but unlike in Norway, Vietnam also applied this to subsea installations. In addition, all offshore facilities were provided with an area 2 km in radius with prohibition against anchoring. This affected several types of fishing. The grievances of the fishers, however, were not heard. Instead, the criticism went in the opposite direction. The oil companies complained that the fishers frequently neglected the restrictions and fished close to the installations, which turned out to attract many species of fish. Hence, the oil companies had to seek assistance from the navy and other vessels to keep the fishers away. They started

to report unlawful fishing to the provincial fishing authorities and demanded that they take action. PetroVietnam also organised a series of courses for local fishers to teach them about safety rules and the dangers of coming close to the oil and gas installations, especially when they practice blast fishing. Fishers who were willing to attend the courses and who promised not to fish in the prohibited areas were provided with support in terms of insurance and free life jackets. In 2003, PetroVietnam introduced a compensation scheme for fishers whose payaos[2] were destroyed. The scheme was improved in 2012, but according to the fishers, the compensation offered is still very low and difficult to obtain.

Today, the relationship between the two industries is largely a non-issue in Vietnam. In interviews, the fishers told us that they frequently had their payaos damaged by seismic vessels or offshore supply vessels. The fishers are not well notified prior to seismic operations and oil slicks, tar balls, and debris pose constant challenges. As the oil activity has expanded and fields like the White Tiger–Dragon fields and the Lion fields include groups of platforms, the exclusion zones have also become much larger, which means that the fishers have to take greater detours to get to their fishing grounds. The powerful 24/7 lighting on rigs and platforms also forces the fishers to operate further away when they try to attract fish by the use of light. Longer fishing trips imply increased operating costs and loss of fishing opportunities. As the seismic activity is stepped up, new pipelines are built, and the fishing fleet is becoming more mobile, the potential conflicts are increasing.

However, since the late 1990s Vietnam has developed legislation and management systems on health, safety and environment, including a national response system to cope with oil spill incidents. This work has been supported by the Norwegian Government (Knutsen, 2015). In 2002, Vietnam established the Ministry of Natural Resources and Environment, and in 2005, a new Law on Environmental Protection was promulgated, replacing a first law from 1993. The law, which was amended in 2014, contains many provisions affecting the oil industry. Environmental impact assessments and protection plans are required in connection with large-scale natural resource projects or projects having potential risks or adverse impact on the environment. There are also provisions for the collection, storage and treatment of hazardous waste. A comprehensive environmental monitoring programme has been set up for the marine environment. As a result, the oil companies have to submit environmental impact statements and monitor the environment around the installations. Likewise, they must report on the types and amount of waste and send hazardous waste to processing companies licenced

[2] Payaos are anchored floating rafts, used for the attraction and aggregation of fish.

by the Ministry. PetroVietnam has made great efforts to develop guidelines on safety and the environment, to organise the oil spill response, and to carry out environmental sensitivity mapping. However, the environmental impact assessments are frequently of low quality and many of them are not publicly available (An, 2010; Saigon Times Online, 2015). In general, there is a lack of transparency and accountability, implementation and control is weak, and companies are seldom reprimanded for violations of rules (Gam, 2013; Knutsen, 2015). The system of oil spill prevention and response also has limited capacity, and inadequate resources and coordination of measurements impede the environmental monitoring.

In Norway, the relationship between the oil industry and the fishing industry has gradually improved. A number of measures have been launched to facilitate peaceful coexistence. First, before new areas are opened for petroleum exploration and exploitation, the Ministry of Energy and Petroleum must carry out a strategic impact assessment that includes the consequences for other industries, the environment and society. Second, the oil companies also have to carry out impact assessments before their plans for the development and operation of new fields can be approved. These assessments, like the assessments undertaken by the Ministry, are subject to public hearings and all inputs must be responded to and treated openly. Third, when new areas are announced for the award of production licences, important fishing grounds and spawning and nursery areas are usually excluded. For instance, the sea off Lofoten and Vesterålen, which is a vital spawning ground for cod and herring, has not been opened. Fourth, time and area restrictions are introduced if seismic surveys, drilling, and development entail potential conflict of interest with fishing. According to Norwegian law, all subsea installations and pipelines must allow for over-trawling. Fifth, during seismic surveys, Fisheries Liaison Officers have to be on board the seismic vessels. The ministries of petroleum and fisheries have developed joint guidelines for seismic operations. Sixth, discharges of drilling fluids, cuttings, and produced water from offshore operations are heavily regulated and closely monitored and government and industry work together to achieve zero discharges into the sea. Seventh, the fishers can claim economic compensation for economic loss caused by the oil industry. The compensation is paid by the state and a committee consisting of one representative from the Petroleum Directorate, one representative from the Directorate of Fisheries, and one independent judge handles the claims. Eighth, a number of research projects have been initiated to investigate the effects of oil spills, discharges, and seismic surveys on eggs, larvae, and fish dispersal (Research Council of Norway, 2012).

Thus, there are noticeable differences between Vietnam and Norway. In both countries the development of the oil industry has been given priority and the industry's interests have prevailed. However, whereas few measures have been launched in Vietnam to reconcile the interests of the oil industry and the fishing industry, Norwegian governments have tried to balance these interests. Several cross-sector committees have been appointed to investigate the conditions for coexistence and sustainability (e.g., NMPE, 2003, 2006). In Vietnam, there has also been a lack of organised contact and communication at the industry level, whereas in Norway, the two industries have developed a close cooperation. Inspired by the liaison organisation set up in Newfoundland and Labrador in 2002, the Norwegian Oil and Gas Association and the Norwegian Fishermen's Association have established the joint forum, 'One Ocean', where the leaders meet regularly (Thesen et al., 2013). They have also set up joint working groups that deal with issues of conflict and how they can best be avoided or resolved. Today, the oil companies consult with the fishers to find the best placement before new pipelines are laid, and there are consultations prior to the seismic programmes. In the northern part of Norway, the oil companies have engaged a number of local fishers and their vessels in their oil spill response system. Furthermore, a large share of today's Norwegian offshore supply fleet is owned by fishing families whose maritime experiences have benefitted the oil industry. People also move between jobs in the oil and the fisheries sectors, and many Norwegian companies now provide equipment and services to both industries, which means that technology transfer is taking place.

Based on the factors outlined above, our conclusion is that the relationship between the oil industry and the fishing industry is largely uncoordinated in Vietnam. The safety zones of 500 m, which are declared around all fixed installations and other devices in both countries, can be seen as an example of negative coordination but this is the only clear element of coordination in Vietnam. The main purpose is to divide interests. In Norway, the integrated management plans for the Barents Sea, the Norwegian Sea and the North Sea apply the same principles to large coastal and ocean areas. The plans specify the areas designated for petroleum activity and where, how and when exploration and exploitation are not allowed in order to safeguard fisheries and the environment. The plans thus entail a large-scale negative coordination. But, in addition, there is a positive coordination in Norway, aimed at fostering synergies and joint solutions. The integrated management plans have been helpful in this regard by establishing an inter-ministerial steering group and setting up joint forums and meeting places across sectors and governmental levels (Olsen et al., 2014). However, the positive coordination is mainly driven by the two industries and the associated government

agencies, based on mutual understanding and respect, and it takes place outside the scope of the integrated management plans.

Still, there are conflicts between the fishing industry and the oil and gas industry in Norway. They largely revolve around two issues. The first is seismic surveys, which have increased over recent years. The second is the future status of the sea off Lofoten and Vesterålen. The oil industry is eager to obtain access to this promising area, but the majority of the fishers are clearly against an opening.

6. Use conflicts and environmental effects

In the case of fisheries versus oil, it is understandable that many governments prefer to give precedence to the oil industry. The oil industry typically generates much more wealth than the fishing industry, and energy security is a central concern of every modern state. Nevertheless, avoiding or resolving conflicts can be beneficial to both industries. By adapting to each other, they can be spared from damage to gears, vessels and installations, and interference with operations and hazardous situations can be prevented. Likewise, the actors can avoid protracted and costly litigation, which might occur if conflicts end up in lawsuits and legal proceedings. Through collaboration, the industries can also create synergies and new and more optimal combinations, as the Norwegian example demonstrates, and they can find more flexible and site-specific solutions than general government regulations allow for. The next question, however, is if this makes any difference for the marine environment. Are efforts aimed at peaceful coexistence between interdependent industries also good for the environment? There are several arguments as to why this is the case.

First, if two or more industries occupy the same marine space and pay attention to each other, they have to see their own operations from the perspective of the other industries. Each sector has to consider how its operations affect the resource base, operational conditions, and future prospects of the other sectors. Second, if one industry is not environmentally friendly and acts to the detriment of the others, the representatives of that industry know that they have to be able to justify and defend their own actions. The complaining industries can also expect to be scrutinised for their weaknesses and shortcomings. When the fishers, for example, criticise the oil industry, their own harmful fishing practices are quickly questioned. Such ‘blame games’ tend to trigger a search for alternative solutions or compromises. Third, users operating side by side are in a better position to monitor each other than any arms-length government agency. Hence, when interdependent industries relying on different ecosystem services and environmental qualities

coordinate their activities, this will be beneficial to the environment. At first, the scope may be relatively narrow and limited to the avoidance of conflict, but when contacts and negotiation systems are established, the scope can be widened.

However, there are arguments to the contrary. In the conflict between economic development and nature conservation, the industries represent user interests. Neither the fishing industry nor the oil and gas industry are primarily occupied with protecting the marine environment, even though the fishing industry harvests living marine resources and thereby depends on healthy ecosystems. When there is no overlap and conflict the industries may also turn a blind eye to the damage that each of them causes to the environment. In the case of fishing versus oil, emissions to air of CO_2 or NO_x, for example, have not received attention. Hence, there will be problems that none of the sectors address. This indicates that balancing sectoral interests can help to achieve sustainable use of marine resources, but it is important to have a diverse stakeholder group that includes environmental organisations.

Our study shows that Norway has come a long way in resolving disputes and fostering cooperation between different users of the ocean. There is a close dialogue between the ministries and agencies responsible for the fisheries and the oil sector and this involves both of the industries and other stakeholders. As Grant (1978: 147) pointed out, governments can provide a framework, but this has to be 'filled out by the practices and attitudes of those whom it seeks to regulate'. The two industries also collaborate to achieve common goals and find joint solutions. In Vietnam, the relationship between the fishing industry and the oil and gas industry is much more asymmetrical. Measures have been taken in order to separate fishers and oil and gas installations, and the fishers have been offered some compensation, but principally it is the oil industry that has the upper hand. PetroVietnam is both the operator and regulator of the oil industry at the same time.

Our study clearly indicates that promoting a harmonious relationship between the main users of the ocean has a positive impact on the marine environment. In Norway, the conflicts between the fishing industry and the offshore oil and gas industry have put pressure on the authorities as well as on the industries. The tensions have been a continual source of improvement in legislation, cooperation models, the knowledge base, and relevant technology. Sustainable management of living marine resources and maintenance of clean and productive oceans are key objectives of Norwegian policy. In the coastal and marine areas of Norway, there is over-exploitation of certain species, bottom trawling has destroyed a number of coral reefs, and there is a risk of acute oil pollution, but overall, the marine ecosystems and stocks are in good condition (NMCE, 2014). During the last decades, there has been a large

reduction in the discharge of hazardous waste from the oil and gas activities (Knol, 2011), and the amount of accidental oil spills is low (NEA, 2015).

In Vietnam, the situation is bleaker. The large number of fishing boats are a significant source of pollution in the coastal and ocean areas (MONRE, 2012). Many fish stocks are over-exploited due to the overcapacity in the coastal fishing fleet. Destructive fishing practices are still widespread, with devastating consequences for the marine environment and, in particular, for vital fish breeding grounds like coral reefs and seagrass meadows (CIEM, 2012). Pollution from the oil industry is also a serious problem. There have been a number of oil spill incidents (Son and Thang, 2011). A further problem relates to the discharges from the regular oil and gas activity, which contain oil and other toxic substances with a harmful impact on the marine environment (Anh, 2011; Anh et al., 2009; Thong, 2011; Tuyet, 2011). In the regions producing and processing oil, such as the Binh Thuan and Quang Ngai provinces, the level of pollution is reported to be especially high, and this has caused serious environmental damage. Among our interviewees, also representatives of the oil industry expressed their concern about this. Due to the inadequate treatment of the hazardous waste from the Dung Quat oil refinery, many of the fishing households in the Binh Son district have been forced to move to other regions for inshore fishing. Oil pollution has clearly affected marine biodiversity, fishing and aquaculture in the coastal provinces. There has been a reduction in the number of species and their density (Thong, 2011). In addition, oil slicks and tar balls have consequences for tourism, sea transportation and many aspects of daily life (Duong et al., 2012). The Vung Tau region, with the highest level of oil production, also has the highest level of organic waste dumped into the ocean (Lan et al., 2011; Tuyet, 2011). In the 2014 Environmental Performance Index (Hsu et al., 2014), Norway ranks as number 10 and Vietnam as number 136 of 178 countries.

7. Conclusion

The coastal and ocean areas have seen a growing number of human activities that affect the marine ecosystems (Smith, 2000). According to UNEP (2006), the coastal and marine ecosystems are among the most productive, yet threatened, ecosystems in the world. The concept of ecosystem-based management has been launched as a response to these challenges. This integrated approach emphasises the links between ecosystem well-being and human well-being and seeks to sustain the ecosystems' long-term capacity to deliver the services that humans want and need. However, as we have argued, the approach tends to be biased. The main focus is on the ecosystems and the cumulative effects of human activities and influences

— the so-called ‘pressures’, whereas the issues of use conflicts and governance are paid relatively little attention. In this paper, we have, therefore, highlighted what we see as the weakest element in the ecosystem approach, namely the regulation of multi-use conflicts.

In a study of use conflicts in ocean management, Cicin-Sain noted that, ‘there has been little systematic comparative research analyzing what types of conflicts occur, where, and why, and how they can be resolved’ (Cicin-Sain, 1992: 280). The conflicts between fisheries and offshore oil and gas development are among the most well-known examples of marine use conflicts, and we have compared the relationship between these two industries and how conflicts have been dealt with in Norway and Vietnam, respectively. The character of the use conflicts seems to depend on the location of the relevant resources, the structure and development of the interdependent industries, and the extent to which they acknowledge each other as legitimate users of the sea and seabed. Similarly, the legal and institutional frameworks, the human and financial resources, the industries’ political clout, and the general environmental awareness are other important factors.

We have shown that there are noticeable differences between Vietnam and Norway when it comes to how conflicts between the fishing and the oil industry are handled. In Vietnam, the interactions are largely uncoordinated. Officially, there is no conflict of interests. In Norway, there are not only elements of a negative coordination but also a positive coordination between the two industries. The positive coordination has not developed because of the integrated management plans for the Barents Sea, the Norwegian Sea and the North Sea. Rather, it has emerged through decades of conflict and dialogue between the industries, their associations, and the related government agencies and research institutions. This has meant that the two industries now can work side by side.

Our conclusion is that resolving use conflicts is a central issue in the context of ecosystem-based management, especially in densely used areas. For the industries involved, this is important for avoiding intractable conflicts, but it is also important for the health of the ecosystems. The beneficial environmental effects arise because the industries have to consider each other’s needs, because conflicts and clarification of differences tend to raise government environmental standards and requirements, and because these processes promote knowledge generation, technology development, and the search for more sustainable solutions. Hence, to be truly integrative, ecosystem-based management has to take use conflicts and their modes of resolution much more seriously.

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