Chapter 28
Challenges and Foundations of Sustainable Ocean Governance

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Abstract The article gives an overview of environmental conflicts in the marine realm. It also explains the central challenges and elements of sustainable international resource management and environmental conservation in this area. Overall, it is intended to provide an analytical frame for the many existing ideas, theories, and arguments from political and legal sciences as well as economics that embark on the quest for the elements of effective and sustainable ocean governance.

Keywords Ocean governance • Law of the sea • Marine environmental law • Effectiveness of international law • Effectiveness of marine environmental law • Making and implementing law of the sea • Making and implementing marine environmental law • Overcoming the prisoner's dilemma and the tragedy of the commons • Governing commons • Conflict structures in the marine realm

28.1 Introduction

Technological progress and the ever-increasing demand for raw materials of the growing world population propagate the economic utilization and exploitation of the seas. As a result, the associated burdens on marine ecosystems—including pollution, overfishing, eutrophication induced from the shores, acidification, warming, and the loss of biological diversity—also continue to grow and intensify to unsustainable levels. Furthermore, exploitation interests can clash not only with each other, but also with marine environmental protection interests. For these reasons, intervention by nation states and the international community is imperative. Recent developments in important areas of the commercial maritime sector as well as the present marine environmental status in many areas of the globe, however, indicate that the existing political and legal institutions are not yet capable of permanently

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solving existing conflicts. This article, then, primarily serves as an orientation to the many ideas and arguments about the causes of marine environmental problems and possible approaches to solve them. First, an argument for the necessity of a sustainable arrangement for the use of the marine environment will be presented. Next, the fundamental structural obstacles to this will be discussed. The third step will be to discuss how these challenges can be overcome, and to identify some important elements necessary for the establishment of effective marine environmental protection regimes. The article will also bring together some of the relevant theories of environmental economics, international relations, and international law (especially international environmental law) to the problems of marine environmental conservation. Naturally, such an article can be neither comprehensive nor conclusive.

28.2 The Growing Need for Sustainable Utilization of the Seas

The protection of the marine environment from the negative effects of the advance of technology and the rise of marine exploitation was first considered shortly after World War II. Despite several conservation measures, however, up until the 1970s the relationship between humans and the seas was mainly based on exploitation (Beyerlin and Marauhn 2011: 121–143). Protection regimes only began to be created after rapidly increasing pollution became apparent, devastating accidents involving tankers took place, and the phenomenon of overfishing became understood. Since then, marine environmental policy and law have developed significantly, and now constitute independent and complex disciplines with their own extensive subcategories. The individual regimes deal with, among others, the protection of the marine environment from maritime navigation, inshore and open-sea fishing, mariculture, gravel and sand extraction, military activities, scientific research, and operations to produce oil, gas and wind energy, as well as the laying of oil and gas pipelines and energy and data cables (Sands and Peel 2012: 342–448; Rothwell and Stephens 2016: 308–346). The challenges to protect the marine environment from the effects of these diverse activities will become even more important in the future for two reasons. First, existing demand for maritime raw materials and marine space will continue to increase. Second, technology for maritime activities will continue to advance, yielding new ways to exploit the sea (WBGU 2013: 39 et. seq.; Chap. 27). Some of these trends are imaginable and identifiable: wave, current, and tidal power plants, carbon dioxide storage on the continental shelf, “intelligent” offshore energy grids, multi-use platforms, and the development of fish farming at ever increasing distances from the coast, to name a few. (WBGU 2013: 25–36; Future Ocean 2014; Chaps. 27 and 43). Moreover, the lasting development and transformation of land based activities—including agriculture, forestry, coastal tourism, the operation of harbors, and (not least!) industrial production and mining—have also been significant for conditions in the marine environment, as sewage and emissions from these

activities often end up in the seas by way of rivers, ground water, or the atmosphere (European Environment Agency 2014; Chaps. 30 and 35). In particular, the rapid conversion of land use in transition states (e.g. Brazil, Russia, India, and China) will result in an even larger increase of stress on the seas in the very near future.

28.3 Central Challenges to Achieving Sustainable Ocean Governance

There are many challenges yet to be overcome before it will be possible to achieve effective and sustainable governance of human activities in the marine environment (see also Rothwell and Stephens 2016: 506–533; Young 1994; Young 1992: 160–194). The following sections are aimed at illuminating some of the social conflict challenges, some central informational and conceptual challenges, some legal and institutional challenges, and finally some of the individual and state self-interest challenges behind the continuing depletion of the marine environment and its resources.

28.3.1 Social Conflict Challenges

There are four main types of social conflict that emerge when dealing with marine and maritime interests. First and foremost are allocation conflicts among *users of a single resource*. For example, a fair distribution of fishing resources among fishers must be organized and structured. Second, conflicts exist among *users of different resources.* For example, a growing number of disputes emerge between fishers and offshore wind farm operators or mining companies about the use of particular (especially near-shore) areas. Third, the continuous technology and market driven expansion of maritime activities as well as their increasing environmental impacts require reconciliation between *user and conservation interests*. An example of this are the environmental regulations in areas of classic utilization, such as shipping, fishing, and offshore oil and gas extraction, which have progressively tightened over the last decades (Beyerlin and Marauhn 2011: 121–143; Sands and Peel 2012: 324–448). Finally, *inter-ecological conflicts* have been occurring ever more frequently. For example, offshore wind mills provide for energy production with low CO_2 emissions (and thus decreased ocean acidification), but they negatively impact the marine environment by creating noise, consuming energy, and striking birds. Another example is the use of ship scrubbers. While they do clean harmful ship emissions and thus help reduce atmospheric inputs into the atmosphere, their operation may also lead to pollutants entering waters (Markus and Helfst 2014).

The issues arising from these social conflicts can also be defined through their *cross-sectoral and cross-border problem structures* (Markus et al. 2011: 59–90; Erbguth and Schlacke 2014: 415 ff.; Chap. 49; Scott 2015: 463–489). Regarding

the cross-sectoral aspect, it is key that impact-reducing measures in the areas of agriculture, fishing, transportation, industry, energy and defense policy actually contribute to marine environmental protection. Practically speaking, however, measures adopted under these specific policies are usually designed to fulfil sectoral interests by solving sectoral problems. As sectoral measures mostly are not made with the intent to primarily protect the seas, they are often not aligned with the needs of the marine ecosystem but instead the particular interests, goals and logic of individual sectors and fields of policy. The result of such an approach is almost always a failure to produce a systematic, coherent conservation concept which integrates all cumulative anthropogenic impacts (Salomon and Dross 2013; Markus et al. 2011: 1–32 ff.; Markus 2009: 15–24). Complicating things further, the various anthropogenic impacts, the ecosystem to be protected, and the ecosystem services often extend beyond national borders. This situation demands international, or at least, cross-border balancing of the clashing interests. Compared to environmental problems at the local or national level, cross-border issues often come with more actors and competing interests. This quite naturally increases the complexity of the conflicts and raises the transaction costs of their solutions.

28.3.2 Information and Conceptual Challenges

The protection of the marine environment requires a broad scientific understanding of its ecological state and its resources, as well as the specific and cumulative effects of various anthropogenic impacts. Furthermore, a fundamental understanding of the socio-economic and technical backgrounds of utilization and regulation is required for governing and controlling activities which impact the seas.

Currently, considerable knowledge gaps exist in many areas with respect to the marine environmental status and the dynamics of anthropogenic induced impacts (WBGU 2013: 39 ff.; Markus 2013: 1–21). In particular, the effects of future utilization are nearly impossible to predict. In many cases, sound and intercalibrated scientific evaluation methods are missing at the national and especially the international level. Where data does exist regarding specific impacts, it often is fragmented, both with regard to substance and standardization; available information from different sources is often difficult to integrate (Markus 2013: 1–21; Markus et al. 2015: 162–163; Chap. 52; regarding biodiversity, see Markus 2017a). Thus, national and international conservation efforts must be aware of all of the challenges and costs of collecting scientific information about the marine environment when designing their management regulations, strategies, programmes, measures, and actions.

Besides the immediate need for information, a fundamental, conceptual challenge exists in the field of marine environmental conservation. Against the background of the substantial differences between sea and land, the question arises as to what extent the legal instruments and measures originally designed for terrestrial problems can be applied to the sea, and to what extent they could contribute to solv-

ing conservation and utilization conflicts there (Wolf 2010: 365–371). The sea as a geographical space for human activities comprises the seabed and its subsoil, the water column, the sea surface, and the air space above. Utilization and inputs usually take place from the surface into the water column or at the seabed and its subsoil. In contrast to land, the sea surface itself has a relatively low utilization value. This poses a significant difference between the anthropogenic use and impact dynamics in the marine ecosystem and on land, which is why maritime environmental protection has to be conceived three dimensionally rather than two dimensionally as it is in terrestrial conservation (see also Wolf 2010: 366; Heselhaus 2011, para. 6–7). Furthermore, the acquisition of private property over space in the seas does not affect conservation efforts as it does on land (see also Heselhaus 2011, Rn. 7).

In order to successfully integrate the data and information into political or legal processes, it may be important that they are collected or generated in a certain manner. This is particularly true for the adoption of international environmental agreements as well as for their implementation. To allow for mutually candid bilateral or multilateral negotiations, the knowledge utilized in the process must be understood and accepted by all parties. For this, procedures and institutional mechanisms which convey and promote the clarification, neutrality, plurality, intercalibration, and quality of the relevant information may be required (Gillespie 2006: 211–226; Markus 2013: 1–21).

Furthermore, there is a considerable need to scrutinize the *implementation and observance* of regimes established. Knowledge about the implementation and observance is a fundamental requisite for a deeper understanding of the functioning and effectiveness of any regime and thus provides the basis for any necessary adjustments and developments. In addition, awareness about the effectiveness of the rules is an important incentive for the addressees of the rules to follow them (Ulfstein et al. 2007: 4–5; Markus 2016b).

28.3.3 Legal and Institutional Challenges

Marine conservation efforts are embedded in a complex network of global, regional and national regulatory systems. Existing regimes are usually substantively and geographically restricted. Often, they only address specific problems of marine environmental protection or alternatively are only effective locally or regionally. From a global perspective, this results in a complex, fragmented, overlapping, uncoordinated, and partially incoherent legal and institutional marine protection system.

The starting point of all law on marine environmental protection is the United Nations Convention on the Law of the Sea (UNCLOS) from 1982. Quoting Tommy T.B. Koh, of Singapore, President of the Third United Nations Conference on the Law of the Sea, UNCLOS is often referred to as the "constitution for the oceans". In its preamble, it declares that the contracting member states are "[p]rompted by the desire to settle, in a spirit of mutual understanding and cooperation, all issues relating to the law of the sea […]". UNCLOS divides the seas into different zones and

allocates the coastal states sovereign powers, rights and duties (see, for example, Markus 2017b). UNCLOS distinguishes between so-called inland waters, territorial waters, archipelagic waters, exclusive economic zones (EEZ), the continental shelf, as well as the high seas and the so-called "Area", the latter being defined in Art. 1(1) UNCLOS as the 'seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction'. Whereas—in principle—the sovereignty of the coastal states extends to inland, territorial and archipelagic waters, they only have functionally limited sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources in the EEZs and on the continental shelf (Art. 56 and Art. 77 UNCLOS). The high seas stretch beyond the EEZ and the continental shelf. Here the "freedoms of the high seas" apply (freedoms of shipping, overflight, laying submarine cables and pipelines, installing systems, fishing, scientific research, etc.) Below the high seas water column lies the so called Area, which subjects to the 'common heritage of mankind' principle and is administered by the International Seabed Authority (Art. 136 ff. UNCLOS).

Besides zoning the seas and assigning certain sovereign powers, UNCLOS also prescribes duties to protect the marine environment (Art. 192–237 UNCLOS). Regulations relevant to the protection of the marine environment can also be found in other conventions, such as the Convention on Biological Diversity (CBD), the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). Marine protection treaties also exist at the regional level as a product of the Regional Seas Programme of the United Nations Environmental Programme (UNEP) (Hafner 2006: 417 ff.). In northern Europe, this has resulted in the Convention for the Protection of the Marine Environment of the North-East Atlantic of 22 September 1992 (OSPAR Convention) and the Convention on the Protection of the Marine Environment of the Baltic Sea Area of 9 April 1992 (Helsinki Convention). In addition to agreements pursuing nature or species protection, sectoral international treaties are also essential for marine conservation (which constitutes one of the challenges for sustainable ocean governance, see above). Such treaties regulate specific activities and uses of the seas, e.g. the Agreement of 4 August 1995 for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stock (FSA). The success of marine environmental protection highly depends on the effectiveness of these conventions.

International marine environmental law is thus comprised of a patchwork quilt of regulations, competences and institutions, which should be coordinated and integrated to a certain degree. In practice, this integration is lacking all too often (for example, Markus and Singh 2016: 347–362; Zimmermann 2008; Rayfuse 1998: 579–605; Rayfuse 2004). For example, coastal states in Europe are increasingly developing spatial and sectoral planning instruments for marine areas under their jurisdiction (Chap. 54; Douvere and Ehler 2009: 77–88; Schubert 2015), but this is happening in a largely uncoordinated fashion. On the high seas, corresponding

initiatives such as marine protected areas are highly restricted in scope, particularly in their geographical range as well as their level of protection (e.g. Matz-Lück and Fuchs 2012: 532–542). Even in the EU, for example, the various national marine policies are hardly coordinated and aligned (Markus et al. 2011: 59–90).

28.3.4 Individual and State Self-Interest Challenges

The following sections will discuss in further detail some actor dynamics which cause overburdening and overutilization of the marine environment and thus necessitate governmental intervention. Further, key negative incentives for states will be highlighted which make the adoption of international measures and conventions to protect the seas difficult.

28.3.4.1 Individual Interests and Social Dilemmas

As previously discussed, global population and economic growth, technological advance, changing consumption patterns, and the spatial concentration of economic activities constitute the basic drivers behind many marine environmental problems (Chaps. 26 and 27; WBGU 2013). While theoretically, the environmental problems created by these drivers could be mitigated or solved (for example, as long as they could be neutralized through energy and resource efficiency, or the use of environmentally friendly technology, or a shift towards consuming more environmentally friendly goods), these potential solutions are not typically implemented due to socio-economic dynamics.

The root cause for environmental problems is traditionally seen, especially by environmental economists as the destructive incentive structure in which the actors find themselves; it is this structure which fundamentally defines the relationships between the many users of environmental goods. From an economic point of view, the marine environment in its entirety, the individual ecosystem services it provides, and its resources constitute so called *common pool resources* (and thus a special case of what economists term as *public goods*) (Posner and Sykes 2010: 569–596; Cooper 1975: 357–377; for an early analysis, see Gordon 1954: 124–142). Common pool resources are defined by two central characteristics (for more details see Madison et al. 2010: 839–850). First, common goods in nature are subject to little control or authority (or sometimes none at all), which means that excluding individuals from using them is for the most part impossible. Secondly, their use is characterized by scarcity and rivalry, which means that the use of the environmental good by one actor reduces or makes more expensive the use by others (this burden imposed on third parties is usually termed *externality*). In sum, profits are usually privatized while costs and losses are usually socialized. For example, fishing

activities by some reduce the opportunities and raise the costs for other fishers to catch fish. Also, the extraction of non-renewable resources such as oil, gas, minerals, sand, and gravel reduces the amount available to other parties and makes further extraction more complicated and expensive. In addition, the marine ecosystem's ecological carrying capacity and its potential to provide ecosystem services may be seen as common pool resources. Utilization and harm of every kind can affect ecosystem services, impairing, for example, marine waters' ability to promote biological diversity or provide clean coastal waters for recreational use. Finally, even marine resources which have yet to be discovered could be regarded as common pool resources. In principle, every newly discovered resource makes the search for other undiscovered resources more expensive (Posner and Sykes 2010: 569–596).

The public nature of marine environmental goods and the rivalry between users creates a social dilemma which is widely referred to as the '*tragedy of the commons'* (Gordon 1954: 124–142; Hardin 1968: 1243–1248; partially revising Hardin 1998: 682–683). From the point of view of a rationally-acting user of marine environmental resources, the situation is as follows: exploitation costs will decrease and profits will increase if competitors restrict their exploitation activities in order to preserve the environment or to promote the efficient distribution of the contested resource. An economic incentive thus arises to not contribute to conservation or the efficient use and to pocket higher profits (*free-riding*). If competitors, however, do not undertake any efforts for conservation or the efficient distribution of the resource at all, forgoing benefits of resource exploitation would be totally irrational from an economic perspective, because (a) the rational user would not be able to guarantee the preservation of the resource by himself alone, (b) as a single contender, only he or she alone would lose profits, and (c) the advantages of forgoing would solely benefit the competitors. This mostly ends in individual strategy decisions which lead to inefficient and destructive results for the community (Weimann 1995: 66 ff.). Not least, the competitive situation within the social dilemma is exacerbated by the fact that for single competitors, short-term, calculable profits have a higher value than long-term non-calculable benefits. That, again, results in exponential increase in pressure to utilize (also referred to as the *race to resource* or *race to fish*, etc.).

The solution to this dilemma can only come through cooperation among involved users which aims at an overall limited and efficient use and distribution of the resources. As seen above, though, such cooperation is difficult to obtain. Against this backdrop, traditional environmental economics has drawn two strategic conclusions: either utilization rights should be allocated under state control, or the common pool should be transferred to be private property (as already stated by Hardin 1968: 1243–1248). Both solutions would require external control and neither has proven to be consistently successful in practice. In particular, recent studies have shown that limiting oneself intellectually to these two solutions does not help to meet the challenges of the problem, and that, despite the social dilemma, cooperative solutions are possible by means of internalized norms and successful communication (Ostrom 1990; Ostrom 2010b: 641–671). Before all others, *Elinor Ostrom* identified eight 'design principles' in extensive studies that promote independent, largely autonomous cooperation solutions (Ostrom 2010b: 641–671). The principles include, for

example: clear and accepted borders between legitimate users and non-users; sanctions which become increasingly severe when rules are broken repeatedly; precise monitoring of the resources and their users; local avenues for quick resolutions of conflicts; a minimum level of competences to create rules; and a non-hierarchical and polycentric system of decision making.

There is obviously a difference between solving local and global problems. The potential of local or regional cooperation to solve problems is, however, also of great importance for supra-regional and global marine environmental protection as international marine environmental policy is dependent on local and regional participation in its development and implementation. Additionally, solving global environmental problems usually takes much time, so the prior development of bottom-up initiatives is an essential factor for solving environmental problems.

28.3.4.2 States' Negative Interests

Despite the possible potential of autonomous governance approaches, state regulation seems indispensable in resolving local, regional and especially global environmental and resource problems. Considering the cross-border nature of such issues, this generally needs to be done cooperatively by groups of states. At this level, however, negative structural incentives can discourage states from cooperating with each other.

First and foremost, the social dilemma discussed above also occurs to some extent at the international level. If not all relevant states participate in the creation and implementation of a treaty concerning the conservation of a specific aspect or element of the marine environment, the position of states willing to participate is as follows: why should states participate in the cost intensive development and implementation of a treaty, when (a) through their unilateral action the preservation of the resource cannot be guaranteed, (b) they would lose their (short-term) benefits, (c) the advantages of their forbearing would only benefit other states? At the same time though, one should not overestimate the heuristic value of this social dilemma model to explain international relations (Rao 2002: 47–91); In the international framework, the complexity of interests and inner structures of the institutional players far exceeds the somewhat overly simplistic rationale of the *homo oeconomicus* (Wiener 1999: 749–794; Sprinz and Vaathoranta 1994: 77–105; Barrett 2003; Bodansky 2010: 108–190). Negotiation situations in particular are characterized by a complex set of international and national interests and values. To use *Putnam's* words, international negotiations are complex 'two level games' (Putnam 1988: 427–460).

With respect to environmental protection in general and marine protection in particular, the central challenge to cooperative problem-solving at the international level is that negotiating parties often have varying or even conflicting economic interests and differing values regarding nature. Beyond that, states usually have the tendency to shy away from the costs of designing and implementing new international treaties (especially creating new administrative structures). Not to mention,

states are generally unwilling to suffer sovereignty costs (i.e. shifting power away to the international level), have diverging perceptions of the problems in question, and differ greatly regarding their administrative, technical and financial problem solving capacities (Bodansky 2010: 136–190; Markus 2016b).

Furthermore, the varying forms and complexities of problems and their causes, as well as the geographical and substantial fragmentation of competences and responsibilities, weigh heavily in international marine protection. Matters such as fishing, oil, gas and mineral extraction, as well as shipping are central areas of national sovereignty: the mining of resources deals with the energy and natural resource supply (energy sovereignty), fisheries touch on the planning and safeguarding of food supplies (food security/food sovereignty), and the regulation of shipping may encroach on national trade and geostrategic interests (Purohit and Markus 2013: 13–30; Markus 2016b). The final obstacle to mention here is that maybe, with the exception of the conservation of "very likeable species" (i.e. the polar bear or the orca), marine protection in its entirety tends to be rather abstract, complicated, and distant, and the problems are perceived in different ways in individual regions. A critical, trans-border general public community which effectively engages for the protection of the seas is thus slow to develop.

28.4 Foundations of a Sustainable International Ocean Law

As shown above, the need for a political, legal, and institutional framework for the sustainable use of the seas is growing. At present, the most crucial actors for the overcoming of the outlined problems are states. They develop, structure, and negotiate their solutions and strategies and then inscribe and fix them into international conventions (on the relevance of treaties in international law see generally Koch and Mielke 2009: 403–409; Simma 1994: 221–384). Considering the central role which states and their interstate agreements play in addressing marine environmental issues, the following shall discuss how the effectiveness of conventions can be maximized to solve the respective problems. The starting point of this discussion will be the fundamental question as to why states conclude international treaties and why they adhere to them (or why they do not) (e.g. Markus 2016b; Beyerlin and Marauhn 2011: 315–388; Bodansky 2010: 138–190; Barrett 2003; see also Brunnée 2003, 2012) fundamentals Bothe 2010, paras. 6–18; Guzman 2008; Koh 1997: 2599–2695; Neuhold 1999: 84–124; Henkin 1968; Joyner 1998: 271–309). As an overview and for simplicity reasons, factors that could encourage contractual solutions to cross-border environmental problems can be divided into three groups (Markus 2016b): Those which (1) encourage development and conclusion of international treaties, (2) are of substantive or material nature, and (3) promote an effective implementation. It should be kept in mind that the different aspects of the law making, the substance of the law and the implementation of law, are relatively dependent on each other (Koh 1997: 2649; Markus 2016b). In addition to these

factors, other factors like the existence of reciprocal interests between states, their potential to use force or other sanctions to promote compliance, and possible reputational interests are deemed to play an important role in solving issues within the framework of international agreements (von Aaken 2013: 227–262).

It is usually not enough to ask in isolation either under which circumstances states conclude treaties, or whether a treaty's content is suitable or adequate to solve the problem, or why the treaty is eventually implemented. Instead, it is more reasonable to try to comprehensively clarify under which circumstances an international convention achieves the solution of a concrete problem, (i.e. problem effectiveness), as an isolated view of a single or random selection of measures and factors could lead to the neglect of other important measures or a misinterpretation of their relative importance.

For pragmatic reasons, various developments and actors which in reality play an increasingly important role in marine environmental protection have been disregarded here. One such case is the continuous transformation of the state and their national and international laws that govern cross-border or global societal developments and problems (Alston 1997: 435–448; Twining 2000; Berman 2014; Sousa de Santos 2002). This is also not the place to go into detail of cross-border private or subnational forms of cooperation, such as Stewardship Councils (Marine & Aquaculture), administrative networks, and NGOs acting quite independently of their nations in the influencing of law making (see for this, e.g. Boyle and Chinkin 2007: 41–209; Herberg 2008: 17–40; Winter 2012: 103–145; Winter 2006: 1–33; Dilling and Markus 2016; see also articles in Dilling et al. 2011).

28.4.1 Elements of Successful Negotiations of International Environmental Protection Conventions

The first category of elements contains those elements which can help the conclusion and development of international agreements (Franck 1990; Chayes and Chayes 1995; Palmer 1992: 259–283; Boyle and Chinkin 2007: 22–40; Bodansky 1999: 596–624). These can be further divided into domestic and international factors (note the description of the 'two-level game', above). Without domestic political consent, states cannot engage in much binding foreign policy. Thus, in general, it should be noted that foreign policy interests of states are not only determined by their external economic or geostrategic interests but to an important extent by their predominant internal economic conditions and values, the technological solutions available, as well as the level and distribution of costs of potential environmental protection measures.

Both at the domestic and interstate level, it is important that problem-framing takes center stage. This includes that the most credible information possible about the environmental problem is available, especially information on its effects and the possible costs of non-action. It also includes that the positive effects of the solution

must be made clear. The more precise and illustrative the problem and possible courses of action are depicted, the better they can be communicated and negotiated through the political process.

Further, agreement on effective problem-solving approaches depends on whether a large group of strong private and state actors can successfully be brought on board. In that regard, it is not only important to gain the support of ecological interest groups, but also to provide for economic growth, jobs, the development of innovative industries, and the inclusion of other actors (e.g. offshore renewable energy sector; sustainable fishing; sustainable tourism, etc.)[1] These findings apply equally to the inter-state level. Also here, alliances of strong actors benefit the conclusion of effective international agreements.

Additionally, political windows of opportunity are often required for successful contractual framing or development. Events and situations such as catastrophes (e.g. algae outbreaks, tanker accidents, beached whales, collapse of commercially used fish stocks, etc.), domestic elections, the political responsibility and public interest of states in the context of international conferences (e.g. Conferences of Parties), and the redirection of interests (e.g. the exit from nuclear energy and the expansion of renewable energies in Germany) can potentially influence values, the perception of problems, the constellations of actors and so on in favor of marine protection.

From a procedural perspective, it seems reasonable to assume that a sensible amount of participation from regulates, experts, and the public improves both the technical and social regulatory context and the quality and effectiveness of legislation. Having said that, finding the right amount of participation of civil society in international negotiations is not only organizationally challenging but also problematic from a legitimacy point of view (Boyle and Chinkin 2007: 57 ff.). Essentially, the right amount of participation should be identified, determined and negotiated in each case. The basis of any form of participation is, however, that international negotiations have a high degree of transparency, which the public will be able to understand and assess, and then politically react to the process.

Another important factor is the choice of which national ministry or international organization has the mandate to prepare regulations or treaties (forum choice). It should be recognized that considerable differences exist between the individual ministries and international forums regarding their protection interests, technical competences and organizational and institutional facilities (see e.g. Markus and Ginzky 2011: 477–490; Ginzky 2014: 105–117).

Not least, the conclusion of an international treaty also depends on the personal leadership and negotiation skills of the respective negotiators as well as their official mandates (Boyle and Chinkin 2007: 103–108 and 144–151; Bodansky 2010: 136–190). This is true not only for Conferences of Parties themselves, but also for the preparatory conferences of the technical and legal working groups (Ginzky 2014: 105–117; Markus 2016b). So-called pioneer states play an important role here,

[1] Various scholars show the possibilities of economic growth based on energy and raw material efficiency, see among others and with further references E.-U. von Weizsäcker 2009.

because they take on technical, organizational, and political responsibility for the success of the development process (Lindenthal 2009). Regarding the negotiation mandate, it is especially important that it is formulated clearly and that the negotiating parties agree on the 'right' type of regulation (resolution, model law, binding framework agreement, etc.), choose a functionally adequate but also politically achievable regulatory frame for the future agreement's scope (content, geographic, as well as participating parties), and aim at the right intervention and control intensity (Bodansky 2010: 136–190).

28.4.2 Substantial and Material Elements of Successful Environmental Conventions

Regarding the substantial factors that help solve cross-border environmental problems in general and marine protection in particular, it is reasonable to differentiate between formal and material elements. For the former, the following elements are worth mentioning:

- The clearest structure and language possible (Chayes and Chayes 1995: 10–13);
- Procedures or institutions to control and promote implementation (scientific councils, secretariats, monitoring, reporting, and dispute settlement mechanisms, etc.);
- Flexible regulations that are open to development and enable quick adaption to new or worsening environmental problems;
- A balanced mixture of clear-cut binding regulatory duties on the one hand and market based mechanisms on the other.

With regard to material elements, rules within national laws or international treaties seem to be most effective when they are suitable to actually solve the social problems at hand. For example, concerning international protection of species and habitats, the last decades have clearly shown that *ad-hoc* moratoriums and comprehensive utilization bans are not very effective and may cause considerable problems in and of themselves. It has been shown more than once that the general possibility for utilization and participation of interested users in management decisions can be an incentive for conservation (Markus 2016b). Furthermore, conventions seem to be more effective when they also generate clearly visible benefits for the parties besides the associated costs. Win-win situations should thus be created and clearly communicated, with particular attention given to the creation of synergies with other policy fields (e.g. renewable energies as business sector of the future; certified fish production, etc.).

It is also assumed that the integration of justice considerations and respective discourses in international negotiations promote a will by those regulated to follow the law (Hurd 1999: 379–408; Albin 2001; Franck 1995; WBGU 2013: 335–337; Epiney 2007: 31–38). If integrated effectively, such considerations could have an effect on regime adherence with regard to, for example, the distribution of mineral

resources in the deep seabed, or more generally on distribution equity in international environmental law (Czarnecki 2008).

28.4.3 Elements of Successful Implementation of Environmental Conventions

With regard to the implementation of international conventions, the question should also be asked as to which elements within these conventions promote the solution of environmental problems (for this, see among others the works and ideas in Ulfstein et al. 2007; in Treves et al. 2009; as well as in Beyerlin et al. 2006; Zimmermann 2007: 15–47; Markus 2016b). Some of the elements listed above should also be named here, but it should be highlighted that effectiveness and control in international and supranational law are dependent on the ability of nation states to legitimize, apply and enforce it. Groups of states bound by international law or international organizations often do not have the sovereign powers or means to apply and enforce the law agreed in the respective institutional frameworks, so international enforcement of multilateral environmental treaties thus still plays a secondary or subsidiary role in practice. As a result, it is important to see how solutions laid down in international conventions can be implemented at the national level in a way that is in line with the goals agreed on at the international level, as well as to see how they can be integrated into internal legal and institutional structures. The following are some characteristics of successfully implemented conventions:

- A culture of compliance in the national authorities and courts;
- Sufficient administrative expertise;
- The lowest possible implementation costs;
- Parallel domestic interests which will be positively affected by fulfilling international conservation duties;
- An existing public interest (i.e. the public interest may also be created by the duties from the international treaty);
- Specific and quantifiable requirements (as opposed to mere regulatory objectives, which are comparatively difficult to implement and control) (Bodansky 2010: 178 ff.);
- Cross-compliance mechanisms at the international level (i.e. the benefits guaranteed to addressees of rules in other policies and areas of law are made dependent on the fulfillment of their environmental duties);
- Joint implementation with other states through an international control system (scientific councils, secretariats, monitoring, reporting, and dispute settlement mechanisms, etc.);
- The inclusion of non-state actors in the control of implementation (complaint procedure; expert commissions, etc.) (Epiney 2006: 319 ff.).

In the area of international environmental law (including marine environmental law), it is especially important that in addition to sanction processes and dispute settlement procedures, treaties include mechanisms that promote their implementation (managerial approach) (Chayes and Chayes 1995; Raustiala and Slaughter 2002: 538–558). Apart from equipping a treaty regime with institutions such as secretariats, scientific committees, control committees, etc., the implementation can also be advanced through mechanisms such as technical and legal support (through technical and legal implementation guides), financial support (through funds and loans, etc.), as well as through procedures to include the public, the addressees of rules or independent experts.

28.5 Conclusion and Perspectives

This article gave an overview of the structures and causes of environmental conflicts in the marine realm. It also explained the central challenges and elements of sustainable international resource management in this area. The cursory character and style was necessary to introduce the many existing interpretations, theories and arguments. Individual aspects, such as the question of the possibility of just treaty terms, are the subject of extensive special literature, extracts of which were referred to here. For pragmatic reasons, various other developments which play an increasingly important role in the reality of marine environmental protection were disregarded: among others, the continual transformation of states and the increasing importance of cross-border private and subnational state cooperation. It should be highlighted that states and their law (in common) are only partial aspects to the solution of cross-border marine environmental problems. Inspired by Elinor Ostrom's terminology, the solution of marine environmental problems should be understood as being 'polycentric', i.e. to be achieved by many different actors (Ostrom 2010a: 550–557). In the future, all stakeholders will need to be effectively mobilized to achieve the goal of sustainable utilization of the seas.

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