CHAPTER 1
Introduction

One of the most, if not the most, daunting problems humankind is currently facing is climate change. The issue is ubiquitous. Constant reminders that climate change is progressing are provided daily when watching, reading, or listening to the news. The impacts of climate change, including storms, heat, and drought, are well known and frequently mentioned.[1] However, not all effects of climate change have received equal attention. Those impacts that are not immediately visible have particularly been flying under the radar. One such impact is ocean acidification (OA).[2] The oceans have long served as an enormous carbon sink. In fact, they have absorbed up to 39 per cent of the carbon dioxide (CO_2) produced since the Industrial Revolution.[3] Although this uptake has limited the amount of CO_2 in the atmosphere and thereby mitigated impacts on land, it has come at a high price.[4] Ocean chemistry is undergoing substantial changes, including a 30–40 per cent decrease in ocean pH compared to pre-industrial levels.[5] These changes are referred

[1] See, for example, Mark Poynting and Esme Stallard, 'How Climate Change Worsens Heatwaves, Droughts, Wildfires and Floods' (*BBC News*, 9 August 2021) www.bbc.com/news/science-environment-58073295 accessed 8 December 2023; Rachel Ramirez, 'Without Climate Change, These Extreme Weather Events Would Not Have Happened' (*CNN*, 15 June 2023) www.cnn.com/2023/06/15/world/extreme-weather-events-climate-change/index.html accessed 8 December 2023; Dawn Liu and Denise Chow, 'China's Summer of Extremes Has Farmers Worried' (*NBC News*, 8 August 2023) www.nbcnews.com/news/world/china-floods-drought-farming-wheat-climate-change-rcna96111 accessed 8 December 2023.

[2] Cf. Sandra L. Cooke and Sojung C. Kim, 'Exploring the "Evil Twin of Global Warming": Public Understanding of Ocean Acidification in the United States' (2019) 41 *Science Communication* 66, 67.

[3] Galen A. McKinley and Others, 'External Forcing Explains Recent Decadal Variability of the Ocean Carbon Sink' (2020) 1 *AGU Advances* 1, 1.

[4] Cf. Megumi O. Chikamoto, Pedro DiNezio and Nicole Lovenduski, 'Long-Term Slowdown of Ocean Carbon Uptake by Alkalinity Dynamics' (2023) 50 *Geophysical Research Letters* 1, 1; Hilal Elver and Nilufer Oral, 'Food Security, Fisheries and Ocean Acidification: A Human Rights Based Approach' in David L. VanderZwaag, Nilufer Oral and Tim Stephens (eds), *Research Handbook on Ocean Acidification Law and Policy* (Edward Elgar Publishing 2021) 75.

[5] Helen S. Findlay and others, 'Ocean Acidification around the UK and Ireland' (2022) *MCCIP Rolling Evidence Updates* 1, 3.

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to as OA. However, OA is more complex than it initially appears, as it is not solely related to CO_2 emissions. For instance, processes in the coastal zone can also create OA hotspots in coastal waters.[6] Whether in the open ocean or coastal areas, OA negatively impacts many marine organisms and ecosystems.[7]

Once CO_2 reaches the seawater, a series of chemical reactions follows, causing the water to become more acidic.[8] This rise in acidity makes carbon ions less available as building blocks for shells, corals, and other marine organisms. Therefore, building and maintaining structures such as shells becomes difficult for these so-called calcifying organisms, including oysters, sea urchins, and some types of plankton.[9] However, non-calcifying species can also be affected by these changes in ocean chemistry. For example, certain fish may experience behavioural changes and become unable to detect predators.[10] Thus, more acidic waters pose a risk to the entire food web as well as to the people relying on it. Many individuals and economies depend on fish and shellfish for their daily calorie intake.[11] Chapter 2 will provide the non-scientist reader with a detailed overview of what the problem is and its repercussions.

While OA has become a topic of intense discussion in the scientific literature,[12] in the international social science literature, the problem has received much less attention (see below). Indeed, policy changes to address this issue at the international or regional level are scarce, and no laws have been passed at the international level to address OA. To increase understanding of OA and the governance landscape surrounding this issue, this book will explain OA for non-scientists and investigate the problem from a governance perspective. More specifically, this book will explore how OA is and should be governed in light of the nature of the problem it presents.

When examining how OA is and should be governed, the focus is on identifying the forms of governance applied to OA rather than providing exhaustive details of the governance landscape. In addressing the 'should' question, the focus is on assessing the suitability of a global experimentalist governance framework for OA. That said, a brief appraisal of the current governance landscape is included in Chapters 3 and 5 (for a longer explanation, see Annex B).

[6] Ryan Kelly and others, 'Mitigating Local Causes of Ocean Acidification with Existing Laws' (2011) 332 *Science (New York, N.Y.)* 1036, 1036.

[7] See, for example, Scott C. Doney and others, 'Ocean Acidification: The Other CO_2 Problem' (2009) 1 *Annual Review of Marine Science* 169.

[8] Ibid., 172.

[9] Steeve Comeau and others, 'Pacific-Wide Contrast Highlights Resistance of Reef Calcifiers to Ocean Acidification' (2014) 281 *Proceedings: Biological Sciences/The Royal Society* 1, 1; Secretariat of the Convention on Biological Diversity and others, *An Updated Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity* (2014) 7, 13, 14.

[10] Arctic Monitoring and Assessment Programme and others, *AMAP Assessment 2013: Arctic Ocean Acidification* (2013) 50; Secretariat of the Convention on Biological Diversity and others (n 9) 8, 46, 70.

[11] Secretariat of the Convention on Biological Diversity and others (n 9) 82.

[12] Cf. Dan Laffoley and others (eds), *An Introduction to Ocean Acidification: What It Is, What We Know, and What May Happen* (International Union for Conservation of Nature and Natural Resources IUCN 2017) 8.

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Before starting to explore the question posed above in the following chapters, this introduction will provide an overview of the relevant social science literature regarding OA (Section 1.1), the methods used (Section 1.2), and the argumentation employed (Section 1.3).

1.1 The Relevant Social Science Literature

Before delving into the question of how OA is and should be governed, it is imperative to understand the literature. As OA is an environmental problem that can be scientifically explained, the state of the natural science literature also needs to be consulted in addition to the law and governance literature. Without a firm understanding of the science behind OA – including, for example, the problem's causes – it is difficult to find governance solutions that can tackle OA. OA, by its nature, is a very complex and creeping problem that will endanger ecosystems and humans alike. Unsurprisingly, OA science and scientific literature have grown rapidly over the years to gain a better grasp of the issue.[13] In fact, research on OA has become one of the fastest-developing fields in the marine sciences.[14] This rich body of literature explains not just the causes of OA but also engages in many more important questions surrounding OA. For instance, researchers attempt, through different experiments, to understand the reaction and resilience of various species in the face of changing ocean chemistry.[15] Researchers are also working to understand how OA and other ocean stressors, including fishing and ocean warming, interact.[16] Thus, the body of scientific literature contains many highly specific and technical papers, which makes it difficult for the non-scientific reader to understand. Nevertheless, a sound understanding of OA is necessary to answer the research question and, specifically, to investigate how OA should be governed. Therefore, Chapter 2 of this book will provide the non-scientist reader with an overview of what OA entails.

While the scientific literature is quickly growing, the topic has only recently entered the social science literature as a point of discussion. This review will provide an overview of the development of two strands of literature relevant to this book: the law and global governance literature. First, it will examine how these two bodies of literature understand and frame OA. Second, it will explore how they currently classify the governance landscape of OA. Finally, it will summarise both the

[13] Cf. ibid.

[14] Ulf Riebesell and Jean-Pierre Gattuso, 'Lessons Learned from Ocean Acidification Research' (2015) 5 *Nature Climate Change* 12, 12.

[15] Daniel S. Swezey and others, 'Evolved Differences in Energy Metabolism and Growth Dictate the Impacts of Ocean Acidification on Abalone Aquaculture' (2020) 117 *Proceedings of the National Academy of Sciences* 26513; Kristy Kroeker and others, 'Kroeker K. J., Kordas R. L., Crim R. N. & Singh G. G. – Meta-Analysis Reveals Negative yet Variable Effects of Ocean Acidification on Marine Organisms', (2010) 13 *Ecology Letters* 1419.

[16] Isabelle M. Côté, Emily S. Darling and Christopher J. Brown, 'Interactions among Ecosystem Stressors and Their Importance in Conservation' (2016) 283 *Proceedings of the Royal Society B: Biological Sciences* 20152592.

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legal and governance literatures. This book positions itself within and builds on these literatures, including their shared understanding, framing, and description of the governance landscape concerning OA. Therefore, this literature review will closely analyse how both law and governance literature understand and frame OA (Section 1.1.1) and describe the existing governance landscape of OA (Section 1.1.2). After this, the discussions of OA law and governance will be examined separately (Section 1.1.3). This is because, despite their common debates regarding understanding, framing, and governance landscape, they focus on different questions and constitute separate bodies of literature.

1.1.1 Understanding and Framing of Ocean Acidification

The understanding of how OA can be framed and presented as an issue has rapidly evolved in the international law and governance literature. Originally, many authors, such as Simons and Stephens,[17] Baird and colleagues,[18] Downing,[19] Stephens,[20] and Kim,[21] focused their discussions on OA primarily on mitigation, specifically the reduction of CO_2 emissions. At most, geoengineering activities were considered alongside emission reductions.[22] This narrow perspective on OA restricts the initial discussions regarding law and governance to the mitigation of these emissions. The only outlier at the time appears to be Billé and colleagues,[23] who considered, among other topics, 'Local Factors of Ocean Acidification' and 'Strengthening Ecosystem Resilience to Ocean Acidification'.[24] Otherwise, Simons and Stephens' thoughts on OA reflect the characteristics of the early OA literature: '[i]n contrast to climate change, where there is the possibility of mitigation, adaptation and even geoengineering solutions (…) ocean acidification can only be effectively addressed by mitigating CO_2 emissions or drawing them down into terrestrial biomass. With ocean acidification there is limited capacity to adapt'.[25]

[17] Meridith Simons and Tim Stephens, 'Ocean Acidification: Addressing the Other CO_2 Problem' (2009) 12 *Asia Pacific Journal of Environmental Law* 1.

[18] Rachel Baird, Meredith Simons and Tim Stephens, 'Ocean Acidification: A Litmus Test for International Law' (2009) 3 *Carbon & Climate Law Review* 459.

[19] Yangmay Downing, 'Ocean Acidification and Protection under International Law from Negative Effects: A Burning Issue amongst a Sea of Regimes?' (2013) 2 *Cambridge Journal of International and Comparative Law* 242.

[20] Tim Stephens, 'Warming Waters and Souring Seas: Climate Change and Ocean Acidification' in Donald Rothwell and others (eds), *The Oxford Handbook of the Law of the Sea* (1st ed., Oxford University Press 2016) https://academic.oup.com/edited-volume/42608/chapter/357548970 accessed 12 November 2023.

[21] Rakhyun E. Kim, 'Is a New Multilateral Environmental Agreement on Ocean Acidification Necessary?: Is a New Agreement on Ocean Acidification Necessary?' (2012) 21 *Review of European Community & International Environmental Law* 243.

[22] Ibid., 249, 250; Downing (n 19) 261; Simons and Stephens (n 17) 10, 11; Baird, Simons and Stephens (n 18) 464, 465.

[23] Raphaël Billé and others, 'Taking Action against Ocean Acidification: A Review of Management and Policy Options' (2013) *Environmental Management* 761.

[24] Ibid., 767, 768.

[25] Simons and Stephens (n 17) 5.

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Simons and Stephens, as was typical for the literature at the time, only focus on and understand the need to discuss the mitigation of CO_2 emissions when tackling OA. They do not see any potential for adaptation, for example, which is a widely discussed aspect of OA today. However, this perception of OA has changed, and authors are increasingly moving away from this narrow understanding of the problem. Over the years, authors have painted a more holistic picture of OA, in line with the continuously evolving scientific literature. For example, thanks to authors such as Harrould-Kolieb and Hoegh-Guldberg,[26] Harrould-Kolieb,[27] Makomere and McDonald,[28] Scott,[29] Jagers and colleagues,[30] and Gordon,[31] non-climate drivers of OA, as well as considerations related to resilience and adaptation, redress, and restoration, have entered the discussions apart from mitigation. Thus, the law and governance literature has developed in accordance with the scientific literature, broadening its understanding of OA, including the aspects that are necessary to consider when tackling the issue in a holistic manner.

In the same vein, the framing or presentation of OA as an issue has been discussed. A frequently raised question in both the law and governance literatures is whether OA can be considered a concurrent problem to climate change or an effect of it. In other words, the question is whether OA is a parallel but distinct issue to climate change or an effect of it. Downing, for instance, suggests that '[o]cean acidification is a problem concurrent to climate change, sharing the same root cause of anthropogenic CO_2 emissions'.[32] Other authors express similar opinions.[33] In contrast to these authors, Harrould-Kolieb[34] recently relied on definitions of climate change elaborated by the Intergovernmental Panel on Climate Change (IPCC) to show that OA is an (adverse) effect of, rather than a concurrent problem with, climate change.[35]

[26] Ellycia R. Harrould-Kolieb and Ove Hoegh-Guldberg, 'A Governing Framework for International Ocean Acidification Policy' (2019) 102 *Marine Policy* 10.

[27] Ellycia R. Harrould-Kolieb, 'Framing Ocean Acidification to Mobilise Action under Multilateral Environmental Agreements' (2020) 104 *Environmental Science & Policy* 129.

[28] Reuben Makomere and Jan McDonald, 'Responding to Ocean Acidification beyond Climate Governance' in Jan McDonald, Jeffrey McGee and Richard Barnes (eds), *Research Handbook on Climate Change, Oceans and Coasts* (Edward Elgar Publishing 2020) https://china.elgaronline.com/view/edcoll/9781788112222/9781788112222.00026.xml accessed 12 November 2023.

[29] Karen N. Scott, 'Ocean Acidification: A Due Diligence Obligation under the LOSC' (2020) 35 *The International Journal of Marine and Coastal Law* 382.

[30] Sverker C. Jagers and others, 'Societal Causes of, and Responses to, Ocean Acidification' (2019) 48 *Ambio* 816.

[31] Jennicca Gordon, 'The Legal Implications of Ocean Acidification' in Paul G. Harris (ed), *Routledge Handbook of Marine Governance and Global Environmental Change* (Routledge 2022).

[32] Downing (n 19) 250.

[33] Scott, 'Ocean Acidification' (n 29) 383; Kim (n 21) 247, 254, 257; cf. Dan Laffoley and others, 'Ocean Acidification: Scientific Understanding and Challenges' in David L. VanderZwaag, Nilufer Oral and Tim Stephens (eds), *Research Handbook on Ocean Acidification Law and Policy* (Edward Elgar Publishing 2021) 12; Dorothee Herr and others, *Ocean Acidification: International Policy and Governance Options* (2014) 11.

[34] Ellycia R. Harrould-Kolieb, '(Re)Framing Ocean Acidification in the Context of the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement' (2019) 19 *Climate Policy* 1225.

[35] Ibid., 1229.

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Harrould-Kolieb identifies that, according to article 1(2) of the United Nations Framework Convention on Climate Change (UNFCCC), climate change is 'change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere'.[36] According to the author, who relies on the IPCC for her argumentation, one interpretation of the word 'climate' within this definition includes the state of the climate system.[37] Therefore, climate change is a change in the state of the climate system.[38] As the climate system also encompasses the ocean and not just the atmosphere, put simply, this interpretation of climate change also includes changes to the ocean resulting from an altered composition of the atmosphere caused by human activity.[39] Hence, Harrould-Kolieb argues that: '[g]iven that ocean acidification is a result of the absorption of anthropogenic CO_2 into the ocean from the atmosphere it can therefore justifiably be understood as being an adverse effect of climate change under the Convention'.[40]

Although Harrould-Kolieb makes an important point – namely, that framing OA as a concurrent problem to climate change has led to several shortcomings regarding OA governance (see below) and needs to be reconsidered – the author's argument is difficult to follow. For example, it is unclear why OA is considered an effect of climate change and not part of climate change itself. If the word 'climate' in the definition of 'climate change' refers to the climate system, which includes the ocean and its changes, why is OA only viewed as an effect of climate change and not as part of this change of the climate system itself? Especially since OA can be attributed indirectly to human activity and alters the composition of the global atmosphere by absorbing CO_2 and maintaining a balance of the levels of CO_2 between the atmosphere and ocean (see Chapter 2). Even though some steps in the argument seem to be omitted, the importance of Harrould-Kolieb's point remains unchanged: OA should not be treated separately from climate change (but rather as an effect of climate change). This connection between the issues is, as Harrould-Kolieb also mentions, aligned with the 2010 Cancun Agreements, in which OA is included in a footnote as an example of a slow-onset event.[41] These slow-onset events fall under the adverse effects of climate change.[42] The author provides two valid reasons why this artificial split between the two issues is problematic.

Harrould-Kolieb criticises the framing of OA as a concurrent problem at the international level, as it has led to two problems regarding OA governance.[43] First, the UNFCCC has been interpreted as having no obligation to address OA because, being a 'concurrent' problem to climate change, it is considered distinct from the UNFCCC's general competences regarding climate change. Second, this

[36] Ibid., 1228, 1229. [37] Ibid., 1229. [38] Ibid. [39] Cf. ibid. [40] Ibid.

[41] United Nations, 'FCCC/CP/2010/7/Add.1 – Report of the Conference of the Parties on Its Sixteenth Session, Held in Cancun from 29 November to 10 December 2010' 6 https://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf accessed 13 January 2024.

[42] Ibid.

[43] Harrould-Kolieb, 'Framing Ocean Acidification to Mobilise Action under Multilateral Environmental Agreements' (n 27) 130.

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exclusive focus on the reduction of CO_2 as the sole global approach to combat OA has removed the possibility of responses from other regimes, such as those related to ocean and biodiversity.[44] In Harrould-Kolieb's words: '[T]he international level has focused heavily upon mitigation and the need for rapid and substantial reductions in CO_2 emissions. Far less attention has been paid to the role of adaptation and redress activities'.[45]

Thus, because the literature has focused primarily on the mitigation of CO_2 emissions and the UNFCCC as the relevant instrument, little attention has been given to what other regimes could achieve, particularly concerning resilience and adaptation, redress, or restoration. In other words, Harrould-Kolieb argues that the epistemic community's framing of OA as a parallel problem to climate change has led to a lack of action on the international stage. Specifically, although the literature has strongly emphasised the climate change regime in its discussions, this framing of OA as a concurrent issue has distanced the problem from ongoing discussions within the regime. Simultaneously, the potential to address OA through other multilateral environmental agreements has been overlooked, as these agreements have not received adequate attention.[46]

Therefore, this book will continue the trend already present in the literature and provide a holistic understanding of OA based on rapidly developing scientific knowledge. Consequently, answering the question posed above will be anchored in a scientific understanding of the problem of OA. Additionally, this book will frame OA as an effect of climate change, while also acknowledging other causes and interactions with additional ocean stressors such as warming, fishing, and pollution. Thus, this book aligns with the framework outlined by Harrould-Kolieb and will present OA as a complex issue with various causes, stressors, and adaptation options. Therefore, it will focus on the multifarious instruments and actors that can address these causes, stressors, and adaptation strategies relevant to this complex problem and its governance. Consequently, while recognising the significance of discussions surrounding the climate change regime (which will also be briefly addressed in the forthcoming discussions), this book will refrain from engaging in the already crowded legal debates at the international level.

1.1.2 The Already Existing Governance Landscape of OA

Along with debating the understanding and framing of OA as a problem, and before diving into discussions of either the legal or governance literatures, many authors explain that OA has not yet been properly addressed on the international plane.[47] Some authors point out that the problem exists within an 'international

[44] Ibid. [45] Ibid. [46] Ibid.

[47] Cf. Harrould-Kolieb and Hoegh-Guldberg (n 26) 10; Gordon (n 31) 39; Simons and Stephens (n 17) 2; Kim (n 21) 243; Nilufer Oral, 'Ocean Acidification: Falling between the Legal Cracks of UNCLOS and the UNFCCC?' (2018) 45 *Ecology Law Quarterly* 9, 11; Charles Galdies, Rachel Tiller and Beatriz Martinez

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legal twilight zone'.[48] For instance, Makomere and McDonald state that 'responses to date have been piecemeal, governed by an uncoordinated assortment of environmental laws and policies'.[49] Meanwhile, Downing explains that '[e]xisting international regimes only tangentially address the issue'[50] and that '[t]he current international legal machinery in place (…), consists of an uncoordinated array of multilateral and regional regimes'.[51] In addition, OA is considered a complex problem that is unlikely to be resolved by one unifying treaty but instead is governed by an array of regimes.[52] Therefore, many authors classify OA as a 'regime complex'.[53]

While the literature indicates that OA is a complex problem likely governed by multiple existing regimes rather than a single treaty, none of the authors actually maps out the governance landscape for OA or tests it against regime complex theory. Therefore, it remains unclear what the regime complex for OA looks like or whether it even exists. Although many relevant legal instruments have been mentioned by authors over the years,[54] which actors are involved in OA governance remains largely unexplored. Thus, in contrast to certain other authors, this book will not assume that the OA governance landscape can be characterised as a regime complex. Instead, it will map out the OA governance landscape and test it against regime complex theory as defined by Raustiala and Victor.[55] This identification as a regime complex, along with the scientific background mentioned above, will be essential for understanding what type of governance approach is suitable and can build on the characteristics of OA as a problem and a regime complex.

1.1.3 Discussions of Ocean Acidification Law and Governance

Sections 1.1.1 and 1.1.2 elaborated on common themes between the law and governance literature. However, these two bodies of literature remain distinct from each other due to their different approaches to discussing OA. First, the stream of

Romera, 'Global Ocean Governance and Ocean Acidification' in Walter Leal Filho and others (eds), *Life Below Water* (Springer International Publishing 2021) 6 http://link.springer.com/10.1007/978-3-319-71064-8_109-1 accessed 12 November 2023; Katja Fennel and David L. VanderZwaag, 'Ocean Acidification: Scientific Surges, Lagging Law and Policy Responses' in Robin Warner and Stuart B Kaye (eds), *Routledge Handbook of Maritime Regulation and Enforcement* (Routledge 2016) 342; Herr and others (n 33) 5.

[48] Baird, Simons and Stephens (n 18) 460; Oral (n 47) 11; Kim (n 21) 243; Gordon (n 31) 440.

[49] Makomere and McDonald (n 28) 330. [50] Downing (n 19) 242. [51] Ibid., 249.

[52] Fennel and VanderZwaag (n 47) 342; Scott, 'Ocean Acidification' (n 29) 389; Ellycia Harrould-Kolieb and Tim Stephens, 'Ocean Acidification' in Rosemary Rayfuse, Aline Jaeckel and Natalie Klein (eds), *Research Handbook on International Marine Environmental Law* (Edward Elgar Publishing 2023) 264, 265 www.elgaronline.com/view/book/9781789909081/book-part-9781789909081-20.xml accessed 12 November 2023; Harrould-Kolieb and Hoegh-Guldberg (n 26) 10; Makomere and McDonald (n 28) 346.

[53] Scott, 'Ocean Acidification' (n 29) 390; Gordon (n 31) 39; Simons and Stephens (n 17) 1; Harrould-Kolieb and Stephens (n 52) 265; Baird, Simons and Stephens (n 18) 459; Kim (n 21) 247.

[54] See, for example, Stephens (n 20); Kim (n 21); Baird, Simons and Stephens (n 18); Scott, 'Ocean Acidification' (n 29).

[55] Kal Raustiala and David G. Victor, 'The Regime Complex for Plant Genetic Resources' (2004) 58 *International Organization* 277.

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literature that explores a governance and policy approach to OA aims to provide a general overview of the problem and responses to it through governance options.[56] This stream debates the necessary steps, evaluated from a scientific perspective, to combat OA, such as by implementing mitigation, adaptation, or resilience-strengthening measures. Second, the other stream of literature addresses how OA can be handled through international law.[57] More specifically, it enquires which legal instruments and treaty regimes may be relevant and to what extent they are equipped to address the problem. In the following discussion, the latter stream will be addressed first, followed by a return to the first stream.

1.1.3.1 The Legal Literature

To understand whether states have legal obligations to address OA, all of the papers examine instruments that may be relevant to OA, primarily treaties such as the UNFCCC and the entire climate change regime, the United Nations Convention on the Law of the Sea (UNCLOS), and the Convention on Biological Diversity (CBD), among others.[58] However, as noted earlier, the discussion often centres on the climate change regime and UNCLOS.[59] The emphasis on these regimes is easily explained: OA manifests its effects in the ocean and is triggered by CO_2, a greenhouse gas governed by the climate change regime. Thus, these treaties – particularly the climate change regime – attract the most interest and debate. The most common

[56] Jagers and others (n 30); Harrould-Kolieb and Hoegh-Guldberg (n 26); Makomere and McDonald (n 28); Harrould-Kolieb, 'Framing Ocean Acidification to Mobilise Action under Multilateral Environmental Agreements' (n 27); Billé and others (n 23); Galdies, Tiller and Martinez Romera (n 47).

[57] Cf. Heidi R. Lamirande, 'From Sea to Carbon Cesspool: Preventing the World's Marine Ecosystems from Falling Victim to Ocean Acidification' (2011) 34 *Suffolk Transnational Law Review* 183; Ellycia R Harrould-Kolieb, 'Ocean Acidification and the UNFCCC: Finding Legal Clarity in the Twilight Zone' (2016) *Washington Journal of Environmental Law & Policy* 612; Baird, Simons and Stephens (n 18); Cecilia Engler, David L. VanderZwaag and Katja Fennel, 'Ocean Acidification Post-Paris: Gauging Law and Policy Responses in Light of Evolving Scientific Knowledge' (2019) 33 *Ocean Yearbook Online* 207; Gordon (n 31); Downing (n 19); Simons and Stephens (n 17); Scott, 'Ocean Acidification' (n 29); Kim (n 21); Ellycia R. Harrould-Kolieb, 'The UN Convention on the Law of the Sea: A Governing Framework for Ocean Acidification?' (2020) 29 *Review of European, Comparative & International Environmental Law* 257; Stephens (n 20); Oral (n 47); Fennel and VanderZwaag (n 47); Ellycia Harrould-Kolieb and Dorothee Herr, 'Ocean Acidification and Climate Change: Synergies and Challenges of Addressing Both under the UNFCCC' (2012) 12 *Climate Policy* 378; Harrould-Kolieb, '(Re)Framing Ocean Acidification in the Context of the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement' (n 34); Harrould-Kolieb and Stephens (n 52); Ellycia R. Harrould-Kolieb, 'Implications of the Paris Agreement for Action on Ocean Acidification within the UNFCCC' in David L VanderZwaag, Nilufer Oral and Tim Stephens (eds), *Research Handbook on Ocean Acidification Law and Policy* (Edward Elgar Publishing 2021); Naporn Popattanachai and Elizabeth A. Kirk, 'Ocean Acidification and Multilateral Environmental Agreements' in David L. VanderZwaag, Nilufer Oral and Tim Stephens (eds), *Research Handbook on Ocean Acidification Law and Policy* (Edward Elgar Publishing 2021).

[58] Gordon (n 31); Downing (n 19); Simons and Stephens (n 17); Kim (n 21); Harrould-Kolieb (n 57); Scott, 'Ocean Acidification' (n 29); Oral (n 47); Stephens (n 20); Baird, Simons and Stephens (n 18).

[59] Harrould-Kolieb (n 57); Scott, 'Ocean Acidification' (n 29); Oral (n 47); Harrould-Kolieb, '(Re)Framing Ocean Acidification in the Context of the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement' (n 34); Harrould-Kolieb, 'Ocean Acidification and the UNFCCC: Finding Legal Clarity in the Twilight Zone' (n 57).

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approach the authors of this stream use for their analysis is to identify the relevant treaties applicable to the problem and discuss rules or related reports that may be useful.[60] All of them arrive at the same conclusion: existing legal obligations are insufficient to address the issue of OA to the extent necessary to prevent negative consequences for humans and ecosystems.[61] A variety of solutions are proposed to tackle this problem. There are several lines of discussion and arguments in the literature that have been debated more extensively. An example will be provided to illustrate the types of issues that the authors have considered thus far.

As indicated above, authors seem to look towards the climate change regime to find solutions to OA. Particularly lively are the discussions surrounding the question of whether the problem of OA fits within the regime's mandate.[62] More specifically, there is a debate related to the application of the UNFCCC to OA, which includes discussions about the focus of the treaty and the entire climate change regime. The authors raise the question of whether the regime is concentrated on the atmosphere/temperature.[63] This focus is significant because a regime that deals solely with the atmosphere/temperature is unlikely to adequately address the issue of acidification, which is related to ocean chemistry. Consequently, the parties would have no specific obligations to prevent OA.[64] Article 2 UNFCCC is a key component of the debate and is relevant to the question of the applicability of the convention to a specific problem, as it establishes the objective of the entire climate change regime.[65] Authors discuss whether OA can fall under the objective of the convention, which, according to article 2 UNFCCC, is to stabilise 'greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'.[66] For instance, one group of authors (Baird et al.,[67] Simons and

[60] Baird, Simons and Stephens (n 18); Simons and Stephens (n 17); Kim (n 21); Gordon (n 31); Harrould-Kolieb and Herr (n 57).

[61] Gordon (n 31) 48; Downing (n 19) 272, 273; Harrould-Kolieb, '(Re)Framing Ocean Acidification in the Context of the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement' (n 34) 1235; Harrould-Kolieb and Herr (n 57) 5; Fennel and VanderZwaag (n 47) 354; Oral (n 47) 28, 29; Stephens (n 20) 797, 798; Baird, Simons and Stephens (n 18) 471; Kim (n 21) 257, 258; Scott, 'Ocean Acidification' (n 29) 406–408.

[62] Baird, Simons and Stephens (n 18) 463, 464; Downing (n 19) 250–254; Fennel and VanderZwaag (n 47) 350–351; Kim (n 21) 245, 246; Harrould-Kolieb, 'Framing Ocean Acidification to Mobilise Action under Multilateral Environmental Agreements' (n 27) 131.

[63] Harrould-Kolieb and Stephens (n 52) 273; Baird, Simons and Stephens (n 18) 463; Kim (n 21) 246; Gordon (n 31) 41; cf. Downing (n 19) 250–253; Simons and Stephens (n 17) 7; Oral (n 47) 13; Fennel and VanderZwaag (n 47) 39; Harrould-Kolieb, 'Implications of the Paris Agreement for Action on Ocean Acidification within the UNFCCC' (n 57) 25.

[64] Harrould-Kolieb, '(Re)Framing Ocean Acidification in the Context of the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement' (n 34) 1228.

[65] Downing (n 19) 251; Gordon (n 31) 41; Simons and Stephens (n 17) 7; Baird, Simons and Stephens (n 18) 464; Oral (n 47) 13.

[66] Downing (n 19) 251; Gordon (n 31) 41; Simons and Stephens (n 17) 7; Baird, Simons and Stephens (n 18) 464; Oral (n 47) 13.

[67] Baird, Simons and Stephens (n 18) 463, 464.

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Stephens,[68] Downing,[69] Kim[70] and cf. also Oral[71] and Engler et al.[72]) problematise that 'dangerous anthropogenic interference' in the climate system is meant to be a threshold, and they question whether, due to the atmospheric focus they ascribe to article 2 UNFCCC, even though OA is mentioned by the IPCC, dangerous interference can be defined by referring to dangerous ocean pH thresholds. Harrould-Kolieb criticises the notion of an exclusively atmospheric focus of the regime, arguing that such an interpretation would misrepresent the ordinary meaning or purpose of the UNFCCC text.[73] Concerning the question of whether OA can be considered dangerous interference, the author presents the argument that article 2 UNFCCC 'does not focus on the atmosphere to the exclusion of other elements of the climate system'.[74]

From this brief overview of the legal literature, it is evident that legal instruments – particularly the climate change regime and UNCLOS – have garnered attention. Given that this area is relatively well explored, rather than contributing to this already rich discussion, this book will primarily focus on which other instruments and actors are pertinent to the governance of OA.

1.1.3.2 The Governance Literature

The governance literature is quite broad and challenging to categorise, making the identification of common themes difficult. However, most texts share a common focus on how these frameworks can or should address OA at large.[75] More specifically, authors pinpoint the areas where action is needed regarding OA, such as mitigation, including local causes of OA, adaptation, and resilience. For example, Makomere and McDonald[76] and Billé and colleagues[77] identify and examine four different categories of responses to address OA: mitigation, resilience, adaptation, and reparation (Billé et al.)/reverse or reduce local OA (Makomere and McDonald). Although they use similar response categories for OA, the papers adopt distinct approaches to governance. Makomere and McDonald do not discuss how OA should be governed but rather state 'that response strategies to ocean acidification provide an important foundation for governance of the problem'.[78] Contrarily, Billé and colleagues categorise the feasibility and potential of governance tools within the four categories mentioned above[79] and identify that more coordination among relevant international frameworks is needed to effectively govern OA.[80] Yet another

[68] Simons and Stephens (n 17) 7, 8. [69] Downing (n 19) 250–253. [70] Kim (n 21) 246.
[71] Oral (n 47) 14, 15. [72] Engler, VanderZwaag and Fennel (n 57) 216, 222.
[73] Harrould-Kolieb, 'Ocean Acidification and the UNFCCC: Finding Legal Clarity in the Twilight Zone' (n 57) 614.
[74] Ibid., *624*.
[75] Makomere and McDonald (n 28); Billé and others (n 23); Jagers and others (n 30); Harrould-Kolieb and Hoegh-Guldberg (n 26); cf. Harrould-Kolieb, 'Framing Ocean Acidification to Mobilise Action under Multilateral Environmental Agreements' (n 27).
[76] Makomere and McDonald (n 28) 333, 334. [77] Billé and others (n 23) 762.
[78] Makomere and McDonald (n 28) 346. [79] Billé and others (n 23) 773. [80] Ibid., 775.

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approach to discussing OA governance is presented by Galdies et al.[81] The authors provide an overview of the scientific background of OA and then review the legal literature, presenting some of the legal instruments that currently govern OA, such as the UNFCCC, the CBD, and the Marine Strategy Framework Directive at the EU level.[82] All of these papers offer a contextual overview of significant aspects of OA governance, categorising different response areas and reporting on the current governance framework surrounding the issue. Nevertheless, a more systematic exploration of OA governance would be beneficial, as none of them thoroughly investigates suitable methods for governing OA.

A more systematic approach to OA governance is offered by Harrould-Kolieb and Hoegh-Guldberg.[83] Drawing on natural science literature, the authors provide a 'science-based governing framework' to tackle OA.[84] The paper created an '(…) analytical framework through [which] existing governance structures can be explored for their capabilities to respond to OA'.[85] In other words, the authors organise the possible responses to OA systematically and establish a framework that is meant to be used to 'guide future actions or assess the capabilities and gaps in existing governance structures'.[86] In addition, Harrould-Kolieb and Hoegh-Guldberg foresee, for instance, that multiple actors could work on OA simultaneously but in accordance with their respective mandates and restrictions.[87] This is consistent with the arguments put forward in this book.

Inspired by Harrould-Kolieb and Hoegh-Guldberg, this book adopts a science-based approach to governance and identifies areas where responses to OA are necessary, including mitigation, stressors, and adaptation. Furthermore, this book will build upon these responses to outline the governance landscape, recognise global experimentalist governance as an appropriate governance form, and examine its presence in case studies.

Overall, several points can be made regarding the reviewed literature. First, in terms of understanding and framing, there is an increased comprehension of the scientific background of OA in the literature. Recent studies portray the issue more holistically, considering not only the mitigation of CO_2 emissions but also local sources of acidification and adaptation. Nevertheless, as Harrould-Kolieb outlines, despite intense discussions of OA and the climate change regime – due to framing OA as a concurrent problem to climate change – the issue has yet to be properly addressed within this framework. Furthermore, there is a lack of engagement with other multilateral environmental agreements and their potential role in OA adaptation and similar efforts. Second, while the literature has identified that the issue of OA is governed by a regime complex, none of the authors have actually mapped the OA governance landscape or tested it against the theory of regime complexity. Consequently, the appearance of the regime complex for OA remains unexplored.

[81] Galdies, Tiller and Martinez Romera (n 47).
[82] Ibid., 6–8.
[83] Harrould-Kolieb and Hoegh-Guldberg (n 26).
[84] Ibid., 10.
[85] Ibid.
[86] Ibid., 11.
[87] Ibid., 15.

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Although many relevant instruments have been discussed by authors, the roles of various actors in the governance of the issue remain under-explored. Third, regarding the literature addressing the law and governance of OA, it has been noted that while different responses to OA and even a framework to guide future actions or assess the capabilities of governance structures have been discussed, suitable governance options have neither been debated nor evaluated by the authors.

Section 1.2 will provide an overview of the methodological choices made to investigate the question posed above, which aims to address these shortcomings in the literature.

1.2 Overview of Methods

Throughout this book, several methodological choices have been made, which will be explained chapter by chapter in the following sections, starting with Chapter 2. While the methods used will be discussed in detail in the separate chapters, a brief overview is provided here as an introduction.

Chapter 2 reviews the scientific literature and provides the non-scientist reader with an overview of what OA entails, including an explanation of its causes, other ocean stressors, and adaptation options. To navigate through the technical and intricate natural science literature, the social science literature was first consulted to investigate how these authors describe the problem, as this literature tends to keep scientific explanations relatively simple. Thus, the social science literature could help gather a fundamental understanding of the issue. Subsequently, with the help of references from the social science literature, scientific papers were consulted to answer open questions and gain a deeper understanding of the chemical underpinnings of OA, for instance. This deeper understanding of OA is necessary, on one hand, to explain OA in simple language in this chapter and, on the other, to explore in this book which governance options should be applied to OA. Later, references (this time from the scientific literature) were again consulted to find additional sources to clarify the remaining questions. As a final step, during a research stay at the UC Davis-Bodega Marine Laboratory (Ocean Climate Lab), the chapter was revised based on what had been learned during discussions with scientists and feedback on the chapter provided by a scientist at the lab.[88]

In Chapter 3, a map of the OA-relevant legal instruments and actors is provided to create an overview of the OA governance landscape. The map includes legal instruments and actors that were either considered relevant by the legal and scientific literature or discovered through an internet search. Thus, the map aims to give the reader an idea of the number of actors and instruments that could potentially

[88] Comments provided by Meghan Zulian, PhD candidate in the Ocean Climate Lab at UC Davis and Bodega Marine Lab.

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be relevant for OA governance, without claiming to be exhaustive. Regarding the internet research, Google was used as the primary search engine.

The internet search was conducted in two rounds. First, to create an initial overview of institutions capable of tackling OA, keywords such as 'ocean acidification', 'ocean acidification governance', and 'CO_2 governance' were used, among others (see Chapter 3). Second, following the initial search, each institution was examined individually to determine whether it had the potential to address aspects of OA (causes, stressors, adaptation) and could therefore be included in the map, as further explained in the chapter. Once all the institutions were selected, they were compiled in an Excel sheet, which was then transformed into a map using JMP, a program that links data to graphical representations. After creating the map, it was tested against the various governance options to see which ones were present (ranging from integrated regime to fragmentation). Lastly, employing what the theory refers to as 'forces' – namely, uncertainty, interests, and linkages – the governance landscape can be identified as a regime complex. Additionally, the forces were utilised to enhance the understanding of why OA, as an issue area, yields a regime complex.

Chapter 4 builds on the lessons learnt from the science (Chapter 2) and the current governance landscape (Chapter 3) to identify a suitable governance approach. Multiple governance options were considered, including orchestration, regime interaction, and global experimentalist governance. Ultimately, global experimentalist governance was chosen as the focus of the analysis, as this governance approach is well-suited to address the problem of OA and can leverage the existing governance landscape. This will be detailed in Chapter 4. To evaluate whether OA as a problem and global experimentalist governance as a theory are a good match, the characteristics defining OA were identified and compared to the characteristics of the problems that global experimentalist governance can effectively address. Additionally, the chapter draws on the literature to explain the foundations of global experimentalist governance. Based on this theory, a framework consisting of five steps describing the ideal type of global experimentalist governance was created. Grounded in this ideal type, Chapters 5, 6, and 7 conduct a case selection and two case studies to determine if global experimentalist governance is currently being pursued by two actors included in the map.

Chapter 5 selects two actors for case studies in Chapters 6 and 7. Following this case selection, Chapters 6 and 7 each engage in a case study of the OA Alliance and the International Maritime Organization (IMO), respectively. While the work of the OA Alliance allows for a strict comparison of its work procedures to global experimentalist governance, the IMO requires a different approach. As the IMO does not directly deal with OA (as opposed to the OA Alliance), as will become apparent in the chapter, the chapter first identifies the areas of the IMO's work relevant to OA and where OA could be embedded within those efforts. Afterwards, the working procedures within one area through which the IMO indirectly addresses OA are examined to evaluate the presence of features of global experimentalist

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governance. The case selection rests on six criteria: suitability, significant potential, variation in targeted organisations, focus on CO_2, differences in legalisation, and access. Therefore, a table based on the map of institutions was created to facilitate the selection. The table encompasses institutions that could be suitable as case studies. The chapter distinguishes between instruments and actors that are merely suitable to address OA and those with significant potential to tackle it. This distinction is founded on the science behind OA. It was found that the majority of the actors and instruments included in the table have significant potential to address OA. Due to space and time constraints, not all of these potentially interesting case studies could be examined, so the focus was ultimately narrowed to two actors. Thus, to arrive at the case selection, five different actors and their related instruments from the map that show significant potential were selected and analysed in greater detail. For example, institutions that operate solely at the regional level were excluded.

Following this, institutions were chosen that can specifically tackle CO2, as science indicates that CO_2 is the leading cause of OA. Therefore, this book initially focuses on the OA Alliance, a relatively new and growing institution dedicated solely to OA, which nonetheless engages in numerous activities, including addressing CO_2 emissions. Second, it examines the IMO as a case study because transportation (and as part of that, the shipping sector) is a continually increasing contributor to CO_2 emissions. Moreover, the IMO also regulates other aspects of shipping relevant to OA. Methodologically, these cases can be considered to have intrinsic importance for this topic of study, as they highlight key players in addressing OA. Furthermore, since the issues identified in their governance approaches are symptomatic of employing global experimentalist governance to OA, it can be argued that other actors would also encounter the same challenges as these institutions in institutionalising global experimentalist governance.[89]

Additionally, these two actors differ from one another and are characterised by varying degrees of legalisation, as will be shown in the chapter. This difference in degrees of legalisation also renders the two cases independent of each other, meaning they do not overlap or directly influence each other's work.[90] By choosing different cases, more diverse challenges that institutions might face when using this governance form to tackle OA can be uncovered.

Finally, individuals working with these two actors were available for interviews with the author, enabling a deeper analysis of the actors. This access ensured not only that empirical material could be obtained but also that information not accessible to the general public was provided to the author, both crucial aspects of a case study.[91] This unpublished empirical material facilitates an in-depth analysis that can illuminate the governance procedures within each of the actors.

[89] John Gerring, *Case Study Research: Principles and Practices* (2nd edn, Cambridge University Press 2017) 42, 43, 45, 46.
[90] Ibid., 43. [91] Ibid., 43, 44, 45.

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Therefore, interviews are used alongside documents and websites as empirical sources in the case studies. While the documents and websites provided by the two actors contain information about their respective work, the websites are often created solely to inform the general public. As a result, these websites and attached documents do not provide in-depth information about, for example, procedures within the actor, and the information provided often lacks the detail necessary to assess whether or to what extent global experimentalist governance is present. Thus, some dynamics of the governance procedures of these institutions cannot be captured by their websites and documents alone, necessitating further information gathering. Hence, this book also employs interviews to collect additional information.

The objective of the interviews is to gather information; thus, they were unstructured – an approach that allows for the discovery of new dimensions in the use of governance and for knowledge gained from previous interviews to inform questions in later ones. The choice of unstructured interviews partly rests on their informational nature and partly on the fact that the purpose of the case design is not to directly compare the two cases but to understand how and to what extent global experimentalist governance exists and functions in these different contexts.[92] This approach allowed the author to ask about specific aspects of the interview in detail, creating a more nuanced understanding of any interesting or pertinent aspects.[93] An interview guide was therefore not created; however, questions were asked concerning, for example, working procedures, stakeholder involvement, and communication with other states.

Interviews were conducted with personnel from the OA Alliance and experts and delegates of the IMO. All interviews were carried out under the premise of anonymity; therefore, each interviewee will only be identified by their organisation and position, designated by numbers (e.g., IMO Delegate Interview #1) to distinguish between the various interviewees. For the OA Alliance, interviews and information exchanges occurred over the course of over a year after introduction to the actors' personnel. This ongoing dialogue facilitated numerous questions (including follow-ups) and insights into internal documentation that informed the case study. The interviews with IMO delegates and experts took place either during the Marine Environmental Protection Committee's meetings (MEPC 79), including those of the Intersessional Working Group on Reduction of GHG Emissions from Ships (ISWG-GHG 13), or afterwards online. Unlike the interviews with the OA Alliance, these interviews were time-constrained and did not permit follow-up questions, but they did allow for a broader spectrum of interviewees. In addition to the interviews themselves, attending the meetings enabled valuable observations regarding the dynamics within the organisation. Therefore, the interviews conducted for both

[92] Felice D. Billups, *Qualitative Data Collection Tools: Design, Development, and Applications* (SAGE Publications, Inc 2021) 37 https://methods.sagepub.com/book/qualitative-data-collection-tools accessed 19 November 2023.

[93] Svend Brinkmann and Steinar Kvale, *Doing Interviews* (SAGE Publications Ltd 2018) 42, 48 https://methods.sagepub.com/book/doing-interviews-2e accessed 19 November 2023.

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case studies provided invaluable material for gaining insights into the procedures of these two organisations.

Before delving into the science of OA in Chapter 2, an overview of the book's argumentation will be provided.

1.3 Overview of Argumentation

In Chapter 2, this book will, similar to recent literature, present the scientific background of OA in accordance with rapidly advancing scientific knowledge. This scientific knowledge will be crucial for the argumentation throughout the entire book. Thus, answering the research question will be rooted in the scientific understanding of the problem of OA. Regarding the framing of OA as an issue, it is understood as an effect of climate change, while additional causes and stressors stem from other sources. Consequently, OA is presented in the science section and throughout the entire book as a complex problem with various causes, stressors, and adaptation options. Though this work acknowledges the importance of discussions surrounding the UNFCCC and the climate change regime, these discussions will not be elaborated upon in the following chapters. As noted in the literature review above, these legal discussions are extensive, and this book will primarily focus on other instruments and actors relevant to the governance of OA. Therefore, in Chapter 3, similarly to the literature discussed above, this work also identifies the governance landscape for OA as a regime complex.

However, before determining that this is the case, the international and transnational governance landscape for OA will be mapped out and tested against regime complex theory. For the purpose of this book, the main distinction between international and transnational is that whereas the former focuses on interactions between the governments of nations within the framework of international organisations,[94] the latter emphasises the processes that occur at non-state levels as well.[95] Thus, the term international assumes the primacy of nation-states and the interactions among them, while transnational encompasses anything that transcends or extends across national border.[96] Transnational is therefore understood as 'referring to the scope of political action and power structures beyond the nation'.[97] Therefore, international solely deals with public international institutions, whereas transnational includes non-state actor institutions.[98]

[94] Jolene Lin and Joanne Scott, 'Looking beyond the International: Key Themes and Approaches of Transnational Environmental Law' (2012) 1 *Transnational Environmental Law* 23, 23.

[95] Ibid., cf. Joseph S. Nye and Robert O. Keohane, 'Transnational Relations and World Politics: An Introduction' (1971) 25 *International Organization* 329, 331.

[96] Ingo Richter, Sabine Berking and Ralf Müller-Schmid (eds), 'Introduction', *Building a Transnational Civil Society: Global Issues and Global Actors* (Palgrave Macmillan 2006) 9.

[97] Ibid.

[98] Alvina Hoffmann, 'The Transnational and the International: From Critique of Statism to Transversal Lines' (2022) 35 *Cambridge Review of International Affairs* 796, 798; Lin and Scott (n 94) 23.

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This book will consider both the international and transnational levels. Therefore, the chapter discussing regime complex theory will provide insights into OA's current governance landscape, including an overview of relevant legal instruments and actors. This overview of the governance landscape, as well as the identification of that landscape as a regime complex, can, along with the scientific background, help determine suitable governance approaches to OA. In other words, this identification as a regime complex will, together with the scientific background mentioned above, be essential for understanding what type of governance approach is suitable and can build upon the characteristics of OA as a problem and a regime complex. Accordingly, in Chapter 4, global experimentalist governance is identified as a suitable governance approach. In addition to this identification, the chapter outlines and explains the five steps of the ideal type of global experimentalist governance. These five steps can be utilised to assess the extent to which global experimentalist governance is present in an actor. Therefore, to examine the presence of global experimentalist governance, Chapter 5 chooses two case studies based on several criteria (see methodological choices): the OA Alliance (Chapter 6) and the IMO (Chapter 7).

Overall, this book will argue that global experimentalist governance is a suitable governance approach for addressing OA. Although these two cases provide promising examples of actors who, according to their mandates and objectives, could engage with OA, global experimentalist governance is currently observed only to a limited extent within the tested cases, as will be seen and discussed in the case studies and conclusion.

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