1. Introduction

Water is the most precious natural resource in the world. There is no life without water. Ecosystems cannot sustain themselves without freshwater.¹ The latter can be found both as surface water and as groundwater. Surface water around the world is under increased stress due to over-exploitation and pollution.² Add to this the negative effects stemming from climate change and the demands stemming from increasing population in many parts of the world and the prospects for relying on surface water become particularly dire.³ It follows that more and more countries will rely on groundwater in the future.

Against this background, it is important to highlight that the percentage of *available* freshwater resources highlights groundwater as the main source of freshwater around the planet. In fact, 97 per cent of available freshwater is found as groundwater.⁴ The latter is mostly stored in aquifers, geological formations capable of storing groundwater.⁵ Aquifers can straddle under political boundaries, becoming transboundary aquifers.⁶ According to a 2015 inventory of transboundary aquifers (and groundwater bodies), there are 592 transboundary aquifers in the world.⁷ Despite its current socio-economic importance,

¹ F Boltz et al., *Healthy freshwater ecosystems: an imperative for human development and resilience, water for development – charting a water wise path*, Rockefeller Foundation, 7 December 2017.

² UN Water / UNESCO, *The United Nations World Water Development Report 2019: Leaving No One Behind*, 2019, p. 13–14.

³ See UN Water / UNESCO, *World Water Development Report 2020: Water and Climate Change*, 2020, p. 1: ‘global water use has increased by a factor of six over the past 100 years and continues to grow steadily at a rate of about 1% per year as a result of increasing population, economic development and shifting consumption patterns’.

⁴ See J Ganoulis and J Fried, *Transboundary Hydro-Governance: From Conflict to Shared Management* (Springer 2018), p. 98. It is important to highlight the term *available* because such a high percentage, 97% of available freshwater resources stored as groundwater, refers to freshwater that is not frozen and locked into ice caps or glaciers. For a precise distribution of Earth’s water see G Eckstein, *The International Law of Transboundary Groundwater Resources* (Routledge 2017), p. 14, figure 2.3.

⁵ For more information on aquifers see chapter 2, section 2.1.

⁶ For more information on transboundary aquifers see chapter 2, section 2.2.

⁷ For more information on the number of transboundary aquifers in the world see chapter 2, footnote 50.

there has been a deafening silence about how to manage groundwater and transboundary aquifers.⁸

It was really only in 2002 that the international community started to devote time and attention to the topic of transboundary aquifers.⁹ The result of this work was the adoption by the United Nations International Law Commission (ILC) in 2008 of a series of *Draft Articles on the Law of Transboundary Aquifers* (the Draft Articles).¹⁰ The Draft Articles have been annexed to UN General Assembly Resolution 63/124. Over the past 12 years, the Draft Articles have been discussed four times before the UN General Assembly 6th Committee.¹¹ The last discussion took place on 22 October 2019 and there will now be a pause of three years until the next discussion on the topic at the UN General Assembly 6th Committee. Now is, hence, a good moment to stop and reflect on the international law of transboundary aquifers, its current status, its prospects and its future. The 2019 debate showed some level of agreement as to the legal nature of the Draft Articles. The latter appear to be considered by many countries as soft law and should be considered as non-legally binding guidelines that countries are encouraged to consider when developing regional and bilateral agreements or arrangements on specific transboundary aquifers. However, there are still concerns on some of the substantive provisions of the Draft Articles, including questions surrounding the relationship between sovereignty, equitable and reasonable utilisation and the no harm rule.¹²

⁸ The international community has only recently focused its attention on developing international rules applicable specifically to all transboundary aquifers. See chapter 3, section 3.3. Compare this to the over 50 years of efforts geared to the development of international law applicable to transboundary surface water and the differences are striking. The progression towards the development of the law of international watercourses covering surface water began in 1970 and culminated in the adoption of the *United Nations Convention on the Law of the Non-navigational Uses of International Watercourses* (UNWC) in 1997. This lengthy period of time was significant, denoting the complexity and political nature of the subject matter. For further information on the development of the UNWC, see chapter 3, section 3.2.

⁹ C Yamada, *Shared natural resources: first report on outlines*, 30 April 2003, Doc. A/CN.4/533 paras 2–4. In 2000, the ILC included in its list of long-term programme of work the topic of ‘shared natural resources of States’. In 2001 some delegations at the UN General Assembly 6th Committee supported the inclusion of the above-mentioned topic. However, it was only in 2002 that the ILC decided to formally include the topic in its programme of work and appointed Chusei Yamada as Special Rapporteur.

¹⁰ *The law of transboundary aquifers*, UN Doc. A/63/10, 11 December 2008 (hereinafter ‘Draft Articles’).

¹¹ For further information on how the *Draft Articles* have been discussed before the UN General Assembly see chapter 5, sections 5.1 and 5.2.

¹² See chapter 4, sections 4.1 and 4.2 for further information on equitable and reasonable utilisation, the no harm rule and sovereignty. See F Sindico and R

Between the adoption of the Draft Articles in 2008 and the 2019 debate at the UN General Assembly, state practice on the management of transboundary aquifers has progressed with a few more regional and bilateral agreements and arrangements negotiated and signed.¹³ However, there is still a dearth of state practice when it comes to the law of transboundary aquifers. As mentioned earlier, there appear to be 592 transboundary aquifers and groundwater bodies in the world, but only seven are subject to a transboundary agreement with several more governed by a transboundary arrangement.¹⁴

Against this background, this book does two things. First, it provides answers to a policy relevant scenario where two countries decide to cooperate in the field of transboundary aquifers. Second, in doing so, it sheds light on the extent to which the emerging international law of transboundary aquifers reflects customary international law, with a particular focus on the Draft Articles and its relationship with customary international law.

But let's start with the scenario that will permeate the book.

Two countries begin to characterise the complexity of their respective groundwater resources and find that an aquifer crosses underneath their shared border (i.e. that they share a transboundary aquifer). The countries appreciate the need to manage the transboundary aquifer together and are interested in identifying relevant international rules and practices that can shed light on how the aquifer can be used and protected at the same time in a way that benefits both countries. Finally, the countries wish to understand whether such international rules and practices are mandatory with no flexibility or if they are to be considered just as guidance that can be adapted to the specific circumstances of their countries and of the specific aquifer.

The scenario that kick-starts this book is underpinned by political will in both countries, which is, clearly, not always the case. With this in mind, the scenario needs to be dissected and clarified. The structure of the book follows

Martin-Nagle, *Transboundary Aquifers at the UN General Assembly 6th Committee: Some discussion but no action*, SCELG Policy Brief 13/2019 for the 2019 discussions before the UN General Assembly 6th Committee.

¹³ The term management in the book is aligned with its meaning in the *International Law Association (ILA) Berlin Rules on Water Resources* (hereinafter '*ILA Berlin Rules*'), Report of the 71st Conference, Berlin, 17 August 2004, Commentary to Article 1: "Management" in this Article, as throughout these Rules, is used to include development, use, protection, allocation, regulation, and control of waters, regarding the quality and the quantity of waters, and not in a narrow, technical sense'. For details on regional and bilateral transboundary aquifer agreements and arrangements see chapter 6.

¹⁴ On the number of transboundary aquifers, see chapter 2, footnote 50, and on the definition of transboundary aquifer agreements and arrangements, see chapter 6, section 6.1.

the policy relevant answers to the scenario. The latter can be divided into three main parts.

First, '[T]wo countries begin to characterise the complexity of their respective groundwater resources and find that an aquifer crosses underneath their shared border.' One of the biggest challenges when it comes to groundwater in general, and to transboundary aquifers in particular, is the fact that not only are these *invisible* natural resources, but that they are still relatively unknown in many regions of the world. Hence, the second chapter provides a brief introduction to aquifers in the context of global water security, climate change and sustainable development. The key point here is that, although there have been improvements in the understanding of aquifers in many countries, research and inquiry into specific aquifers that are transboundary is often still lacking.

Second, '[T]he countries appreciate the need to manage the transboundary aquifer together and are interested in identifying relevant international rules and practices that can shed light on how the aquifer can be used and protected at the same time in a way that benefits both countries.' Once a transboundary aquifer has been identified, the two countries will want to identify possible rules and practices that shine a light on how to manage a transboundary aquifer. The third and fourth chapters of the book explore these rules and practices from an international legal perspective, highlighting both the emergence of an international law of transboundary aquifers and its normative content. I highlighted earlier in this Introduction that the Draft Articles encapsulate such rules and practices, although the legal framework applicable to transboundary aquifers is multifaceted and does not include only the Draft Articles.

Third, '[T]he countries wish to understand whether such international rules and practices are mandatory with no flexibility or if they are to be considered just as guidance that can be adapted to the specific circumstances of their countries and of the specific aquifer.' At this stage, the two countries will have identified a transboundary aquifer and they will have identified a set of international rules and practices that pertain to transboundary aquifers in general. The question now becomes what can they do with such rules? The fifth chapter of the book explores this part of the scenario and, as already mentioned, clarifies that the Draft Articles appear to be consolidating as non-legally binding guidance available to States that wish to develop transboundary aquifer specific agreements and arrangements. The chapter comes to this conclusion after analysing the options that were (and to some extent still are) on the table as to the future format of the emerging international law of transboundary aquifers. This chapter also starts to answer the second question present in this book: the extent to which the international law of transboundary aquifers reflects customary international law. In doing so, the dichotomy between hard and soft international law and the normativity of formally non-legally binding instruments will be explored.

In the sixth chapter, I will explore the very few examples of transboundary aquifer agreements and arrangements, some of which have developed after the adoption of the Draft Articles. By examining the normative and implementation landscape of such agreements and arrangements, I will complete my answer to the second question in this book about the international law of transboundary aquifers and customary international law. Due to the paucity of state practice it is difficult to reach a firm conclusion. However, the book demonstrates that, while not all the content of the Draft Articles reflects customary international law, some of its provisions, especially those of a procedural nature (such as monitoring and exchange of information), appear to be crystallising as customary international law.

However, before exploring the scenario and the extent to which the Draft Articles reflect customary international law, it is necessary to focus on the subject matter of this book from a scientific perspective: the transboundary aquifers, which will be the content of the following chapter.