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## **Master Thesis in Joint Nordic Master Programme in Environmental Law (NOMPEL)**

*The legal framework provided by the Equitable and Reasonable Utilization  
Principle for the establishment of climate change-proof transboundary water  
management agreements between co-riparian States*

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## **Foreword**

This paper marks the end of my journey within the Nordic Master Programme in Environmental Law. Throughout these two years I have discovered and deepened a variety of environmental legal framework's aspects, realizing at each step how complex it is and how concrete it reveals to be beyond its abstract appearance. I was first thinking about writing this thesis on marine law (more precisely about Marine Protected Areas beyond national jurisdictions), but fresh water law crossed my way and kept my attention.

I am originally from South France which has known about water scarcity in summers for years now. I have been engaged in environmental protection since my teenage years, and have a bachelor in French law. Yet, I had never thought about water in a legal way, although the subject leads to animated discussions in my home land. Writing this paper was thus fulfilling the curiosity of both the lawyer and the citizen. By starting it I was not expecting to get that passionate and to wish to work on the matter in the future.

This journey in the writing process was vibrant, and I want to thank my supervisor for her advice, she was a wise guide, bringing me back on track when I was scattering on interesting but irrelevant paths for the question I was investigating. Also, I cannot fail to thank Lore, Tara, and Nelly for their careful and patient proofreading, they made this thesis much more pleasant to read.

## **Abstract**

This paper explores the legal framework brought forward by the Equitable and Reasonable Utilization Principle (ERUP) over transboundary waters and questions its relevance to the establishment of agreements between riparian States that are resilient to climate change and its related upcoming challenges.

By investigating major legal texts in international water law, this thesis describes the content of the principle, composed of three core elements that are the no-harm principle, the cooperation principle, and the protection of the environment. It concludes that the ERUP is favorable to the establishment of climate change-proof agreements, whose main features are their stability, efficiency, and flexibility, especially through the development of joint water management bodies. However, it supposes the partial delegation of States' sovereignty over water resources, which they are reluctant to do.

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## Abbreviations

- CBDM:** Consensus Based Decision Making
- CESCR:** Committee on Economic, Social and Cultural Rights
- CJEU:** Court of Justice of the European Union
- COP:** Conference of Parties
- EIA:** Environmental Impact Assessment
- EQSD:** Ecological Quality Standards Directive
- ERUP:** Equitable and Reasonable Utilization Principle
- EU:** European Union
- GHG:** Greenhouse Gas
- GWD:** Ground Water Directive
- ICJ:** International Court of Justice
- ICPR:** International Commission for the Protection of the Rhine
- IIL:** Institute of International Law
- ILA:** International Law Association
- ILC:** International Law Commission
- IPCC:** International Panel for Climate Change
- IRBD:** International River Basin District
- ITLOS:** International Tribunal for the Law of the Sea
- IWRM:** Integrated Water Resource Management
- NDC:** Nationally Determined Contribution
- NGO:** Non-Governmental Organization
- PCA:** Permanent Court of Arbitration
- RAP:** Rhine Action Plan
- SDG:** Sustainable Development Goal
- UN:** United Nations
- UNECE:** United Nations Economic Commission for Europe
- UNFCCC:** United Nations Framework Convention for Climate Change
- UNGA:** United Nations General Assembly
- WFD:** Water Framework Directive

## 1. Introduction

*“Access to safe water, sanitation and hygiene is the most basic human need for health and well-being,”* Agenda 2030 for Sustainable Development.<sup>1</sup>

Water, aside from being a prerequisite for every form of life on Earth, also provides crucial services for modern societies such as food (e.g. irrigation), energy (e.g. hydroelectricity and cooling nuclear power plants), navigation, ecosystem well-being, and recreation.<sup>2</sup> The importance of fresh water resources was claimed in the 2030 Agenda, which sixth Sustainable Development Goal (SDG) *“recognizes that countries’ social development and economic prosperity depend on the sustainable management of freshwater resources and ecosystems.”*<sup>3</sup> In the context of transboundary waters, their strategic character has led to countless negotiations and conflict regarding their allocation.<sup>4</sup> The first registered war over water happened in 2400 B.C. between the Sumerian cities of Lagash and Umma, and has since then been a recurring event in human history.<sup>5</sup>

Presently, 60% of the world’s freshwaters is of transboundary nature<sup>6</sup>, meaning that parts of surface waters but also ground waters (occurring under the water table<sup>7</sup>) of the same system are flowing across different States.<sup>8</sup> According to the United Nations (UN) water report, the world's water consumption has increased sixfold over the last 100 years and is still growing.<sup>9</sup> This expansion in demand is caused by three main factors, namely, population growth; economic development; and changes in consumption patterns.

This augmentation goes along with a growing intensity of climate change, manifesting itself by more frequent and violent extreme climatic events.<sup>10</sup> This will affect water quality, (e.g. floods

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<sup>1</sup> SDG 6, Agenda 2030 for Sustainable Development.

<sup>2</sup> Belinskij, 2015, p.5397.

<sup>3</sup> UNEP, “Issue Brief SDG 6: Clean Water and sanitation, Ensuring availability and sustainable management of water and sanitation for all”, (2015), <[SDG6\\_Brief.pdf \(unep.org\)](#)>, (last accessed 28<sup>th</sup> April 2023).

<sup>4</sup> Gleick and Heberger, 2012, p.174-208.

<sup>5</sup> Ibid, p.174.

<sup>6</sup> UNECE, 2021, p.7.

<sup>7</sup> Narasimhan, 2009, p.1.

<sup>8</sup> UN Watercourses Convention, art.2.

<sup>9</sup> UN, 2020, p.2.

<sup>10</sup> Ibid, p.1.

increase the risk of water pollution), and physical water availability, as climate change is expected to interfere with seasonal water cycles.<sup>11</sup> Moreover, the precarious quality of water affects our capacity for consumption, such as accessing drinkable water or irrigation for agriculture.<sup>12</sup>

In its sixth assessment report, the International Panel for Climate Change (IPCC) clearly expressed concerns regarding the impacts of climate change upon human well-being and planetary health, including water cycle disruption, coastal and inland flooding, water scarcity, and losses in crop production.<sup>13</sup> Under the UN Framework Convention for Climate Change (UNFCCC), parties are committed to “*develop appropriate and integrated plans for (...) water resources management for the protection and rehabilitation of areas affected by drought, desertification and floods*”.<sup>14</sup> Its implementation is mainly monitored by the Conferences of Parties (COP); the emblematic 2015 COP21 resulted in the adoption of the Paris Agreement setting the objective to keep global warming “*well below 2°C above pre-industrial levels*”<sup>15</sup>. To do so, it requires parties to publish Nationally Determined Contributions (NDCs).<sup>16</sup> It is worthwhile to note that, although water is not mentioned anywhere within the 2015 Paris Agreement, its sustainable management is at the core of most NDCs.<sup>17</sup>

In Europe, water availability has not been a major issue so far; however, since global warming has increased faster than the global average<sup>18</sup>, the current management of transboundary waters could face drastic changes. The European Rhine River, running through Switzerland, Germany, France, and Netherland, is a good example of the challenges brought by climate change over water management. Located in the northern part of Europe, its average annual water income should remain constant. However, the frequency and intensity of extreme events are expected to increase significantly over its watershed.<sup>19</sup> In addition, the increased temperatures of the Rhine’s River are

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<sup>11</sup> Ibid, p.1.

<sup>12</sup> UNECE, 2021, p.7.

<sup>13</sup> IPCC, 2022, p.17.

<sup>14</sup> UNFCCC, article 4, paragraph 1(e).

<sup>15</sup> Preamble, Paris Agreement.

<sup>16</sup> Article 4 Paris Agreement

<sup>17</sup> UNESCO, 2020, p.2.

<sup>18</sup> IPCC, 2021, p.1-2.

<sup>19</sup> Jülich and Lindner, 2006, p.32.



likely to modify its water ecosystems (by favoring the presence of exotic species) and its quality (warm water being more favorable to the development of bacteria).<sup>20</sup>

Water allocation is already, from the ground up, a complex operation as it must take into account the different services provided by the watercourses in question, both from their surface and ground waters. In order to guide co-riparian States in their water allocation process, the general principle of Equitable and Reasonable Utilization (ERUP) has been developed since the 19<sup>th</sup> century.<sup>21</sup> Hence, ERUP is a compromise made between two opposite legal theories, departing from a shift from the Harmon doctrine (the absolute territorial sovereignty) towards the idea that a water basin could be thought of as a common good to share between riparian States through agreements or on the basis of principles (e.g. proportionality).<sup>22</sup> The theory of absolute territorial sovereignty, mainly argued by upstream States, would allow riparian States to use water resources without regards to the downstream ones. Conversely, the absolute territorial integrity theory, favoured by downstream States, would require upstream States to ensure that a full stream flow arrives downstream.<sup>23</sup> ERUP was explicitly established for the first time in the Helsinki Rules, adopted in 1966 by the International Law Association (ILA), as “*the basic principle of international water law*”.<sup>24</sup> Even if the status of the ERUP is relatively well established under international law, its definition and what it entails exactly remain vague.<sup>25</sup> Although several texts in international law are advocating for a list of factors in order to consider what an equitable and reasonable use of water may look like, these are not exhaustive and local factors must be taken into account, mainly through bilateral or multilateral agreements.<sup>26</sup>

## 1.1 Research question

As mentioned above, although climate change will most certainly disturb water distribution and its availability, there remain uncertainties regarding specific effects at a local level<sup>27</sup>. Ongoing

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<sup>20</sup> UNESCO, 2020, p.31.

<sup>21</sup> Salman, 2007, p.625.

<sup>22</sup> Ibid, p.627.

<sup>23</sup> McCaffrey, 1996, p.551.

<sup>24</sup> Salman, 2007, p.629.

<sup>25</sup> McIntyre, 2020, pp.601–618.

<sup>26</sup> UNECE, 2021, p.89.

<sup>27</sup> The United Nations, 2020, p.2.

agreements could be forced to be renegotiated and forthcoming ones shall allow for flexibility in order to face uncertain yet inevitable challenges. Therefore the question arises whether the ERUP may provide a compelling legal framework for climate change-proof transboundary water management agreements between co-riparian States.

This paper explores how the ERUP can legally address climate change in transboundary waters-related challenges. Chapter 2 will determine what the obligations of co-riparian States represent under international law. In turn, chapter 3 will analyze the specific application of ERUP to the challenges posed by climate change to international agreements. Chapter 4 investigates whether the ERUP can be used to frame responses to climate change in the management of the Rhine River basin mentioned above, governed by the legal framework of the European Union (EU) and the 1999 Convention on the Rhine establishing the International Commission for the Protection of the Rhine (ICPR).

## **1.2 Method**

In order to answer the research question of this thesis, this paper incorporates doctrinal research, combined with a case study approach. The doctrinal research is of use both to describe the deployment of ERUP within an international framework and, subsequently, to analyze its application to climate change. The deployment of ERUP is elaborated in chapter 2, which dissects the two main UN Water Conventions, namely the 1992 UNECE Water Convention and the 1997 UN Watercourses Convention. The section additionally covers the 2004 Berlin Rules and the 2008 Draft articles on the Law of Transboundary Aquifers. Finally, the use of ERUP by Courts is also included, predominantly through the Gabčíkovo Case of the International Court of Justice (ICJ). The analysis of ERUP response to climate change is contained in chapter 3. This part further investigates how international agreements may be altered in such a way that they become increasingly climate change-proof.

The Doctrinal research will allow to understand where the ERU principle comes from, how it is currently expressed in the law (in chapter 2 the approach is purely legal, the paper won't analyze

the efficiency of the law in this part), and what it could become. Therefore, this section also includes a normative approach on potential improvement regarding ERUP application.

Afterwards a case study approach is used for the investigation in chapter 4. This part illustrates the practical implementation of ERUP in the Rhine watercourse. This approach is particularly relevant for this paper as it allows to overcome possible disconnection between legal theory and practical implementation. Throughout this paper, referring to economic, environmental and climate change sciences is necessary for several reasons. Firstly, these terms unable to understand the interest of ERUP and its application scope in Chapter 2 and 3. Secondly, they permit to assess its efficiency as seen through chapter 4. Lastly, the scope of this paper will be limited to transboundary waters within the EU territory.

## 2. The Equitable and Reasonable Utilization Principle: A framework principle

The ERUP had a slow emergence and evolution in soft law throughout the 20<sup>th</sup> century, which will be developed in the first section. It is only from 1966 and with the Helsinki Rules that it started to be seen as an applicable principle.<sup>28</sup> Its history is shared with a growing recognition for the plurality of usages made from and on rivers, described in section 2. The third section will cover the inclusion of ERUP in UN Water Conventions and its recognition by the ICJ achieved its current status.

### 2.1 ERUP's evolution throughout the 20th century: From soft law to positive law

As mentioned in the introduction, the ERUP is a compromise between the territorial sovereignty theory and the territorial integrity theory, although neither has ever really been applied since it would have made relationships between neighboring countries impossible.<sup>29</sup> The territorial sovereignty had its climax in 1895 when the Opinion of Attorney General Judson Harmon, related to the US-Mexico conflict upon the use of the Rio Grande, was issued.<sup>30</sup> While the legal framework upon navigation was already well developed at that time, the increase of water consumption raised needs for regulations.<sup>31</sup> The dispute resulted in the elaboration of a report on the regulation of “*the use of the waters (...) as to secure to each country concerned and to its inhabitants their **legal and equitable rights** and interests in said waters*”.<sup>32</sup> Subsequently, a Treaty on the Equitable Distribution of the Waters of the Rio Grande for Irrigation Purposes was signed between the USA and Mexico in 1906.<sup>33</sup>

The 1911 Madrid Declaration of the Institute of International Law (IIL) prohibits the parties to “*utilize or allow the utilization of the water in such a way as to seriously interfere with its utilization by other States (...)*”.<sup>34</sup> The wording is recalling the 1941 Trail Smelter Case where the arbitral

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<sup>28</sup> ILA, 2004, p.20.

<sup>29</sup> McCaffrey, 1996, p.551.

<sup>30</sup> Salman, 2007, p.627.

<sup>31</sup> Ibid, p.626.

<sup>32</sup> Ibid, p.570.

<sup>33</sup> Convention between the United States and Mexico providing for the Equitable Distribution of the Waters of the Rio Grande for Irrigation Purposes, signed at Washington, May 21, 1906.

<sup>34</sup> International Regulation regarding the Use of International Watercourses for Purposes other than Navigation-Declaration of Madrid, 20 April 1911.

Tribunal, regarding the transboundary pollution between Canada and USA, stated that “*no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein (...)*.”<sup>35</sup> The IIL will repeat the no-harm principle in its Salzburg Resolution (1961) but will subject it to the right of use conferred to other States.<sup>36</sup>

The post-world war II saw an increase in the number of international watercourses conflicts over water utilizations.<sup>37</sup> In order to deal with the issue, the ILA established a River Committee from 1954 to 1966.<sup>38</sup> The Committee issued a first report on “principles upon which to base rules of law concerning the uses of international rivers” in 1956.<sup>39</sup> It contained eight principles, including the no-harm principle and the equitable utilization, but was rejected during the 1956 Dubrovnik Conference.<sup>40</sup> A second report, this time adopted by the 1958 ILA Conference in New-York, established in article 2 the equitable utilization principle.<sup>41</sup>

The adoption of the Helsinki Rules in 1966 marked the beginning of the ascension of ERUP in international law.<sup>42</sup> The principle resides in article 4 which states that “[e]ach basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.”<sup>43</sup> The Helsinki Rules go even further by establishing in article 5 a list of relevant factors to determine the equitability and the reasonability of an action.<sup>44</sup> Moreover, it does not distinguish nor oppose the no-harm rule from the ERUP (contrary to a consequent part of the doctrine); instead, the no-harm rule is a factor to take into consideration under ERUP,<sup>45</sup> this is also the angle taken by this paper as explained in section 4. ERUP’s ascension went along with the growing importance of co-related concepts within international law.

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<sup>35</sup> Report of international arbitral awards, Trail Smelter Case (US v. Canada, 16 April 1938 and 11 March 1941, vol.III, p.1965.

<sup>36</sup> Salman, 2007, p.628.

<sup>37</sup> Boisson de Chazourne, 2013, p.123.

<sup>38</sup> Bourne, 1996, p.213.

<sup>39</sup> ILA, 1957, p.1.

<sup>40</sup> Salman, 2007, p.628.

<sup>41</sup> Bourne, 1996, p.162.

<sup>42</sup> ILA, 2004, p.20.

<sup>43</sup> ILA, *Report of the fifty-second conference, Helsinki rules on the uses of the waters of international rivers*, London, 1967, art.4.

<sup>44</sup> Ibid, art.5.

<sup>45</sup> Salman M. A., 2007, p.630.

## 2.2 Definition of core related concepts

The ERUP evolution was in parallel with several changes within the international landscape, bringing international watercourses and their integrated management in the center of the general attention.<sup>46</sup>

### 2.2.1 Transboundary watercourses

The concept of transboundary watercourses has been subject to a radical transformation, driven by scientific advances in water systems understanding across the 20<sup>th</sup> century.<sup>47</sup> In 1956, the ILA report presented to the Dubrovnik Conference defined international rivers as those “*which flows through or between the territories of two or more States*”.<sup>48</sup> This definition takes into account only surface waters, which are the one visible above the land surface and, in this case, flowing across States territories.<sup>49</sup> However, it is nowadays well known that a water system is formed by the complex interaction between surface waters and ground waters.<sup>50</sup> Ground waters are defined as the ones “*that occur below the water table, entirely saturating the pores of geological materials.*”<sup>51</sup>

Due to their invisible nature, it took a long time before their crucial role in freshwater supply was acknowledged.<sup>52</sup> Yet, it represents 98% of the world’s unfrozen freshwater<sup>53</sup> and their depletion can lead to dramatic environmental damages (e.g. seawater intrusion, base-flow reduction in perennial streams, and deterioration of ecosystems).<sup>54</sup> The novel *Silent Spring*, published in 1962 by Rachel Carson, blew up the subject of groundwater (and many other environmental matters) in the public space.<sup>55</sup> In 1966, ground waters were included in the Helsinki Rules definition of drainage basin, worded as follows: “*a geographical area extending over two or more States*

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<sup>46</sup> UNECE, 2021, p.101.

<sup>47</sup> Narasimhan, 2009, p.3.

<sup>48</sup> International Law Association Statement of Principles Resolution of Dubrovnik, 1956 from Report of the Forty-Seventh Conference, held in Dubrovnik 1956.

<sup>49</sup> Koch, 1960, p.61.

<sup>50</sup> Sophocleous, 2002, p.52.

<sup>51</sup> Narasimhan, 2009, p.1.

<sup>52</sup> Ibid, p.7.

<sup>53</sup> UNESCO, “Groundwater”, (17<sup>th</sup> April 2023), <[Groundwater \(unesco.org\)](https://www.unesco.org/en/groundwater)>, (last accessed 3<sup>rd</sup> May 2023).

<sup>54</sup> Narasimhan, 2009, p.7.

<sup>55</sup> Ibid, p.5.

*determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus*". The UN Water Conventions<sup>56</sup> are also providing definitions, to summarize them international watercourses are characterized by three elements: 1) It is composed by surfaces and ground waters "constituting, by virtue of their physical relationship a unitary whole"<sup>57</sup>; 2) These waters flow into a common terminus (mostly sea or ocean); 3) They flow over more than one State territory. The increasing visibility of global water issues during the 1990s pushed for the development of their integrated management.<sup>58</sup>

### 2.2.2 Integrated Water Resources Management (IWRM)

The emergence of the IWRM is estimated to have happened during the mid-1960s but it may be much older, and originated in Latin America.<sup>59</sup> The 1992 International Conference on Water and the Environment is considered a cornerstone moment.<sup>60</sup> It sets four principles (the Dublin Principles) on water: firstly, it reminds the importance, finite and vulnerable nature of water; the second calls for a participatory management of the resource; the third states the importance of women in its protection; finally, the fourth considers water as an economic good.<sup>61</sup> The IWRM was defined in 2000 by the Global Water Partnership as

*a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.*<sup>62</sup>

The idea is to find a compromise between the different uses or users from the same source of water.<sup>63</sup> The four main components of IWRM are water, energy, food security, and environmental

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<sup>56</sup> The 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses and the 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes

<sup>57</sup> 1997 UN Watercourses Convention, art.2.

<sup>58</sup> Biswas, 2004, p.249.

<sup>59</sup> Garcia, 2008, p.23.

<sup>60</sup> Van der Keur and Henriksen, p.1678.

<sup>61</sup> Ibid, p.1678.

<sup>62</sup> Asit K. Biswas, 2004, p.249.

<sup>63</sup> Garcia, 2008, p.24.

sustainability.<sup>64</sup> What implies environmental sustainability within this specific context is “*the explicit allocation of water to meet ecosystems needs.*”<sup>65</sup> The 2007 Brisbane Declaration called this water allocation “the environmental flow” and defined it as “*the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems*”.<sup>66</sup> The relationship between the different water usages has been conceived as the water-food-energy-ecosystems nexus approach.

### 2.2.3 Water-Food-Energy-Ecosystems nexus approach

As said by the European Commission, the Water-Food-Energy-Ecosystems nexus approach (thereafter referred as the nexus approach) represents a *paradigm shift* towards IWRM.<sup>67</sup> The nexus is aimed to “*increase resource efficiency, reduce trade-offs, build synergies and improve governance among and between sectors, while simultaneously protecting ecosystems.*”<sup>68</sup> In other words, instead of managing separately each water-related sector, institutions are encouraged to integrate interlinkages into their management plan, with the IWRM as a tool to do so.<sup>69</sup>

Interlinkages are numerous; the 2020 *United Nation World Water Development Report* gives an excellent overview on the matter. For instance, if water may produce energy, its consuming water requires energy as well (4% of the global electricity consumption in 2014).<sup>70</sup> From an agricultural and food perspective, reducing food waste would increase water efficiency (in addition to avoiding Greenhouse Gases (GHG) emissions from decomposition).<sup>71</sup> Finally, degraded ecosystems are GHG emitters but healthy ones may prove to be highly efficient carbon sink and water flow regulators and purifiers.<sup>72</sup> The necessity to integrate interlinkages into water management is reflected in the ERUP, as depicted by international law.

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<sup>64</sup> Shimelis, 2015, p.1-8.

<sup>65</sup> Ibid, p.3.

<sup>66</sup> Ibid, p.3.

<sup>67</sup> EU, “Water, food, and ecosystem nexus”, <[Water, energy, food, and ecosystem nexus \(europa.eu\)](https://www.europa.eu/water-energy-food-ecosystem-nexus)>, (last accessed 2<sup>nd</sup> April 2023).

<sup>68</sup> UNECE, 2021, p.69.

<sup>69</sup> UNESCO, 2020, p.118-125.

<sup>70</sup> Ibid, p.119.

<sup>71</sup> Ibid, p.121.

<sup>72</sup> Ibid, p.121.



## 2.3 International water law: ERUP as the basis

There are two main Conventions in the international waters management area: the 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (the 1992 UNECE Water Convention) and the 1997 UN Convention on the Law of the Non-navigational Uses of International Watercourses (the 1997 Watercourses Convention). Two other texts are also worth analyzing: the 2004 Berlin Rules, adopted during the ILA Conference in Berlin, and the 2008 Draft articles on the Law of Transboundary Aquifers. Moreover, the 1993 judgment of ICJ on the Gabčíkovo-Nagymaros Project case played a major role in the international recognition of the principle.

### 2.3.1 *The 1993 Gabčíkovo-Nagymaros Project case (ICJ)*

The Gabčíkovo-Nagymaros Project case, which opposed Hungary and Slovakia, started in 1976 with the acceptance of Hungary and what was then Czechoslovakia of a Joint Agreed Plan aimed at regulating the Danube's course through the construction of several dams and reservoirs as well as at producing hydroelectricity.<sup>73</sup> Although Czechoslovakia was quite enthusiastic about the achievement of the Treaty, Hungary soon became reluctant, firstly because the project raised important objections in public opinion for environmental concerns, secondly because the lack of funds led Hungary to contract a loan from Austria.<sup>74</sup> In 1989, Hungary finally abandoned the project and agreed, in 1993, with the newly independent Slovakia, to submit the case to the ICJ.<sup>75</sup> This case was the first time that the Court, freed from jurisdictional constraints that limited some of its previous judgements on environmental-related cases (e.g. the Nauru case)<sup>76</sup>, ruled on international water law and environment matters.<sup>77</sup> Therefore, the Court seized the opportunity to sharpen several environmental principles.<sup>78</sup>

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<sup>73</sup> Forlati, 2020, p.12.

<sup>74</sup> Ibid, p.18.

<sup>75</sup> Ibid, p.19.

<sup>76</sup> *Certain Phosphate Lands in Nauru* (Nauru v. Australia), Judgement, ICJ, (1992).

<sup>77</sup> Fitzmaurice, 2013, p.366.

<sup>78</sup> Boisson de Chazournes, 2020, p.163.

Firstly through the emphasis put on the prevention principle, while traditional environmental law focuses on the no-harm rule (e.g. Principle 21 of Stockholm Declaration and Principle 2 of Rio Declaration), seen at that time as an obligation to not do harm, the Gabčíkovo-Nagymaros Project Judgment establishes a positive general obligation to take measures to prevent damages.<sup>79</sup> Moreover, it considered the preservation of ecological balance as “*part of the essential interests of States*” which have to be preserved.<sup>80</sup> Secondly by developing and enhancing, for the first time in a Court, the concept of sustainable development, stating in its paragraph 140 that the “*need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development*”.<sup>81</sup> Thirdly, and this is the most interesting part for this paper, the paragraph 78 referred to a “*basic right* [for States, Hungary in this case] *to an equitable and reasonable sharing of the resources of an international watercourse*”.<sup>82</sup> This declaration of *equitable and reasonable sharing* being a basic right of riparian States propelled the ERUP to the rank of international customary law, meaning that it may apply to all States, even those not part of any agreement mentioning ERUP.<sup>83</sup>

### 2.3.2 The 1992 UNECE Water Convention

The United Nations Economic Commission for Europe (UNECE), set up in 1947, is a regional forum for joint policies on economy, environment and technology.<sup>84</sup> It gathers governments from Europe, North America, Central Asia and Israel.<sup>85</sup> Adopted in 1992 and entered into force in 1996, the UNECE Water Convention provides a legal framework for regional cooperation between countries of the UNECE and, since 2003, from outside the region.<sup>86</sup> The Water Convention is part of a larger environmental legal framework composed of four additional conventions within the UNECE (addressing air pollution; industrial accidents; environmental impact assessment; and access to information and public participation in decision-making and access to justice).<sup>87</sup>

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<sup>79</sup> Ibid, p.163.

<sup>80</sup> Mbengue, 2020, p.167.

<sup>81</sup> Ibid, p.168.

<sup>82</sup> UNECE, 2021, p.91.

<sup>83</sup> Ibid, p.88.

<sup>84</sup> UNECE, “Mission”, <[Mission | UNECE](#)>, (last accessed 8 May 2023).

<sup>85</sup> UNECE, 2004, 24p.

<sup>86</sup> Ibid, p.5.

<sup>87</sup> UNECE, “UNECE and the SDGs”, (2015), <[UNECE and the SDGs | UNECE](#)>, (last accessed 28<sup>th</sup> April 2023).

The Water Convention is built around three main pillars: the no-harm rule, the principle of cooperation and the equitable and reasonable use principle.<sup>88</sup> The ERUP is included in article 2.2(c), stating that:

*the Parties shall, in particular, take all appropriate measures (...) to ensure that transboundary waters are used in a reasonable and equitable way, taking into particular account their transboundary character, in the case of activities which cause or are likely to cause transboundary impact.*

The meaning of States' responsibility "to ensure" has since been clarified through two advisory opinions from the International Tribunal for the Law of the Sea (ITLOS) issued respectively in 2011<sup>89</sup> and 2015.<sup>90</sup> It results that the obligation behind it is one of due diligence duty.<sup>91</sup> In continuity with the 2010 Pulp Mills Case,<sup>92</sup> ITLOS describes the due diligence obligation as 1) An obligation to take necessary measures and 2) An obligation to enforce with vigilance (i.e. inclusion of enforcement mechanisms to the necessary measures taken).<sup>93</sup> However, this obligation is one "of conduct" and not "of result".<sup>94</sup> Hence, as long a State is using "(...) **all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State**"<sup>95</sup>, it cannot be held responsible if a damage still occurs.<sup>96</sup> To understand what are "all the means" available for States under the UNECE Water Convention, other principles and obligations enshrined in the Convention must be considered.

First, the Convention establishes a general obligation for all parties to "prevent, control and reduce any transboundary impacts".<sup>97</sup> According to the following provision of article 2, this obligation, also known as the no-harm principle, must be guided by the precautionary principle and the

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<sup>88</sup> UNECE, 2021, p.24.

<sup>89</sup> ITLOS, 2011.

<sup>90</sup> ITLOS, 2 April 2015.

<sup>91</sup> Ibid.

<sup>92</sup> ICJ, Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment of 20 April 2010.

<sup>93</sup> ITLOS, 2 April 2015, par.131.

<sup>94</sup> Pulp Mills Case, par.101 ; 2015 ITLOS advisory opinion, par.110.

<sup>95</sup> Pulp Mills Case, par.101

<sup>96</sup> 2015 ITLOS advisory opinion, par.110.

<sup>97</sup> 1992 UNECE Watercourses Convention, art.2.1.

polluter-pays principle.<sup>98</sup> It also provides for the application of Best Environmental Practices (BEP) and the realization of Environmental Impact Assessments (EIA).<sup>99</sup> A second obligation, specific to Parties sharing transboundary waters, is encompassed in the UNECE Water Convention.<sup>100</sup> Indeed, co-riparian parties shall “*enter into bilateral or multilateral agreements or other arrangements (...) [providing] for the establishment of joint bodies*”.<sup>101</sup> This obligation to cooperate and the resulting actions are detailed in different articles of the Convention (see section 2.4.3).

### 2.3.3 The 1997 UN Watercourses Convention

Adopted in 1997 by the UN General Assembly, the UN Watercourses Convention was not enforced before 2014.<sup>102</sup> This text is aimed at enhancing the sustainable management of international watercourses through co-riparian States’ cooperation.<sup>103</sup> Therefore, the Convention encourages parties to enter into local watercourses agreements “*which apply and adjust the provisions of the present Convention to the characteristics and uses of a particular international watercourse*”.<sup>104</sup> It also provides that the Convention does not affect pre-existing local agreements.<sup>105</sup> Thus, the main interest of the Convention is to provide guidelines to international watercourses management where no local or regional agreements have been established yet and to fulfill potential gaps if necessary.

The general principles are listed in the Part II of the Convention, the first one, laying in article 5, is the equitable and reasonable utilization and participation principle. The first paragraph starts as follows, “*watercourses States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner*”.<sup>106</sup> The next sentence of the paragraph provides more details, as parties are required to act “*with a view to attain **optimal and sustainable utilization***”<sup>107</sup> of the watercourse, with due regards with other riparian States interests.

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<sup>98</sup> UNECE, 2004, p.7.

<sup>99</sup> Ibid

<sup>100</sup> Ibid.

<sup>101</sup> 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, art.9.

<sup>102</sup> UN Watercourses Convention, “About Us”, <[About Us - UN Watercourses Convention](#)>, (last accessed 20<sup>th</sup> March 2023).

<sup>103</sup> Ibid.

<sup>104</sup> 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses, art.3.3.

<sup>105</sup> 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses, art.3.1.

<sup>106</sup> Ibid, art.5.1.

<sup>107</sup> Ibid, art.5.2.

The meaning of sustainability can be found in the 1987 Brundtland Commission Report<sup>108</sup>, which defined sustainable development as the one “*that meets the needs of the present without compromising the ability of future generations to meet their own needs*”.<sup>109</sup> Following this conception of a sustainable development, this paper deduces that a sustainable utilization would be the one that limits itself in order to meet future needs. However, the additional term of *optimal* in the sentence may indicate that the limitation of the present utilization should not go further than the strict safeguarding of future needs. The 2013 Arbitration on Indus Waters Kishenganga from the Permanent Court of Arbitration (PCA) specified that sustainable development requires a balance between economic, social and environmental sectors with a long-term view,<sup>110</sup> furthermore, according to the UNECE, the concept “*translates into the duties to conduct an EIA and, more generally, to prevent environmental harm by taking all appropriate measures.*”<sup>111</sup>

The second paragraph of article 5 relates to the participation part of the principle; according to the text: “*watercourse States shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner.*” The rest of the paragraph specifies that this participation contains two elements: 1) The right to utilize the watercourse; 2) The duty to cooperate in its protection. The next article, provides that “*all relevant factors and circumstances*” must be taken into account when evaluating what is the equitable and reasonable utilization of a specific watercourse.<sup>112</sup> It establishes a list of factors, going from natural characteristics of the watercourse to the human and economic impact of the utilization. However, this list is not exhaustive and other factors might come into consideration depending on local and regional specificities.<sup>113</sup> Finally, like the UNECE Water Convention, the UN Watercourses Convention establishes an obligation to not cause significant harm (article 7) and to cooperate (article 8).

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<sup>108</sup> UN, 1987, 247p.

<sup>109</sup> Wibisana, 2014 p.98.

<sup>110</sup> UNECE, 2021, p.100.

<sup>111</sup> Ibid, p.100.

<sup>112</sup> Art.6.

<sup>113</sup> UNECE, 2021, p.115.

These two UN Water Conventions set the legal framework on fresh water law. However, texts posteriorly issued inform on the evolution of the international community's conception and utilization of ERUP.

#### 2.3.4 *The 2004 Berlin Rules*

Almost 40 years after the Helsinki Rules, the ILA published the Berlin Rules. Although the ILA cannot issue legally binding legal texts, the Helsinki Rules are a good illustration of the impact in the international community that the ILA, as a Non-Governmental Organization (NGO), can have. The Berlin Rules aimed to revise (inter alia) the Helsinki Rules and to express the development of international law bodies related to waters and the applicable rules (including customary law).<sup>114</sup>

There are two major differences with the Helsinki Rules. The first one relates to the scope of the rules, as a large part of the Berlin Rules is not only applicable to international waters but also to national and non-transboundary ones.<sup>115</sup> The second one concerns the approach of ERUP; instead of stating *a right* for riparian States to get a reasonable and equitable share of watercourses, the Berlin Rules establish *a duty* to manage transboundary waters within their territory “*in an equitable and reasonable manner*”.<sup>116</sup> The management of waters is defined in article 3(14) as including “*the development, use, protection, allocation, regulation, and control of waters.*”

The Berlin Rules are quite extensive and encompass numerous principles and concepts already mentioned in this paper, such as the integrated and sustainable management of water resources, the no-harm principle and the cooperation principle.<sup>117</sup> However, such as in the two UN Water Conventions, groundwater is missing a proper consideration.<sup>118</sup>

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<sup>114</sup> ILA, Berlin Conference: water resources law, 2004, p.4.

<sup>115</sup> Salman, 2007, p.636.

<sup>116</sup> Ibid, p.636; 2004 ILA Berlin Conference: water resources law, art.12.

<sup>117</sup> 2004 ILA Berlin Conference: water resources law, arts. 6, 7, 8, 11 & 16.

<sup>118</sup> McCaffrey, 2011, p.567.

### 2.3.5 The 2008 UN Draft articles on the Law of Transboundary Aquifers

During the first decade of the 21<sup>st</sup> century, the UN International Law Commission (ILC) realized that the definition of watercourses provided by the 1997 UN Watercourses Convention did not include confined ground waters (also known as fossil waters).<sup>119</sup> Indeed, the Convention refers to “a system of surface waters and ground waters”<sup>120</sup>, which excludes ground waters that are not connected with surface waters.<sup>121</sup>

A first Draft was issued in 2008 and adopted by the UN General Assembly (UNGA) without any vote and after only six years of negotiations.<sup>122</sup> It is applicable to all transboundary aquifers, defined as any “permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation”<sup>123</sup>, and therefore not only to confined ground waters.<sup>124</sup> Two main criticisms were made regarding the Draft Articles. Firstly, it overlaps with the 1997 UN Watercourses Convention, which poses the problem of which text is applicable when some waters fall under both.<sup>125</sup> Secondly, it establishes for States, in article 3, a sovereign right over aquifers located within their territories.<sup>126</sup> The main concern related to this provision, as expressed by Stephen McCaffrey, is that it “risks [to encourage] the state to drill first and ask questions later – or, more likely, to wait to see if its neighbour asks questions later.”<sup>127</sup> Sovereign right over natural resources has already been used in international law, notably by the Principle 2 of the Rio Declaration, however, it seems hardly compatible with shared natural resources.<sup>128</sup>

Besides, the Draft Articles contain some UN Watercourses Convention’s principles, namely the no-harm principle (article 6), the cooperation principle (article 7) and the ERUP (articles 4 and 5). Article 4 requires Parties to “utilize transboundary aquifers or aquifer systems **according to the**

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<sup>119</sup> McCaffrey, 2011, p.567.

<sup>120</sup> 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses, art.2.

<sup>121</sup> McCaffrey, 2011, p.567.

<sup>122</sup> Devlaeminck, 2021, p.164.

<sup>123</sup> 2008 UN Draft articles on the Law of Transboundary Aquifers, art.2.

<sup>124</sup> McCaffrey, 2011, p.567.

<sup>125</sup> McCaffrey, 2011, p.567

<sup>126</sup> Ibid, p.567.

<sup>127</sup> Ibid, p.570.

<sup>128</sup> Devlaeminck, 2021, p.167.

*principle of equitable and reasonable utilization*". Article 5 lists some relevant factors to take into account, mainly similar to those listed in the UN Watercourses Convention. The Draft Articles were recommended, in 2013, "as guidance for bilateral or regional agreements and arrangements' concerning the joint management of transboundary aquifers."<sup>129</sup>

Once the spatial scope of ERUP's application is settled, the question of what it implies must be answered. This is the object of the next section explaining ERUP's components.

## **2.4 ERUP as an umbrella principle for international water law**

To determine what an equitable and reasonable utilization is, it might seem tempting to establish a priority order among the water-food-energy-ecosystems usages. However, this is not the approach used in practice, albeit human needs enjoy a certain preference as shown in section 2.4.1. What results from the analysis of legal texts above is that ERUP is almost systematically co-related to the no-harm rule, to which environmental protection is a core element, and to the cooperation principle, these principles are respectively detailed in sections 2.4.2 and 2.4.3. Section 2.4.4 focuses on public participation, as it is also quite clear that it is a key element for the effective implementation of ERUP.

### *2.4.1 Human needs consideration*

Historically, navigation used to be favored over all other uses, this priority was enshrined in the 1815 Act of the Congress of Vienna, which established the freedom of navigation.<sup>130</sup> During the 20<sup>th</sup> century, the importance of other usages (notably irrigation and hydropower) arose from the increased use of water.<sup>131</sup> The 1921 Barcelona Convention on the Regime of Navigable Waterways of International Concern, despite preserving the navigation right, acknowledges that attention must be given to other usages.<sup>132</sup> Soon after, the 1923 Geneva Convention Relating to the Development

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<sup>129</sup> Ibid, p.172.

<sup>130</sup> Boisson de Chazournes, 2013, p.13.

<sup>131</sup> Salman, 2007, p.626.

<sup>132</sup> Ibid, p.626.



of Hydraulic Power Affecting More than One State grant to any riparian States the right to develop hydraulic power within their territory.<sup>133</sup>

Nowadays, none of the UN Water Conventions aforementioned open the possibility of a systematic hierarchy among the different uses made of watercourses, this scenario is even denied by the article 10 of the UN Watercourses Convention stating, “*in the absence of agreement or custom to the contrary, no use of an international watercourse enjoys inherent priority over other uses.*” This absence of systemization is quite logical since each watercourses are different from each other, whether by their ecology, their social and economic importance, their hydrology, etc.<sup>134</sup> This equality among usages is also adopted in the 2004 Berlin Rules.<sup>135</sup>

However, article 17 of the Berlin Rules declares a right of access to water to every individual in order to meet their “*vital human needs*”. The definition of vital human needs is provided by the article 3(20) of Berlin Rules and means “*waters used for immediate human survival, including drinking, cooking, and sanitary needs, as well as water needed for the immediate sustenance of a household.*” This consideration for human needs is also reflected within the 1992 UNECE Water Convention, which refers to the needs of present and future generations (article 2.5), and the 1997 UN Watercourses Convention’s list of relevant factors to assess ERUP (article 6). It refers, inter alia, to the “*social and economic needs*” of riparian States and to the “*population dependent on the watercourse in each watercourse State*”.<sup>136</sup>

The consideration of human needs, in ERUP application as well as in the prohibition to cause damages, is in expansion.<sup>137</sup> This is driven by the recognition of water as a human right in 2010 both by the UN General Assembly, which even characterized it as “*a human right that is essential for the full enjoyment of life and all human rights*”, and by the Human Rights Council.<sup>138</sup> This increasing weight of human needs is even visible in case laws such as the 1993 Gabčíkovo-

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<sup>133</sup> Ibid, p.626.

<sup>134</sup> McIntyre, 2020, p.607.

<sup>135</sup> Art.14.

<sup>136</sup> Boisson de Chazournes, 2013, p.147.

<sup>137</sup> Ibid, p.147.

<sup>138</sup> Ibid, p.149.

Nagymaros case, which links the minimal flow of Danube with human needs.<sup>139</sup> According to the Committee on Economic, Social and Cultural Rights (CESCR), there are three elements of the right to water: 1) Its availability; 2) Its quality; 3) Its accessibility (the access must be safe, affordable, and non-discriminatory).<sup>140</sup> The protection of environment and ecosystem protection are also linked to the right to water since their destruction generally jeopardizes one or several of the elements indicated by the CESCR.<sup>141</sup>

Considerations for human needs are strongly linked to another component of ERUP, the no-harm principle.

#### *2.4.2 The No-Harm Principle*

Scholars trace back the origins of the no-harm principle to the late 19<sup>th</sup> century – early 20<sup>th</sup> century where States had the obligation to take reasonable measures to protect foreigners within their territories.<sup>142</sup> The application of the principle to transboundary environmental damages appeared with the 1941 Trail smelter case (see section 2.1).<sup>143</sup> The prohibition for States to use their territory (or to authorize its use) in a way that would cause damages to another State was recognized in the 1949 ICJ Corfu Channel Case and the no-harm principle is now acknowledged as being part of international customary law.<sup>144</sup>

Nevertheless, its understanding and application can greatly vary depending on time and places.<sup>145</sup> Firstly, because the principle is often referred to as the obligation to prevent “significant” or “substantial” harm, and find out what is significant or substantive is subject to disagreements among actors.<sup>146</sup> The 1957 Lake Lanoux Arbitration stated that it was up to the potentially impacted State to determine if one of its interests was affected.<sup>147</sup> Secondly, because the concept evolves

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<sup>139</sup> Boisson de Chazournes, 2013, p.25.

<sup>140</sup> Ibid, p.156.

<sup>141</sup> Ibid, p.160.

<sup>142</sup> McIntyre, 2020, p.603.

<sup>143</sup> Ibid, p.604.

<sup>144</sup> Ibid, p.605.

<sup>145</sup> Gupta and Schmeier, 2020, p.733.

<sup>146</sup> Ibid, p.734.

<sup>147</sup> Tanzi, 2020, p.623.

with time: tolerance for damages decreases, new technologies further expose risks, and new damages are accumulated with passed ones.<sup>148</sup> Thirdly, there is an increasing complexity in sources and dimensions of harm (which can be delayed in time, affect more distant countries, or even result from joint activities).<sup>149</sup>

To add to the general confusion, the relationship of the no-harm principle with other principles, notably ERUP, is not always subject to consensus within the academic community.<sup>150</sup> It was mainly argued whether the no-harm principle was opposed to the ERUP and if one of them should have the prevalence, or whether they were equal.<sup>151</sup> The lens taken in this paper is that the no-harm principle is a component of the overarching ERUP as it is at least a part of the relationship between the two principles, even if other aspects may exist.

However, some established elements, largely developed by Courts, structure the concept of no-harm principle.<sup>152</sup> The procedural character of the principle is one of them. Indeed, the no-harm principle induces a due diligence obligation<sup>153</sup> (see previous section 2.3.2), whose key factors are 1) the degree of risk and hazard and the degree of care to be exercised, and 2) the degree of economic development of the State.<sup>154</sup> This second factor does not exempt underdeveloped States from their due diligence obligation, but it must be noted that the requirements will be different.<sup>155</sup> The idea is similar to the principle of common but differentiated responsibilities of the Principle 3 of the Rio Declaration.<sup>156</sup> The due diligence duty content was specified by the ICJ in its 2010 Pulp Mills Case, it notably establishes that States must conduct an EIA in order to fulfill their international obligations.<sup>157</sup>

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<sup>148</sup> Gupta and Schmeier, 2020, p.734.

<sup>149</sup> Ibid, p.733.

<sup>150</sup> Ibid, p.737.

<sup>151</sup> Ibid, p.737.

<sup>152</sup> McIntyre, 2020, p.601-618.

<sup>153</sup> UNECE, 2021, p.86.

<sup>154</sup> McIntyre, 2020, p.612.

<sup>155</sup> Ibid, p.612.

<sup>156</sup> UNGA, A/CONF.151/26 (Vol. I) *Report of the United Nations conference on environment and development* in Rio de Janeiro (1992).

<sup>157</sup> UNECE, 2021, p.144.

The EIA is a policy tool aimed at facilitating decision-making when a project with potential environmental impact is to be decided.<sup>158</sup> It includes, inter alia, information on the potential environmental impacts and the existent alternatives to the project.<sup>159</sup> However, the decision maker is not always obliged to consider the EIA's result and the indication of consequent environmental damages does not imply an automatic abandonment of the project.<sup>160</sup>

Environmental considerations have been included in some recent water-related case laws. Hence, the Permanent Court of Arbitration (PCA) stated in 2013 that “*in light of [the no-harm principle] (...) the requirement of an environmental flow (...) is necessary (...)*”.<sup>161</sup> In 2015, in the San Juan Case, the ICJ examined the impact on water quality and aquatic ecosystems to evaluate the significance of the alleged harm,<sup>162</sup> if the Court did not find “*that the construction of the road caused significant harm to the river's ecosystem*”<sup>163</sup> it did recognize that the loss of ecosystems services could open rights to compensation.<sup>164</sup>

The protection, preservation and management of transboundary watercourses and their ecosystems is enshrined in the fourth part of the UN Watercourses Convention. Article 21 establishes that pollution must be prevented, reduced and controlled, and article 23 emphasizes the relationship between watercourses preservation and marine environment protection. The next one, article 24, provides that the aforementioned obligations might be fulfilled through the establishment of joint management mechanisms. Indeed, co-riparian States' cooperation is a cornerstone element in transboundary waters management.<sup>165</sup>

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<sup>158</sup> Koivurova, 2016, p.5.

<sup>159</sup> Ibid, p.5.

<sup>160</sup> Ibid, p.4.

<sup>161</sup> PCA, 2013, In the matter of Indus waters Kishenganga arbitration (India v. Pakistan), par.112.

<sup>162</sup> ICJ, 2015, par.187

<sup>163</sup> Ibid, par.213.

<sup>164</sup> McIntyre, 2020, p.613.

<sup>165</sup> Boisson de Chazourne, 2013, p.137.

### 2.4.3 Cooperation Principle

Cooperation, and in the context of this paper transboundary water cooperation, is to be conceptualized as a continuum of different actions, between two or more co-riparian States sharing a transboundary river, lake, or aquifer, that are “*necessary to manage international waters in an integrated and sustainable way*”.<sup>166</sup> The UNECE identifies three steps in the process of transboundary water cooperation.<sup>167</sup> The first one is to analyze the needs for and the potential benefits of cooperation.<sup>168</sup> The second one is the negotiation of agreements providing for solutions.<sup>169</sup> The third one is the implementation of the agreement and the assessment of benefits.<sup>170</sup> The benefits vary from a basin to another but can globally be summarized in two categories.<sup>171</sup> Firstly, it improves water management, from which might stem, for instance, health improvement (from increased water quality), better access to electricity and water supply, and reduced economic impacts of floods and droughts.<sup>172</sup> Secondly, it enhances trust among co-riparian States, whose results may be the development of a transnational infrastructure network and the reduction of the risk of conflicts.<sup>173</sup>

What exactly induces transboundary water cooperation is enshrined in the two UN Water Conventions.<sup>174</sup> There are four main obligations under the cooperation principle: 1) Information sharing; 2) Coordination; 3) Joint action conduction; 4) Collaboration.<sup>175</sup>

The UN Watercourses Convention establishes a general obligation to cooperate in its article 8:

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<sup>166</sup> UNECE, 2015, p.3.

<sup>167</sup> Ibid, p.5.

<sup>168</sup> Ibid, p.5.

<sup>169</sup> Ibid, p.5.

<sup>170</sup> Ibid, p.5.

<sup>171</sup> UNECE, 2015, p.15.

<sup>172</sup> Ibid, p.19.

<sup>173</sup> Ibid, p.19.

<sup>174</sup> UNECE, 2015, p.4.

<sup>175</sup> Ibid, p.4.

*“Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.”*

The following articles further detail the general obligation. Therefore, States are required to exchange data and information (article 9) and to notify planned measures with possible adverse effects (article 12) for instance. Moreover, as already mentioned the “protection, preservation and management” might lead to the establishment of joint management bodies (article 24).

The UNECE Water Convention is more detailed and comprehensive. It does not only require the exchange of information (article 6), but also provides a list of the information to be exchanged (e.g. the environmental conditions of transboundary waters and the best technologies available).<sup>176</sup> Its article 9 relates to bilateral and multilateral cooperation, notably through the establishment of joint bodies, it also specifies which missions should be assigned to such institutions. Finally, co-riparian States have an obligation of warning and mutual assistance in case of critical situations.<sup>177</sup>

#### *2.4.4 Public Participation*

*“When you inform people you empower them,”*<sup>178</sup> said Mr. Ma Jun, the founding director of the institute of public and environmental affairs in China. This echoes perfectly with the increasing acknowledgement of the importance of public participation in coherent and effective transboundary waters management.<sup>179</sup> The principle 10 of the 1992 Rio Declaration lists three main pillars of public participation: 1) Access to information; 2) Participation in decision-making; 3) Access to justice.<sup>180</sup> It is acknowledged that involving local citizens and non-state stakeholder helps to secure equity in water allocation, improve transparency, contributes to the implementation of local water

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<sup>176</sup> Art.13.

<sup>177</sup> Arts. 14 and 15.

<sup>178</sup> Fisher, *Before the flood*, National Geographic Documentary, 2016

<sup>179</sup> UNECE, 2021, p.94.

<sup>180</sup> Boisson de Chazournes, 2013, p.162.

agreements, and allows emergence of innovative ideas.<sup>181</sup> The 1998 Aarhus Convention<sup>182</sup> is entirely dedicated to the subject and is aimed at “*further the accountability of and transparency in decision-making and to strengthen public support for decisions on the environment*”.<sup>183</sup> It takes back the three pillars stated by the Rio Declaration and details what they entail and what States obligations are induced from them.

On the access to information, it provides that environmental information must be made available as soon as possible by the public authority (within a maximum delay of one month) and that everyone is entitled to require it without having to justify any interest.<sup>184</sup> The case scenario where an administration may be allowed to not transmit an information is considered in a very restrictive manner by the convention which lists with precision each case.<sup>185</sup> Article 5 goes even further than the mere obligation to communicate information, it requires administration to “*possess and update environmental information*”.

On the participation in decision-making, it grants the right for public to “*participate during the preparation of plans and programs relating to the environment*”<sup>186</sup> and “*to the preparation by public authorities of executive regulations and other generally applicable legally binding rules that may have a significant effect on the environment*”.<sup>187</sup> Public shall also be informed “*early in an environmental decision-making procedure*”<sup>188</sup> of the public authority responsible for making the decision or if the activity is subject to an EIA for instance.<sup>189</sup> Regarding the EIA, whose importance in ERUP has been detailed above, the 1991 Espoo Convention<sup>190</sup> requires parties to conduct the EIA prior to taking the decision authorizing or not the activity and to ensure that the public can participate in the EIA process.<sup>191</sup>

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<sup>181</sup> UNECE, 2021, p.98.

<sup>182</sup> 1998 UNECE Aarhus Convention on Access to Information, public participation in decision-making and access to justice in environmental matters.

<sup>183</sup> Preamble.

<sup>184</sup> Art.4.

<sup>185</sup> Ibid.

<sup>186</sup> Art.7.

<sup>187</sup> Art.8.

<sup>188</sup> Art.6.

<sup>189</sup> Ibid.

<sup>190</sup> 1991 Espoo Convention on Environmental Impact Assessment in a Transboundary Context.

<sup>191</sup> Boisson de Chazournes, 2013, p.140.

The right of access to justice is enshrined in article 9, here the Convention is less comprehensive and conditions the right of a review procedure to the presentation of “*a sufficient interest*” or of the “*the maintaining impairment of a right*”. What both of these terms mean is left to be determined to the national jurisdictions. Therefore, it is not enough to observe a breach to exercise this right, and individuals must be impacted by the breach to engage in judicial procedures. Public can nevertheless make communications relating to compliance with the Convention.<sup>192</sup>

Despite the importance of public participation, the matter does not have a predominant place in UN Water Conventions, the 1997 UN Watercourses Convention does not contain provision on public participation and the 1992 UNECE Water Convention, if it does provide a right for public to be informed,<sup>193</sup> it does not provide any definition of the public.<sup>194</sup> It was later agreed that the UNECE Water Convention should be interpreted in light of the Aarhus Convention when relevant.<sup>195</sup>

It results from this chapter that ERUP is a framework principle in international water law, firstly because of its broad utilization in international conventions and recognition as customary law, secondly because of the variety of principles that it encompasses. The question is now to determine whether this framework is relevant for the establishment of climate change-proof agreements, which is the focus of the next chapter.

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<sup>192</sup> Boisson de Chazournes, 2013, p.239.

<sup>193</sup> Art.16.

<sup>194</sup> UNECE, 2021, p.152.

<sup>195</sup> Ibid, p.152.



### 3. The applicability of ERUP to the design of climate change-proof agreements

This paper already went through the advantages of transboundary water agreements' establishment, which are efficient tools to stabilize political relationships among riparian States and achieve sustainable management of shared water resources.<sup>196</sup> They will become even more important with the intensification of climate-change and must therefore be designed in a way that enables them to face this phenomenon.<sup>197</sup> Climate change-proof can be defined as a combination between resistance (the absence of reaction from external pressure) and resilience (the absorption of the pressure and quick recovery), resulting in "*the capacity of a system to continue to function well as the climate changes*".<sup>198</sup>

A well-functioning water system means that it is able to fulfill present and future humans and environmental needs, or in other words, a climate change-proof management is a sustainable one.<sup>199</sup> However, providing a sustainable management of shared watercourses, although it is a good start, is not enough for agreements to be considered climate change-proof.<sup>200</sup> To do so, they need the integration of specific features in their design. Which features and whether ERUP is helping on the matter are two questions that this chapter is addressing.

The correct design of agreements is crucial considering the international law of treaties.<sup>201</sup> Indeed, new negotiations are cumbersome to conduct while withdrawals are generally deemed unlawful, even in cases of changing circumstances (e.g. the ICJ Gabčíkovo case).<sup>202</sup> Thus, States will presumably face climate change with agreements they are currently entering in.<sup>203</sup>

According to the literature, agreements' resilience to climate-change lies on three main elements, namely, their stability, their efficiency, and their flexibility.<sup>204</sup> Although they may appear

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<sup>196</sup> Jafroudi, 2020, p.718.

<sup>197</sup> UNECE, 2021, p.115.

<sup>198</sup> Van Drunen and al, p.169.

<sup>199</sup> Jafroudi, 2020, p.726.

<sup>200</sup> Ibid, p.718.

<sup>201</sup> Cooley and Gleick, 2011, p.714.

<sup>202</sup> Ibid, p.714.

<sup>203</sup> Ibid, p.714.

<sup>204</sup> Ansink and Ruijs, 2008, p.249–266.; Jafroudi, 2020, p.718.; McCaffrey, 2003, p.156–162

contradictory, and they are to some extent, those components are for the most part complementary and do not systematically influence the same components of agreements. The next sections will successively explore what stability, efficiency, and flexibility encompass in transboundary waters agreements context, as well as how ERUP applies.

### **3.1 Stability**

Stability is an important aspect of international agreements as it brings certainty and predictability, without which Parties may be reluctant to enter into agreements or to stay within existing ones.<sup>205</sup> An agreement's stability depends on two features, the characteristics of the river basin (its hydro-regime and the impact of climate change on river's flow) and the characteristics of the agreement.<sup>206</sup>

#### *3.1.1 The characteristics of the river basin*

The hydrological regime of a watercourse is defined by the water cycle and the climatic conditions occurring in its region.<sup>207</sup> There are three main hydro-regimes in Europe, the glacial regime (where the water provided to rivers is issued by glacier melting in summer), the nival regime (it occurs at a lower elevation than the glacier regime and gets its water from snow melting), and the pluvial regime (where water comes from rainfalls).<sup>208</sup>

A river basin is fed by its catchments, and may hence be submitted to different hydro-regimes.<sup>209</sup> The difference between the water intakes (precipitation, melting, etc.) and losses (evapotranspiration, runoff, ice, groundwater, etc.) occurring within the totality of the catchments determines the water balance of the river basin.<sup>210</sup>

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<sup>205</sup> Drieschova et al, 2011, p. 388.

<sup>206</sup> Ansink and Ruijs, 2008, p.262.

<sup>207</sup> Zeiringer et al, 2018, p. 67.

<sup>208</sup> Ibid, p.67.

<sup>209</sup> Ibid, p.67.

<sup>210</sup> Ibid, p.68.

The river flow plays a core role in the functioning of riverine ecosystems, it is the one who “*determines processes that shape and organize the physical habitat and associated biotic communities*”, and their understanding is fundamental for a sustainable management.<sup>211</sup> Human activities (e.g. dam, urbanization, groundwater pumping, etc.) can disrupt more or less severely hydrological regimes and riverine habitats,<sup>212</sup> and climate change will very likely impact them (through temperature and precipitation patterns changing for instance), resulting in a higher variability of river flows (seasonally and annually).<sup>213</sup> This is challenging for transboundary water agreements as it was found that a reduction in river flow induces a reduction of agreement’s stability.<sup>214</sup>

However, Cooley and Gleick note that “*even where transboundary agreements exist, important elements of the hydrological cycle are commonly left out*”, such as water quality and ground waters, which absence is prominent in water agreements.<sup>215</sup> This is a major limitation to the scope of water agreements given that around 99% of the Earth’s freshwater is underground, depriving agreements from their full potential.<sup>216</sup> Although, in my opinion, this gap might be overcome with the application of ERUP since the principle is applicable to ground waters and, as part of customary law, does not need to be mentioned in agreements to be applicable (as explained in section 2.3.1).

### *3.1.2 The characteristics of the agreement*

In addition to being provided with the relevant scope (i.e. all the relevant aspects of the resource are included), four main characteristics will reinforce or weaken the stability of an agreement. They are, namely, the sharing rule applied, the type of non-water transfers (if relevant), the repartition of costs and benefits, and the distribution of the political power among them.<sup>217</sup>

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<sup>211</sup> Ibid, p.69.

<sup>212</sup> Ibid, p.72.

<sup>213</sup> Ansink and Ruijs, 2008, p.256.

<sup>214</sup> Ibid, p.249.

<sup>215</sup> Cooley and Gleick, 2011, p.713.

<sup>216</sup> Ibid, p.714.

<sup>217</sup> Girard and al, 2016, pp.7945–7962.

### 3.1.2.1 The sharing rule

Although the totality of agreements related to transboundary waters management are not dealing with water allocation, available water quantity remains the main focus.<sup>218</sup> 39% of them relate to hydropower generation and 37% to water consumption.<sup>219</sup> Among other agreements' purposes are floods control (9%), navigation (4%) and fishing (1%).<sup>220</sup> Which rule is applied, which quantity of water can be consumed by parties, and how they are allowed to use it are therefore core elements of water agreements.

To establish a sharing rule, policy makers must answer two main questions: 1) How to allocate the water resource; 2) Why allocate them this specific way.<sup>221</sup> Regarding the *why*, it will depend on the lens adopted by States during negotiation, which can be summarized in six approaches.<sup>222</sup> These approaches are, namely, the right-based approach (hydrography or historical use); the needs-based approach; the hierarchy-based approach (hierarchy among usages); the strategic development approach (here Parties are balancing usages in competition by assessing consequences and risks); and the market-based approach.<sup>223</sup>

Regarding the *how*, the UNECE handbook on water allocation distinguishes three types of mechanisms: direct, indirect, and principle-based.<sup>224</sup> Direct mechanisms will allocate a defined amount of water, the main ones are the fixed and proportional allocations.<sup>225</sup> Indirect ones will rather provide for a procedure for the allocation and may establish a hierarchy among usages.<sup>226</sup> The last one, much wider, has a principle as a starting point (e.g. historical use or equitable use).<sup>227</sup> These three mechanisms will be further detailed later in this chapter but it is already useful to note that, although direct mechanisms (in particular fixed allocation, considered as more stable) are

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<sup>218</sup> Hamner and Wolf, 1998, p.161.

<sup>219</sup> Ibid, p.161.

<sup>220</sup> Ibid, p.161.

<sup>221</sup> UNECE, 2021, p.108.

<sup>222</sup> Ibid, p.185.

<sup>223</sup> UNECE, 2021, p.22.

<sup>224</sup> Ibid, p.185.

<sup>225</sup> UNECE, 2021, p.23.

<sup>226</sup> Ibid, p.23.

<sup>227</sup> Ibid, p.23.

historically favored by riparian States, indirect and principle-based mechanisms are increasingly being integrated within water agreements.<sup>228</sup>

Finally, to conclude this part, it can be said that the ideal outcome of a sharing rule is the pareto-efficiency, meaning that “*no other allocation leaves each agent at least as well off and some agent better off.*”<sup>229</sup> However, this is very unlikely to happen if the agreement focuses exclusively on water allocation, therefore enlarging the picture (through non-water transfers and benefits sharing) may create trade-offs.<sup>230</sup>

### 3.1.2.2 Non-water transfers

Prior to exploring non-water transfers, it seems necessary to briefly explain what a water transfer is. Referring to the relocation of water from a water-abundant actor to a water-scarce one,<sup>231</sup> a water transfer can be a physical transfer (such as building pipes) or a transfer of utilization rights.<sup>232</sup> The relevancy of water transfer to deal with long-term water issues is highly controversial, with some arguing that it may increase water availability for ecosystems in recipient regions, while others argue that it increases scarcity in donor regions.<sup>233</sup> The fact remains that it starts to be an important element to take in consideration in water management as 14% of global water withdrawal is made in water transfer project context, and is expected to reach 25% by 2025.<sup>234</sup> Different types of transfer can apply, such as water lease (the right to use water is transferred for a limited period of time) and water bank (the surplus is rented to other users) for instance.<sup>235</sup>

The non-water transfers (also called side payment) occur in the situation where a downstream State is willing to get more water from its upstream neighbor.<sup>236</sup> Parties can, in that case, negotiate monetary (lump-sum or annual) payments.<sup>237</sup> However, as it might be difficult to evaluate the

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<sup>228</sup> Ibid, p.23.

<sup>229</sup> Brióa and Gudmundsson, 2021, p.614.

<sup>230</sup> Janmaat and Ruijs, p.589.

<sup>231</sup> Gohari and al, 2013, p.24.

<sup>232</sup> Ibid, p.24.

<sup>233</sup> Ibid, p.24

<sup>234</sup> Ibid, p.24.

<sup>235</sup> National Research Council, 1992, p.31.

<sup>236</sup> Ansink and Ruijs, 2008, p.251.

<sup>237</sup> Ibid, p.251.

monetary value of water, in-kind payments can be favored.<sup>238</sup> A third solution is to link water allocation with another issue: a country can negotiate a higher share of water with greater navigation freedom for instance.<sup>239</sup>

Ansink and Ruijs define two main types of non-water transfer: they can be constant or flexible.<sup>240</sup> A non-water transfer is called constant when it is calculated according to the *expected* water use that it is supposed to compensate for.<sup>241</sup> On the other hand, a non-water transfer is called flexible if it is calculated according to the *current* use of water that is compensated, and will adapt to the river's flow through time.<sup>242</sup> Their efficiency in agreement stabilization has been proved correlated with the correct assessment of other externalities.<sup>243</sup>

### 3.1.2.3 Costs and benefits sharing

Integrating externalities into agreements offers an opportunity to shift from a zero-sum game to a positive-sum one.<sup>244</sup> Whether these externalities are positives or negatives will have an influence upon negotiations, cooperation and enforcement mechanisms.<sup>245</sup>

Negative externalities are defined as “[the appropriation of] *a water resource by an upstream riparian, leading to negative effects for downstream riparians*”.<sup>246</sup> This situation is challenging for cooperation as the question of the right-holder over the water resource has to be settled beforehand, which may be a source of heavy disagreements among parties.<sup>247</sup> The two opposite sides of the spectrum, the laissez-faire rule, derived from the absolute territorial sovereignty and designating the upstream State as the right-holder, and the liability rule, derived from the absolute territorial integrity and allocating the right to the downstream State, are both excluded by international law.<sup>248</sup>

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<sup>238</sup> Ibid, p.251.

<sup>239</sup> Ibid, p.251.

<sup>240</sup> Ibid, p.249.

<sup>241</sup> Ibid, p.254.

<sup>242</sup> Ibid, p.254.

<sup>243</sup> Chander and Tulkens, 1997, p.379-401.

<sup>244</sup> Dombrowsky, 2009, p.125.

<sup>245</sup> Ibid, p.125–140.

<sup>246</sup> Ibid, p.128.

<sup>247</sup> Ibid, p.128.

<sup>248</sup> Ibid, p.129.

As seen earlier, the international community favored limited sovereignty and its ERU principle. This leaves negotiations with three alternative outcomes.<sup>249</sup> Riparian States may agree on a property right as a basis for negotiations (efficient but potentially unfair), reject any property right (which hamper any negotiation perspectives), or they can negotiate the property right along with benefits sharing on the basis of limited territorial sovereignty.<sup>250</sup> This last outcome is the most likely to achieve a fair and efficient result.<sup>251</sup>

Conversely, a water-management project planned by a State A may have positive consequences for a State B (e.g. flood control through hydropower production projects, improved water quality or better access to electricity).<sup>252</sup> State A might therefore be tempted to invite State B to contribute (financially and/or technically) to the project.<sup>253</sup> This situation has the significant advantage to avoid the water right issue exposed above, driving numerous scholars to invite to focus as much as possible on positive externalities.<sup>254</sup> The main question here is to define which interest would State B have to cooperate.<sup>255</sup> In line with this, Dombrowsky distinguishes three case scenarios.<sup>256</sup> The first one is the situation where the project is individually rational for State A, consequently, State B does not have any incentive (except moral reasons) to contribute as State A will achieve the project anyway.<sup>257</sup> The second one is where State B's contribution results in a Pareto improvement, meaning that State A would still execute the project, but not necessarily in the most optimal way for B.<sup>258</sup> Through its participation, State B can negotiate advantageous modalities.<sup>259</sup> Finally, the third situation is where the project is only collectively rational and where State B involvement results in net benefits for both parties.<sup>260</sup>

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<sup>249</sup> Ibid, p.131.

<sup>250</sup> Ibid, p.131.

<sup>251</sup> Ibid, p.131.

<sup>252</sup> Ibid, p.132.

<sup>253</sup> Ibid, p.132.

<sup>254</sup> Ibid, p.132.

<sup>255</sup> Ibid, p.132.

<sup>256</sup> Ibid, p.132.

<sup>257</sup> Ibid, p.133.

<sup>258</sup> Ibid, p.133.

<sup>259</sup> Ibid, p.133.

<sup>260</sup> Ibid, p.135.

To summarize, the cooperation among States will largely depend on the interests they see to do so, it might be because of a direct consequence for them (positive or negative) but it also can be related to their diplomatic relationships.

#### 3.1.2.4 The distribution of political power

Pande and McKee describe a conflictual model of decision making as the one where “*the strongest player (legally, politically or otherwise) takes as much of an available surplus of water as he or she desires, leaving other players with little or no water.*”<sup>261</sup> This method is not only unfair but also economically inefficient.<sup>262</sup> According to the literature, efficiency and equitability are necessary for an agreement to be acceptable for States (and thereby stable).<sup>263</sup> It can be ensured through a Consensus Based Decision Making (CBDM) model, where all interested parties are given a place in negotiations.<sup>264</sup>

In resource allocation, two main CBDM models can be cited: the Nucleolus solution and the Nash-equilibrium solution.<sup>265</sup> The Nucleolus solution is based on social equity.<sup>266</sup> The principle is that the resource is first allocated to the less satisfied players until it minimizes their complaints.<sup>267</sup> Once it is done, the allocation is extended to the new group of less satisfied players and so on until there is nothing to allocate.<sup>268</sup> The second one focuses on efficiency.<sup>269</sup> According to Dombrowsky, “*an equilibrium is a Nash equilibrium if no player has an incentive to deviate from [their] strategy as long as the other player does not deviate.*”<sup>270</sup> Studies suggest that the Nash solution would be more stable than the Nucleolus one.<sup>271</sup> However, efficient does not mean equitable<sup>272</sup> and this

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<sup>261</sup> Pande, and McKee, 2007, p.2.

<sup>262</sup> Ibid. p.2.

<sup>263</sup> Ibid, p.2.

<sup>264</sup> Ibid, p.1; Arjoon and al, 2016, p. 2135.

<sup>265</sup> Pande, and McKee, 2007, p.1.

<sup>266</sup> Ibid, p.1.

<sup>267</sup> Xiao Gao, 2018, p.2.

<sup>268</sup> Ibid, p.2.

<sup>269</sup> Pande, and McKee, 2007, p.1.

<sup>270</sup> Dombrowsky, 2009, p.131.

<sup>271</sup> Pande, and McKee, 2007, p.1

<sup>272</sup> Arjoon and al, 2016, p. 2136.



model only works as long as the negative consequences of deviation overcome the negative ones of compliance.<sup>273</sup>

ERUP is favorable to agreement stability, firstly because it introduces the flexibility needed to face variability of river basin characteristics (developed below), secondly, because the non-water transfers and the repartition of costs and benefits stem directly from the equitable part of ERU principle. Finally, as developed in Chapter 2, ERUP induces the no-harm principle and a special consideration for human needs, which are indubitably the foundation for agreements stability as well as efficiency landmarks in agreements implementation as developed in the next section.

### **3.2 Efficiency**

Efficiency, as understood in this paper, is the situation where the goals settled within the agreement are cost-effectively reached. More precisely, in the context of water agreements, an efficient agreement is the one that ensures a sustainable management of the river basin, is enforced, and prevents, reduces, and resolves conflicts.<sup>274</sup>

#### *3.2.1 Monitoring*

*Monitoring is commonly defined as the process of gathering information about state variables at different points in time for the purpose of drawing inferences about changes in state.* (Jones and al., 2010).<sup>275</sup>

Its correct design is key in order for an agreement to be efficient since it is the basis of review and amendment procedures (covered later in the next section 3.3.2).<sup>276</sup> A common criticism is the lack of explicit objectives within monitoring programs.<sup>277</sup> These objectives may cover a broad spectrum, such as data collection for knowledge purposes or gathering information on which management

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<sup>273</sup> Ansink and Ruijs, 2008, p.257.

<sup>274</sup> Tir and Stinnett, 2012, p.214.

<sup>275</sup> Jones, 2010, p.451.

<sup>276</sup> Cooley and Gleick, 2011, p.716.

<sup>277</sup> Jones, 2010, p.451.

actions have been implemented.<sup>278</sup> In addition to setting clear objectives, Jones and al. indicate that a monitoring program should be cost effective, provide reliable information, inform at multiple levels, have a high report frequency, be meaningful to the public, and anticipate responses to possible policy changes.<sup>279</sup>

Firstly, the monitoring must be cost effective given that financial resources may be limited.<sup>280</sup> There must be a balance between the necessary investment to obtain the information wanted and the amount beyond which no further relevant information will be gained.<sup>281</sup> The delay to get the information is also a relevant variable to take into account, since having too long of a delay may induce additional costs.<sup>282</sup> Secondly it must be reliable; it has been emphasized that an information resulting from multiple data sets was more reliable because it is harder to manipulate and thus less sensitive to the potential bias of who interprets.<sup>283</sup> Thirdly, it should inform at multiple levels (global, national or even subnational) since it allows better-informed policy-choices.<sup>284</sup> Fourthly, the frequency of reporting shall be as high as possible, taking into account the cost of reporting and the evolution time scale of the indicator concerned.<sup>285</sup> Fifthly, it shall be meaningful to the public. Indeed, as emphasized in a “Letter [to Link] Public Participation in Scientific Research to the Indicators and Needs of International Environmental Agreements”, Danielsen and al. expose how involving local stakeholders in monitoring data collection, “*could transform international agreements to instruments of change and processes for change.*”<sup>286</sup> Undoubtedly, completing data collected by professional scientists with additional empirical observation may help to overcome gaps between agreements and practical reality. It could even allow us to address some issues at an early stage and increase time-efficiency in decision-making.<sup>287</sup> Sixthly, it should be able to anticipate different future policy scenarios and their consequences on water systems.<sup>288</sup> This part,

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<sup>278</sup> Ibid, p.452.

<sup>279</sup> Jones, 2010, pp.454-455.

<sup>280</sup> Ibid, p.453.

<sup>281</sup> Ibid, p.453.

<sup>282</sup> Ibid, p.453.

<sup>283</sup> Ibid, p.453.

<sup>284</sup> Ibid, p.453.

<sup>285</sup> Ibid, p.453.

<sup>286</sup> Danielsen and al, 2014, p.13.

<sup>287</sup> Ibid, p.20.

<sup>288</sup> Jones, 2010, p.453.

just like the multiple level information, allows enlightening choices but requires a deep understanding of mechanisms linking policies and changes in water quality and quantity.<sup>289</sup>

It results from these six elements that a good monitoring must be transparent, coherent, and applied to the correct time and space scales. Its correct conduction may also prevent and reduce conflicts, either by anticipating them or by providing possible solutions.

### *3.2.2 Conflict management*

It is well acknowledged that institutionalized agreements are relevant tools for conflict management as they mitigate the correlation between climate change (and particularly resource scarcity that it might induce) and international conflicts by preventing their emergence and escalation and facilitating their resolution.<sup>290</sup>

Regarding dispute settlement, States can choose among a variety of mechanisms.<sup>291</sup> They may include traditional political negotiation, but also authority delegation to a third person.<sup>292</sup> The delegation will be substantially different depending on the tool designated for the dispute settlement, it goes from mediation and conciliation, through arbitration (binding and non-binding), and until adjudication in Courts (e.g. ICJ).<sup>293</sup>

Regarding their prevention, agreement designers shall be particularly careful to four factors, which may undermine their efficiency.<sup>294</sup> Firstly, the interest of States to comply must be unequivocal to avoid intentional cheating. Notwithstanding the fact that States are deemed bound by the Treaties they ratify,<sup>295</sup> there is no higher authority able to force them to comply.<sup>296</sup> Secondly, the language

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<sup>289</sup> Ibid, p.453.

<sup>290</sup> Tir and Stinnett, 2012, p.211.

<sup>291</sup> Simmons and Steinberg, 2007, p.127.

<sup>292</sup> Ibid, p.127.

<sup>293</sup> Ibid, p.127.

<sup>294</sup> Ibid, p.215.

<sup>295</sup> The Vienna Convention on the Law of Treaties, signed 23 May 1969 (entered into force on 27 January 1980), art. 2.

<sup>296</sup> Ansink and Ruijs, 2008, p.250.

must be precise enough to avert divergent interpretations.<sup>297</sup> Thirdly, the feasibility of agreement's implementation regarding technical, regulatory, and economic capacity of the Parties.<sup>298</sup> Fourthly, the Parties' ability to deal with extreme events, which may lead to involuntary violations.<sup>299</sup> To summarize, the correct enforcement of an agreement is an efficient way to prevent conflicts.

### 3.2.3 Enforcement

As discussed above, treaties and agreements are signed between sovereign States and have therefore no "natural" higher authority,<sup>300</sup> making enforcement one of the main challenges regarding international agreements, which must be self-enforcing.<sup>301</sup> This is particularly true in the case of agreement over negative externalities, as the positive ones tend to be automatically self-enforcing as all parties will lose with the non-execution of the agreement.<sup>302</sup> Dombrowsky recommends designing from the beginning enforcement mechanisms to be included into the agreements.<sup>303</sup> One example may be the "policy of small steps" where a partial payment is made for a partial sharing.<sup>304</sup>

Equitable cost allocation is a way to ensure cooperation, as all parties are financially involved in the project.<sup>305</sup> The perception of equity, as expressed by Corentin Girard and al., "*is strongly shaped by cultural factors, by historical precedent, and by the type of goods and burdens being distributed*".<sup>306</sup> Although ERUP can do little regarding the enforcement (except enhancing it), it provides tools for both monitoring and conflict management. On monitoring, it sets a clear goal of environmental protection (reasonable utilization) and induces public participation and the conduction of Environmental Impact Assessment, as developed in Chapter 2. On conflicts

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<sup>297</sup> Tir and Stinnett, 2012, p.215.

<sup>298</sup> Ibid, p.215.

<sup>299</sup> Ibid, p.215.

<sup>300</sup> Ansink and Ruijs, 2008, p.250.

<sup>301</sup> Dombrowsky, 2009, p.131.

<sup>302</sup> Ibid, p.135.

<sup>303</sup> Ibid, p.132.

<sup>304</sup> Ibid, p.132.

<sup>305</sup> Girard and al, 2016, p.7945.

<sup>306</sup> Ibid, p.7946.

management, its no-harm principle helps to prevent and reduce conflicts (inter alia through correlated principles such as prevention and precautionary principles, due-diligence duty, etc.).

### 3.3 Flexibility

*If agreements (...) fail to allow for flexibility to the new hydrological reality, their stability and effectiveness will be compromised.* (Maryam Jafroudi, 2020).<sup>307</sup>

A major bias pointed in water agreements is that they are mainly designed on the postulation that water flows, their quality, as well as their political and social environment will remain identical.<sup>308</sup> However, as already discussed above in this paper, things will not remain constant. Drastic changes are to be expected although they cannot be fully quantified yet.<sup>309</sup> At the same time, Treaties are not flexible by nature (which comes from their need to be stable and predictable); hence, mechanisms allowing for flexibility must be included in the design of water Treaties.<sup>310</sup>

When it comes to international agreements, two types of uncertainties can arise and undermine their stability and efficiency.<sup>311</sup> On one hand, there are the uncertainties exogenous to the agreement; they arise from variability in resource availability (i.e. water quantity and quality) and in social and political surroundings.<sup>312</sup> On the other hand, we find uncertainties endogenous to the agreement, meaning that they are caused by the agreement itself.<sup>313</sup> States may use different strategies to face this second situation.<sup>314</sup>

Firstly, States can ignore the uncertainty, meaning that the agreement's language will not contain any acknowledgement of it or mechanisms allowing for uncertainty management (undoubtedly, this is the least efficient strategy).<sup>315</sup> Secondly, States can minimize uncertainty, by reducing any

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<sup>307</sup> Jafroudi, 2020, p.718.

<sup>308</sup> Cooley and Gleick, 2011, p.714.

<sup>309</sup> UNECE, 2021, p.37.

<sup>310</sup> McCaffrey, 2003, p.157.

<sup>311</sup> Drieschova and al, 2011, p.390.

<sup>312</sup> Ibid, p.390.

<sup>313</sup> Ibid, p.390.

<sup>314</sup> Ibid, p.390.

<sup>315</sup> Ibid, p.391.

room for ambiguity and being as precise as possible.<sup>316</sup> Finally, States can adopt an open-ended strategy, this third option lies on the assumption that uncertainty cannot be avoided.<sup>317</sup> According to Drieschova and al., “*the solution is hence to either adopt a risk avoidance tactic by prescribing precautionary policies to limit activities or to leave room for change by including flexibility and adaptability to the design of management systems.*”<sup>318</sup> The choice of which strategy to apply will be driven by political and economic factors inherent to each river basin.<sup>319</sup>

Regarding the management of exogenous uncertainties, riparian States can include four different institutional features enhancing flexibility within agreements.<sup>320</sup> They are, namely, the inclusion of adjustable water allocation mechanisms and water quality criteria; of response strategies for extreme events; of amendments and review procedures; and the establishment of joint management institutions.<sup>321</sup>

### *3.3.1 Adjustable water allocation and quality criteria*

According to the UNECE Handbook on water allocation, Treaty mechanisms may allocate ground water, surface water and hydropower benefits either alternatively, or two of them, or all of them.<sup>322</sup> As seen above (section 3.1.2.1. The sharing rule), depending on the lens adopted, riparian States may base water allocation on direct, indirect, and principle-based mechanisms, allowing for more or less flexibility.<sup>323</sup>

Regarding direct mechanisms, fixed allocations represent around a third of treaties containing provisions for water allocation.<sup>324</sup> In this case, a fixed volume of water is allocated either to each country or to only one of them.<sup>325</sup> Indeed, an upstream riparian States can commit to use “only” a

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<sup>316</sup> Ibid, p.391.

<sup>317</sup> Ibid, p.392.

<sup>318</sup> Ibid, p.392.

<sup>319</sup> Ibid, p.392.

<sup>320</sup> Cooley and Gleick, 2011, pp.714-716.

<sup>321</sup> Ibid.

<sup>322</sup> Ibid, p.183.

<sup>323</sup> UNECE, 2021, pp.183-188.

<sup>324</sup> Cooley and Gleick, 2011, p.713.

<sup>325</sup> Ibid, p.713.

certain amount of water or, at the reverse, to release “at least” a given amount of volumetric water to its downstream neighbor.<sup>326</sup> Interestingly, it has been shown that agreements which include a fixed amount of volume to be received and/or available to a downstream country, generally have a very low stability.<sup>327</sup> If this method offers the advantage of being very specific on what water quantity is available for usage, it has the major inconvenience of allowing none (or very few) flexibility to adapt to climate change.<sup>328</sup>

Proportional allocation, conversely, is the configuration where co-riparian States agree on the utilization of the share of the flow (for instance the upstream States commit to release at least 45% of the river flow), the effective quantity of water allocated is therefore frequently evolving.<sup>329</sup> This is maybe why it can be considered as a factor of instability within agreements.<sup>330</sup> This method is less common in water agreements although it has been proved to be more efficient when facing climate change and river flow variability.<sup>331</sup> This may be explained by the fact that most transboundary water agreements were established ahead of climate change becoming a major threat on watercourses.<sup>332</sup>

A complementary way to bring flexibility to water allocation (which is also relevant for other elements of agreements) is the integration of amendment and review procedures.

### *3.3.2 Amendments and review procedures*

Review procedures, which assess the efficiency/success of an action or a regulation, and amendment procedures, which consist of modification to action or regulation assessed, are essential in water management to face climate change.<sup>333</sup> These two complementary procedures allow, firstly, to assess if the action or the regulation evaluated is well adapted to the objectives targeted;

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<sup>326</sup> Ibid, p.713.

<sup>327</sup> Ansink and Ruijs, 2008, p.249.

<sup>328</sup> Cooley and Gleick, p.713.

<sup>329</sup> Jafroudi, 2020, p.719.

<sup>330</sup> Ibid, p.718.

<sup>331</sup> Ibid, p.718.

<sup>332</sup> Ibid, p.719.

<sup>333</sup> Cooley and Gleick, 2011, p.716.

secondly to ensure it is well implemented and/or enforced; and thirdly, to do modifications if necessary.<sup>334</sup> They may cover every step of water management, by studying either one specific part or the entire process (regulation, monitoring plan, enforcement, etc.).<sup>335</sup>

They are even more important that, although a management plan is correctly established at a time, conditions can change. Scientific knowledge can evolve and bring forward new challenges, climate change may result in unexpected reactions, social and political context might vary over time, etc. Hence, a management plan brings flexibility, enhances compliance, and enables learning from past actions.<sup>336</sup> While amendments are generally conducted by Parties, the UNECE, in its 2000 Geneva strategy, indicates that the entity in charge with reviewing should be independent and the procedure legally binding, although it may result in non-legally binding instruments (e.g. guidelines, objectives ...).<sup>337</sup>

### 3.3.3 Response strategies for extreme events

*Resilience refers to strategies for managing and minimizing extreme water quality [and quantity] impacts and ecosystem recovery.* (Sujay et al, 2018).<sup>338</sup>

Extreme events are problematic regarding numerous areas: they may damage ecosystems; threaten access to drinkable water; and cause important economic losses (446 billion euros in the European Economic Area between 1980 and 2019, representing 3% of 2019 Gross Domestic Product).<sup>339</sup>

Lennkh et al. identify three main channels of economic losses.<sup>340</sup> The first one (the economic channel) encompasses direct impacts, such as the destruction of infrastructures during an inundation for instance.<sup>341</sup> The second one (the fiscal channel) relates to public finances, such as decreased tax revenue occurring with decreased economic production, or public spending in

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<sup>334</sup> UNECE, 2021, p.17-30.

<sup>335</sup> Ibid, p.174.

<sup>336</sup> Cooley and Gleick, 2011, p.716.

<sup>337</sup> UNECE, 2021, p.17-30.

<sup>338</sup> Sujay and al., 2018, , p.273.

<sup>339</sup> Lennkh and al, 2021, p.1.

<sup>340</sup> Ibid, p.4.

<sup>341</sup> Ibid, p.4.



mitigation and adaptation policies.<sup>342</sup> The third one (the financial stability channel) refers to financial markets destabilization.<sup>343</sup>

There is a popular belief that extreme climate events are either high-energy but short-term events (e.g. cyclones, freeze-thaw, and floods) or low-energy but prolonged events (e.g. droughts).<sup>344</sup> However it is more and more acknowledged that the frequency of high-energy events will increase, evolving towards high-energy and prolonged extreme events.<sup>345</sup> In Europe, there are two main extreme events to expect: droughts (occurring along with warming and atmospheric changes) and floods (with frost and hail showers).<sup>346</sup>

Two observations have to be mentioned in the context of extreme climatic events. Firstly, there is a diversification of the impacts (a drought alone does not affect ecosystems the same way than a drought combined with an atmospheric warming). Secondly, interaction between climate change and human activities are increasing (a flood damaging an industrial zone may result with high pollution for instance, resulting in a higher destruction of ecosystems and threat on clean drinking water access than in the absence of human activities).<sup>347</sup> The recognition of human activities as a staple factor in climate aggravation is necessary to safeguard water security.<sup>348</sup> In order to establish efficient management strategies, a good understanding of the phenomenon and identification of features are *sine qua non* conditions.<sup>349</sup> It has been shown, for instance, that floodplains would enhance water retention and thus increase agricultural productivity resilience.<sup>350</sup>

One of the main challenges in extreme events management is to transit from an *a posteriori* response, which consists of repairing damages, to a proactive one aimed at preventing damages occurrence.<sup>351</sup> This is even harder because management systems are traditionally based on historical data as a basis to establish future predictions, assuming that the fluctuation in natural

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<sup>342</sup> Ibid, p.4.

<sup>343</sup> Ibid, p.4.

<sup>344</sup> Kaushal and al, 2018, p.274.

<sup>345</sup> Ibid, p.274.

<sup>346</sup> Lennkh and al, 2021, 9p.

<sup>347</sup> Kaushal and al, 2018, p.273.

<sup>348</sup> Kaushal and al, 2017, p.1.

<sup>349</sup> Kaushal and al, 2018, p.277.

<sup>350</sup> Ibid, p.277.

<sup>351</sup> Kaushal and al, 2017, p.2.

systems (which is a natural phenomenon) is actually, to some extent, stable.<sup>352</sup> This assumption is called stationarity.<sup>353</sup> However, due to climate change, this stationary is not reliable anymore, and changes are occurring at a critical speed for planning.<sup>354</sup> Responding to such challenges will require training in non stationarity and uncertainty.<sup>355</sup> To do so, cooperation through joint management institutions, enhancing data sharing, monitoring, and regulation's alignment with science, would be a good start.<sup>356</sup>

### 3.3.4 Joint management institutions

In the context of climate change, it is more and more widely acknowledged that the establishment of joint management institutions is crucial.<sup>357</sup> However, their development is often grappling with questions over State sovereignty, ownership, financing, scope of cooperation, etc.<sup>358</sup> This explains why they remain rare;<sup>359</sup> nevertheless, the situation will presumably change with climate change giving strong incentives for an optimal management of international river basins.<sup>360</sup>

According to Kliot and al “*the success of institutions which were founded on basin-wide joint management lie in their territorial coverage and broad functional frameworks*”.<sup>361</sup> They state that a joint management shall encompass three core features.<sup>362</sup> Their scope ought to cover the whole river basin, preferably without consideration for borders; their costs and benefits shall be shared according to Parties' arrangement; and they must integrate conflict resolution procedures.<sup>363</sup>

The level of cooperation or the level of comprehensiveness are both potential basis for agreement establishment.<sup>364</sup> However, according to Feitelson and Haddad, building agreements from initial

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<sup>352</sup> P. C. D. Milly and al, 2008, p.573.

<sup>353</sup> Ibid, p.573.

<sup>354</sup> Ibid, p.574.

<sup>355</sup> Ibid, p.574.

<sup>356</sup> UNECE, 2015, p.19.

<sup>357</sup> Cooley and Gleick, 2011, p.716.

<sup>358</sup> Solanes, 1995, p.120.

<sup>359</sup> Kliot et al., 2001, p.244.

<sup>360</sup> Ibid, p.231.

<sup>361</sup> Ibid, p.229.

<sup>362</sup> Ibid, p.244.

<sup>363</sup> Ibid, p.244.

<sup>364</sup> Feitelson and Haddad, 1998, p.231.

goals settled by policy-makers would be the most proficient method; experts would then develop the structure.<sup>365</sup> They distinguish several goals for policy-makers such as river basin protection, crisis management, efficiency (on water use and/or water supply), and the integration and comprehensiveness of the structure.<sup>366</sup> These goals are not mutually exclusive, and decision-makers may set several of them, which can evolve through time.<sup>367</sup> The idea is that once an institution is established it will evolve and the integration of conflicting features become easier.<sup>368</sup> A major shortcoming for this approach is the potential failure of the institution in its early stages of development if, because it relies too much on its anticipated evolution, the structure is not built in a workable way.<sup>369</sup>

Once the structure is established, several elements must be assessed.<sup>370</sup> The first one is the sustainability of the institution, meaning that it shall contribute to resource protection, be efficient, and facilitate the response to emergencies.<sup>371</sup> The second one is the flexibility (its ability to adapt to changes).<sup>372</sup> The third one is its ability to reduce potential conflicts.<sup>373</sup> Finally, considering its threat for international cooperation, the infringement on sovereignty must be as minimal as possible.<sup>374</sup>

Unfortunately, joint management institutions (when existing) are still nowadays consigned as non-binding advisors for States, in charge of gathering and analyzing information.<sup>375</sup> Although it is recognized that “*joint management institutions have a very high degree of flexibility suitable to face the uncertainties arising from climate change*”, they are mostly deprived of any enforcement authority.<sup>376</sup>

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<sup>365</sup> Ibid, p.231.

<sup>366</sup> Ibid, p.231.

<sup>367</sup> Ibid, p.231.

<sup>368</sup> Ibid, p.231.

<sup>369</sup> Ibid, p.232.

<sup>370</sup> Ibid, p.229.

<sup>371</sup> Ibid, p.230.

<sup>372</sup> Ibid, p.229.

<sup>373</sup> Ibid, p.229.

<sup>374</sup> Ibid, p.229.

<sup>375</sup> Maryam Jafroudi, 2020, p.728.

<sup>376</sup> Ibid, p.728.

As briefly mentioned above, ERUP can be a flexibility mechanism in itself, especially through principle-based sharing rules, which can be based on ERUP. The UNECE Handbook on water allocation, reasserts the need for transboundary waters management, to follow the no-harm, cooperation, and ERU principles, although it also advises to complete principle-based mechanisms with specifications.

It appears, from all the previous parts of this paper, that the establishment of Joint Management Bodies is the best way to ensure the flexibility needed for water agreements to face climate-change. They are as well, in my opinion, the best adapted to apply principle-based water allocation mechanisms, when provided with the correct authority, as they will be able to take specific action based on ERUP.

However, as seen above, this configuration remains the exception. Joint Management Bodies are thus both the best way to apply ERUP and the one that offers the most perspective and potential for future transboundary water agreements design.

#### 4. Case study – The Rhine River

Running over 1232 km from the Alps to the North Sea, the Rhine River takes its name from a Celtic language meaning “The Great Running Water”.<sup>377</sup> As the fourth biggest river in Europe<sup>378</sup>, it hosts 60 million peoples on its watershed, distributed in nine States, namely, Switzerland, Germany, France, Netherland, Belgium, Luxembourg, Austria, Italia, and Liechtenstein.<sup>379</sup> However, only Switzerland, Germany, France, and Netherland are effectively Rhine River’s riparian States, to which is added Luxembourg, crossed by the Moselle River which is the second biggest catchment of the Rhine River.<sup>380</sup> Its watercourse is divided in six main parts: the Alpine Rhine, the High Rhine, the Southern Upper Rhine, the Middle Rhine, the Lower Rhine, and the Delta Rhine (See figure 1). Each of them contains several catchments of the Rhine River, themselves subjected to different hydro-regimes. The High Rhine and the Southern Upper Rhine are submitted to a glacial and nival regime, while the Middle and Lower Rhine are subjected to a nival and pluvial regime.<sup>381</sup> This is why, historically, the upstream part of the Rhine faces floods in summer, when ice and snow are melting, while the downstream part experiences them in winter with the intensification of rainfalls.<sup>382</sup>

With the occurrence of climate change, especially with the retreat of snow in the Alps, the Rhine River is expected to evolve towards a pluvial regime.<sup>383</sup> Although the annual water average is likely to remain constant, extreme floods and low water levels are going to occur more regularly. This could have a significant impact on navigation, since the water level may be low enough to hamper goods transportation,<sup>384</sup> a major issue in the region where the economic importance of the Rhine is colossal. Approximately 200 million metric tons of goods are transiting each year through its waters,<sup>385</sup> and Rotterdam, where the Rhine meets the North Sea, is one of the biggest harbors in

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<sup>377</sup> ICPR, “International Commission for the Protection of the Rhine”, < [Home \(iksr.org\)](#)>, (last accessed 17<sup>th</sup> May 2023).

<sup>378</sup> Walter Jülich and Klaus Lindner, 2006, p.5.

<sup>379</sup> ICPR, “International Commission for the Protection of the Rhine”, < [Home \(iksr.org\)](#)>, (last accessed 17<sup>th</sup> May 2023).

<sup>380</sup> ICPR, “Moselle-Saar”, <[Moselle-Saar \(iksr.org\)](#)>, (last accessed 17th May 2023).

<sup>381</sup> ICPR, “Partial watersheds”, <[Sub-basins \(iksr.org\)](#)>, (last accessed 17th May 2023).

<sup>382</sup> Ibid.

<sup>383</sup> Jülich and Lindner, 2006, p.32.

<sup>384</sup> Ibid, p.27.

<sup>385</sup> Cioc and Cronon, p.23.

the world and the first destination of Middle-East oil tankers.<sup>386</sup> In addition, all along the riverbanks, farmers are using water for irrigation, nuclear power plants are cooled down, aluminum plants are provided in hydroelectricity, and textile industries and potash mines use it for waste disposal.<sup>387</sup>

Concerns over Europeans rivers' management has been going on for centuries, the 1815 Final Act of the Congress of Vienna (which reorganized Europe after Napoleonic wars) states in its article 108 that "*The Powers whose States are separated and crossed by the same navigable River, engage to regulate, by common consent, all that regards its navigation. For this purpose they will name Commissioners (...)*".<sup>388</sup> The nineteenth century has been the theater of basin organization and commissions expansion,<sup>389</sup> including over the Rhine River with the creation in 1815 of the Rhine Commission.<sup>390</sup> It allowed the conduction of major projects such as the Tulla's Rhine Correction project, initiated in 1817 and accomplished in 1879.<sup>391</sup> The purpose of Tulla's project was to improve navigability over the river by controlling floods.<sup>392</sup> The main interests of this operation were to enhance the connection between mining places, supply big cities with food and goods, and, by draining former flood plains, allow their cultivation, even more necessary with the new industrialization of riverbanks.<sup>393</sup>

The consequences of this intensification of human activities have been all but beneficial for the river's ecosystems. Erstwhile lined with old-growth forests and hosting over 47 fish species, Rhine River environmental state deteriorated rapidly and it became clear during the mid-1900s that the river could not fulfill all the roles it was assigned (e.g. provide clean water while being used for industrial and agricultural wastes disposal). Riparian States were urged to review their management and to establish, in 1963, the International Commission for the Protection of the Rhine against pollution.<sup>394</sup> Later, the "against pollution" was dropped to leave the broader "Protection of the

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<sup>386</sup> Ibid, p.23.

<sup>387</sup> Ibid, p.23.

<sup>388</sup> Boisson de Chazournes, 2013, p.177.

<sup>389</sup> Boisson de Chazournes, 2013, p.176.

<sup>390</sup> Cioc and Cronon, 2002, p.23.

<sup>391</sup> Wilken, 2006, p.47-87.

<sup>392</sup> Ibid, p.52.

<sup>393</sup> Ibid, p.52.

<sup>394</sup> Ibid, p.59.

Rhine” wording. The ICPR is conducting since more than 40 years now a rehabilitation policy, however, environmental needs have to comply with the high dependency of European countries on river’s goods, energy, and water.<sup>395</sup>

A Rhine Action Plan (RAP) was established for the 1987-2000 period, and has proved to be successful. The RAP was constituted of three phases, a list of “priority substances” was firstly established, their discharge was then reduced by 50% (70% for some heavy metal), and the third phase was related to additional measures to improve water quality, such as the banishment of dangerous substances.<sup>396</sup> It was replaced by the Rhine 2020 program, having for objectives the sustainable development of the Rhine ecosystems, floods management, the decontamination of the North Sea, and to ensure access to safe drinking water.<sup>397</sup> The current program to be implemented is the Rhine 2040 program.<sup>398</sup>

Nowadays, the Rhine River is managed by the ICPR, which functions under comprehensive water-related policy provided by the EU, in addition to the international legal framework exposed in Chapter 2. The first section will analyze the role of ERUP within the EU water policy, and the second section will focus on the ICPR and its potential resilience to climate change.

#### **4.1 The legal framework of the Rhine management**

EU legislation over fresh water comprises the 1979 Bird Directive, the 1991 Nitrates and Urban Waste Water Directives, the 1992 Habitats Directive, the 1998 Drinking Water Directive, and the 2020 Water Reuse Directive.<sup>399</sup> However, the most important are undoubtedly the 2000 EU Water Framework Directive (WFD) and its two daughters Directives, the 2006 Ground Water Directive (GWD) and the 2008 Ecological Quality Standards Directive (EQSD), and the 2007 Flood Directive. The 1999 Convention on the Protection of the Rhine is in charge of the practical

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<sup>395</sup> Ibid, p.60.

<sup>396</sup> Ibid, p.71.

<sup>397</sup> Ibid, p.74.

<sup>398</sup> ICPR, “Programme “Rhine 2040” ”, <[Rhine 2040 \(iksr.org\)](https://www.iksr.org/)>, (last accessed 17<sup>th</sup> May 2023).

<sup>399</sup> European Commission, “Environment action programme to 2030”, <[Environment action programme to 2030 \(europa.eu\)](https://european-council.europa.eu/media/en/press-summaries/doc/default-source/environment-action-programme-to-2030.pdf)>, (last accessed 17<sup>th</sup> May 2023).

implementation of the international and EU's framework and deals with the specificities inherent to the Rhine River.

#### 4.1.1 The 2000 Water Framework Directive

*Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such.* (WFD, Preamble).<sup>400</sup>

Adopted in 2000, the WFD (2000/60/EC) requires EU Member States to achieve and preserve surface and ground waters' good status.<sup>401</sup> The "good status" of waters is based on the assessment of four elements: 1) The ecological status of surface waters; 2) the chemical status of surface waters; 3) the chemical status of ground waters; and 4) the quantitative status of ground waters.<sup>402</sup> The last element is particularly important for ground waters since they are further threatened by depletion due to their hidden nature (see Chapter 2).<sup>403</sup> Whereas the WFD includes specific provisions related to ground waters, the majority of the Directive reflects a unified perception of surface and ground waters as water resources which shall be managed within a coherent framework.<sup>404</sup>

Although the WFD does not establish ERUP as one of its principles, it provides in its preamble for a "*prudent and rational utilization of natural resources*".<sup>405</sup> Several principles related to ERUP are also enshrined in the Directive such as the precautionary and prevention principles, the environmental quality standards, and the participation of the public. It also introduces an economic valorization of water through the polluter-pays principle and the principle of recovery of the costs of water services.<sup>406</sup> In addition, its article 5 requires for each international river basin an analysis

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<sup>400</sup> Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, preamble (1).

<sup>401</sup> Ibid, preamble (25) and (28).

<sup>402</sup> European Commission, "Water Framework Directive", <[Water Framework Directive \(europa.eu\)](https://european-council.europa.eu/media/en/press-communications/infographic/infographic_water-framework-directive-2000-60-ec.pdf)>, (last accessed 17<sup>th</sup> May 2023).

<sup>403</sup> UNECE, 2021, p.79.

<sup>404</sup> Narasimhan, 2009, 11p.

<sup>405</sup> WFD, preamble (11).

<sup>406</sup> UNECE, 2021, p.86.



of its characteristics, a review of the impact of human activity, and an economic analysis of water use.<sup>407</sup>

Regarding cooperation, the Directive designates river basin districts as the adequate institutional framework,<sup>408</sup> stating in its article 3 that every international watercourse shall be assigned to a river basin district. Article 13 sets the obligation to establish a management plan for river basins, specifying that, in the case of international river basins, “*coordination [shall be ensured] with the aim of producing a single international river basin management plan.*” However, since the Directive fails to mention climate change, river basin management plans are therefore not under the explicit obligation to be realized in line with this particular challenge.<sup>409</sup> In my opinion, this apparent gap might be mitigated by the wordings of the first article, stating that the purpose of the Directive was, inter alia, to “*contributes to mitigating the effects of floods and droughts*”, which are the main consequences over water expected from climate change in Europe.

Regarding monitoring, river basin management plans have to be reviewed and updated every six years (article 13), in addition, article 14 provides that public information and active participation shall be encouraged “*in particular in the production, review and updating of the river basin management plans*”. Given the cooperative background between Member States and preexistent Commissions, the Directive has mainly been implemented through multilateral agreements and joint management bodies.<sup>410</sup> Regarding disputes over its application, EU riparian States can refer to the Court of Justice of the European Union (CJEU).<sup>411</sup>

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<sup>407</sup> WFD, art.5.

<sup>408</sup> Verschuuren, 2013, p. 250-272.

<sup>409</sup> Ibid, p.262.

<sup>410</sup> Boisson de Chazournes, 2013, p.184.

<sup>411</sup> Boisson de Chazournes, 2013, p.184.

#### 4.1.2 The 2006 Groundwater Directive

The Groundwater Directive (2006/118/EC)<sup>412</sup>, or GWD, on the protection of groundwater against pollution and deterioration stems directly from the WFD<sup>413</sup> and is aimed at “*establishing specific measures to prevent and control groundwater pollution*”.<sup>414</sup> These measures are of three types: The assessment of good chemical status; the identification and reversal of environmentally significant pollutants trends; and preventing or limiting inputs of pollutants into groundwater.<sup>415</sup>

In order to do so, GWD defines ground water quality standards (annex I), which must be part of the assessment of chemical status for groundwater bodies, and threshold values (annex II) to be used by Member States.<sup>416</sup> Annex II must be applied “*for all pollutants (...) which are putting [the good status of] groundwater bodies at risk*”.<sup>417</sup> These two annexes are to be review every six year by the European Commission, taking into account the results of WDF monitoring programs, the EU Research Programs (e.g. GENESIS, BRIDGE, and BaSeLiNe), and the recommendation from stakeholders such as The Scientific Committee on Health and Environmental Risks, Member States or the European Parliament, and Non-Governmental European business and environmental organizations.<sup>418</sup> The GWD’s implementation was, for most Member States, “*the first time that formal quality standards (or threshold values) have applied to groundwater.*”<sup>419</sup> Quality standards over surface waters preceded ground waters’ one, albeit their dedicated Directive appeared two years after the GWD.

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<sup>412</sup> Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration.

<sup>413</sup> European Commission, 2011, p.7.

<sup>414</sup> GWD, art.1.

<sup>415</sup> European Commission, 2011, p.7.

<sup>416</sup> Ibid, p.8.

<sup>417</sup> Ibid, p.8.

<sup>418</sup> Ibid, p.9.

<sup>419</sup> Ibid, p.11.

### 4.1.3 The 2008 Ecological Quality Standards Directive

The concept of Ecological Quality Standards (EQSs) arisen in environmental law through a better understanding of what were the legal needs (e.g. prevent poisoned water) along with a shift of legal focus, moving from what law can forbid to what law can facilitate (i.e. the achievement of precise environmental quality objectives).<sup>420</sup> The EQSs can be defined as “*a scientifically informed numerical specification of what concentration of a particular contaminant is permissibly present in some part of an environmental media (...)*.”<sup>421</sup> Howarth places in opposition ecological quality standards, defined as “*the maximum level of contamination that is legally permissible in a given part of the physical environment*”, and environmental quality standards, which would be “*the minimum acceptable state of ecosystems and their biological components*”.<sup>422</sup>

In contrast with the GWD, the Ecological Quality Standards Directive (EQSD)<sup>423</sup> covers surface waters and sets EQSs for priority substances and eight other pollutants (e.g. benzene, hydrocarbons, pesticides, etc.).<sup>424</sup> These standards can be of two types: 1) they can relate to the average concentration of the substance; 2) they can establish a maximum concentration allowed. The first type of standards is useful for long-term measurements (over 1 year) and aimed at protecting waters against long-term exposition.<sup>425</sup> The second type targets short-term exposures (i.e. pollution peaks).<sup>426</sup>

The original 2008 Directive was updated in 2013 by the 2013/39/EU Directive, which revised the standards according to scientific and technical knowledge improvements.<sup>427</sup> Its objective is to achieve a good surface-water chemical status for these substances by 2021, it also provided that

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<sup>420</sup> Howarth, 2006, p.6.

<sup>421</sup> Howarth, 2006, p.6.

<sup>422</sup> Howarth, 2006, p.9.

<sup>423</sup> Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council.

<sup>424</sup> EU, “Environmental quality standards applicable to surface water”, <[EUR-Lex - I28180 - EN - EUR-Lex \(europa.eu\)](#)>, (last accessed 17<sup>th</sup> May 2023).

<sup>425</sup> Ibid.

<sup>426</sup> Ibid.

<sup>427</sup> Ibid.

the EU Commission would submit a new list in 2018, which good status should be achieved by 2027.<sup>428</sup> In addition, the Directive requires the exploration of substances included in a watch list.<sup>429</sup>

The Directive also covers mixing zone issues. A mixing zone is an area “near a discharge point, which EQSs may be exceeded provided that the rest of the surface water body complies with the standards.<sup>430</sup> These areas must be clearly identified.”<sup>431</sup> Finally, the Directive requires Member States to realize an inventory of emissions, discharges, and losses of substances listed in Part A of its Annex I.<sup>432</sup> These inventories are then verified by the Commission to assess whether pollution from priority substances is reducing and that the emissions, discharges, and losses of priority hazardous substances are stopped.<sup>433</sup>

Howarth emits several criticisms regarding current settings of EQSs, the first one being their anthropocentrism.<sup>434</sup> Indeed, it often appears that EQSs are primarily set to prevent human damages, and if EQSs have a beneficial impact on non-human beings it is rather accidental that truly purposeful.<sup>435</sup> Secondly, the achievability of EQSs is to be discussed; indeed, ecosystems are constantly evolving (see section 3.3.3), the challenge is to determine what stems from natural processes and what is due to human factors.<sup>436</sup> Finally, forasmuch “untouched” areas are almost nonexistent and that human activities are even occasionally the condition of existence of some species (e.g. Cevennes National Park with the Little Owl), the dual conception of humans/nature is to be considered.<sup>437</sup> Instead, humans may be considered as an integral part of ecosystems.

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<sup>428</sup> Ibid.

<sup>429</sup> Ibid.

<sup>430</sup> Ibid.

<sup>431</sup> Ibid.

<sup>432</sup> Ibid.

<sup>433</sup> Ibid.

<sup>434</sup> Howarth, 2006, p.6.

<sup>435</sup> Howarth, 2006, p.7.

<sup>436</sup> Howarth, 2006, p.25.

<sup>437</sup> Howarth, 2006, p.25.

#### 4.1.4 The 2007 Floods Directive

Giving that floods and water-related hazards represent 90% of severe natural disasters<sup>438</sup>, the international community soon sought to tackle the problem. Articles 27 and 28 of the UN Watercourses Convention establish an obligation for States to “*prevent and mitigate conditions resulting from, inter alia, drought or flood that may be harmful to other States (...)*”. In 2000, the UNECE issued, under the Water Convention, Guidelines on Sustainable Flood Prevention.<sup>439</sup> It includes three statements particularly relevant for this paper. Firstly, it states the need for a change of paradigm which should shift “*from defensive action against hazards to management of the risk.*”<sup>440</sup> Secondly, it points human interferences with natural watercourses as a factor worsening floods threats and enjoins to reverse, compensate, and prevent them.<sup>441</sup> Thirdly, since it notes that “*local flood protection measures can have negative effects both downstream and upstream*”<sup>442</sup>, the guidelines encourages for an holistic approach that takes into account the whole river basin, which in case of transboundary waters requires international cooperation<sup>443</sup> and public participation<sup>444</sup>, as well as the establishment of joint bodies such as river commissions.<sup>445</sup>

The 2007 EU Floods Directive<sup>446</sup> was adopted in line with this international framework.<sup>447</sup>

*The purpose of this Directive is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community.*<sup>448</sup>

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<sup>438</sup> UNESCO, 2020, p.38-45.

<sup>439</sup> UNECE, 2021, p.122.

<sup>440</sup> Guidelines (6).

<sup>441</sup> Guidelines (13.a).

<sup>442</sup> Guidelines (8).

<sup>443</sup> Guidelines (8).

<sup>444</sup> Guideline (Box 1).

<sup>445</sup> Guidelines (21); UNECE, 2021, p.122.

<sup>446</sup> Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks.

<sup>447</sup> UNECE, 2021, p.122.

<sup>448</sup> Floods directive, art.1.

Member States are firstly required to undertake preliminary flood risk assessments (article 4) and to realize maps of areas at risk (article 6). This will serve as a basis for the establishment of flood risk management plans (article 7). Article 9 links the Flood Directive to the WFD, stating that “*Member States shall take appropriate steps to coordinate the application of this Directive and that of Directive 2000/60/EC [the WFD] focusing on opportunities for improving efficiency, information exchange and for achieving common synergies and benefits having regard to the environmental objectives laid down in Article 4 of Directive 2000/60/EC.*” Article 14 sets the review period at every six years.

#### *4.1.5 The 1999 Convention on the protection of the Rhine*

The scope of the Convention<sup>449</sup> is defined as covering the Rhine itself and its catchment areas (as long as their management affects the Rhine), as well as the ground waters and ecosystems interacting with the Rhine.<sup>450</sup>

Article 3 sets the purposes of the convention, which are the sustainable development of the Rhine ecosystems, the protection of drinkable water, floods management, and North Sea protection. What includes the sustainable development of Rhine ecosystems is detailed in the same article, it provides, inter alia, that natural habitats should be preserved as much as possible, that ecological needs should be taken into account, and that the natural function of waters should be maintained, restored and preserved. It also provides for an “*environmentally sound and rational management of water resources*”.

The article 4 sets the principles enshrined in the Convention, neither the no-harm principle nor the ERUP are explicitly mentioned within the list. However, the no-harm rule is set through correlated principles such as the precautionary, prevention, rectification at source, and polluter-pays principles, which are inherent to the no-harm principle as seen earlier in Chapter 2. This article also sets principles related to environmental protection, including the principle of sustainable development and the application of best environmental practices.

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<sup>449</sup> Convention on the protection of the Rhine, signed on 12<sup>th</sup> April 1999.

<sup>450</sup> Convention on the protection of the Rhine, art.2.

The cooperation between riparian States is expressed through the establishment of a joint management body, the International Commission for the Protection of the Rhine whose status is settled by the article 6 asserting that “[t]he Commission shall have legal personality [and] enjoy the legal capacity conferred on legal persons by domestic law.”

To summarize, although ERUP is not clearly stated in the Convention for the Protection of the Rhine, its three core elements, namely the no-harm rule, the cooperation principle, and the protection of the environment, are included. The next section is going to explore how the ICPR, as a joint body, can be considered as climate change-proof and how this is related with ERUP.

## **4.2 The International Commission for the Protection of the Rhine**

The ICPR establishes in its “Rhine 2040 programme”, successor of the “Rhine 2020”, the 1998 Action Plan on Floods, and the 1987 “Rhine Action Plan”, that its general objective for 2040 is “*to create a sustainably managed Rhine catchment area that is resilient to the effects of climate change (...)*.”<sup>451</sup> In order to determine if this is likely to happen, this section will analyze successively the ICPR stability, efficiency, and flexibility.

### *4.2.1 Flexibility*

As explained in Chapter 3, the flexibility of an agreement is a *sine qua non* condition for its resilience to climate change, and this flexibility is way easier to reach with the delegation of States’ authority to a joint management institution. In the case of the Rhine the authority is delegated to the ICPR which is granted the legal personality<sup>452</sup> and is in charge with the establishment of management strategies over the Rhine. Chapter 3 detailed three mechanisms to bring flexibility in an agreement, namely the adjustable water allocation and the use of water quality criteria, the programming of responses strategies to extreme events, and the elaboration of amendment and review procedures.

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<sup>451</sup> ICPR, “Programme “Rhine 2040” ”, <[Rhine 2040 \(iksr.org\)](https://www.iksr.org/)>, (last accessed 17<sup>th</sup> May 2023).

<sup>452</sup> Convention on the protection of the Rhine, art.6.

As seen earlier throughout this paper, the Rhine River is so far not subject to quantitative water scarcity and climate change will rather modify the repartition of rainfalls than their quantity. Therefore the tensions over the Rhine were mostly regarding its quality and utilization.<sup>453</sup> Pollution for instance was one of the main issues to be settled, as well as the floods.<sup>454</sup>

The response strategies for extreme events are provided both through the Floods Directive and the Strategy for the International River Basin District (IRBD) Rhine for adapting to climate change.

In the article 8 establishing the monitoring tools of the ICPR, the Commission is also entrusted to conduct a review procedure, in order to “*evaluate the effectiveness of the actions decided upon, notably on the basis of the reports of the Contracting Parties and the results of the measuring programmes and studies of the Rhine ecosystem*”.<sup>455</sup>

#### 4.2.2 Efficiency

Chapter 3 describes the efficiency of an agreement as lying on three points, the monitoring of its implementation, the management of conflicts, and its enforcement.

Article 8 of the Convention on the Rhine describes the monitoring procedure to be applied by the Commission. The Commission is therefore entrusted to conduct measuring programmes and studies of the Rhine ecosystem, make proposals for measures to be taken, and is in charge of the public information regarding the state of the Rhine. The ICPR is also in charge of the warning and alert plans for the Rhine.<sup>456</sup>

This Commission’s task is correlated with a Parties’ duty to regularly report.<sup>457</sup> Article 11.3 specifies that the reports must include the legal measures taken to implement the Convention, the

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<sup>453</sup> Frijters and Leentvaar, 2003, p.24.

<sup>454</sup> Ibid, p.24.

<sup>455</sup> Convention on the protection of the Rhine, art.8 (d)

<sup>456</sup> Convention on the protection of the Rhine, art.8 (c)

<sup>457</sup> Ibid, art.11.



result of the measures taken, and the problems encountered in the implementation. The ICPR also has to submit a report on its activity every year.<sup>458</sup>

The Convention on the Rhine provides in its article 16 that, in case of disputes, parties should first seek to negotiate among themselves in order to find a peaceful solution. If it cannot be reached then the second paragraph provides for an arbitration. It is also useful to remind that, in case the matter is relevant for the EU, the CJEU may be competent on the matter.<sup>459</sup>

Once the ICPR issues its recommendations and decisions of measures referred in article 8, it may specify if it Parties have a time limit and if they shall coordinate for their implementation<sup>460</sup>, which shall be “*in accordance with the national law of the Contracting Parties*”.<sup>461</sup>

#### 4.2.3 Stability

The stability of an agreement depends on the sharing rule applied, the non-water transfer, the benefits and costs sharing, and the distribution of political power (as seen in section 3.1).

As the main issue over the Rhine is not the physical availability of water but rather the preservation of its quality, it is logical that the Convention on the Rhine does not provide a quantitative repartition of its waters. My interpretation is that the sharing rule is of principle-based type, more precisely, it is based on the no-harm principle enshrined in the Convention through its related principles as explained in the previous section.

The distribution of costs is settled in the article 13 of the Convention on the Rhine, it provides that “*Each Contracting Party shall bear the costs of its representation in the Commission and its working structure, and each Contracting State shall bear the costs of the studies and actions it carries out within its territory.*” In addition, the second paragraph of article 13 requires the establishment of Commission’s rules of procedure and financial regulations. The 2022 *Rules of*

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<sup>458</sup> Ibid, art.8.3.

<sup>459</sup> Ibid, Annex.

<sup>460</sup> Ibid, art.11.2.

<sup>461</sup> Ibid, art.11.1.

*Procedure and Financial Regulations of the ICPR* distribute the share of the ICPR annual budget to be bear by each Parties.<sup>462</sup> Therefore, the EU and Luxembourg pay 2,5% each, the Swiss Confederation 12%, and Germany, France, and Netherlands pay 32,5%. Another good example of costs and benefits sharing is the contribution of €5 million from Netherland to a retention project in German territory, aimed at regulating extreme water levels, and which resulted in positive effects for both countries.<sup>463</sup>

The political power is equally distributed among Parties that are represented at the Commission through delegations, which alternate for the chair every three years.<sup>464</sup> The delegation appoints a chairman, who is then supposed to act independently from their delegation.<sup>465</sup> Decision-making is built on a consensus-based, and “*shall be taken unanimously*”, as specified in article 10, and each delegation has one vote.<sup>466</sup> As seen in Chapter 3, CBDM is a way to reinforce agreement stability.

In my opinion, it results from this chapter that the Rhine Convention contains a large part of the criteria conditioning resilience to climate change. It is stable, both in its construction and historically, its efficiency is at least attempted to be ensured through monitoring and conflict management, and it integrates flexible mechanisms, including the most important: the ICPR, a joint management institution. The biggest criticism that may be made is the lack of capacity of ICPR to directly implement its strategies and recommended measures. These responsibilities are left to the riparian States individually.

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<sup>462</sup> Ibid, art.9

<sup>463</sup> UNECE, 2021, p.51.

<sup>464</sup>Convention on the protection of the Rhine, art.7.

<sup>465</sup> Ibid, art.7.3.

<sup>466</sup> Ibid, art.10.

## 5. Conclusion

The Equitable and Reasonable Utilization Principle provides a comprehensive framework over transboundary fresh waters management, both due to its physical scope of application and its jurisdictional scope, since it is applicable to all water resources that cross national borders and given its status as a principle of customary law.

The legal framework of the principle is mainly established through the two UN Water Conventions, which link its application to three principles: cooperation, no-harm, and environmental protection. Although the ERUP is not clearly expressed within the regional and national laws analyzed in this paper, its components are systematically included.

This framework is favorable to the establishment of climate change-proof agreements for several reasons. Firstly, it requires their existence by means of its cooperation principle. The principle requires for the creation of joint management bodies, which are commonly regarded as the golden standard for flexibility and thus climate resilience. Secondly, the no-harm principle and its related principles (prevention, precaution ...), are aimed to pre-empt conflicts and escalation, and thus reinforce agreements stability and efficiency. Thirdly, the objective of environmental protection inherent to ERUP sets a clear goal for monitoring while urging both adaptation and mitigation action to face climate change. Moreover, ERUP's scope cover both surface and ground waters, and it might therefore overcome gaps in agreements and thus provide a better protection of water resources.

The case of the Rhine River illustrates how, although institutions are already in existence, States are reluctant to delegate aspects of their sovereignty. However, this is increasingly necessary and would allow for a stronger implementation of ERUP and resilience of transboundary waters.

# Annex

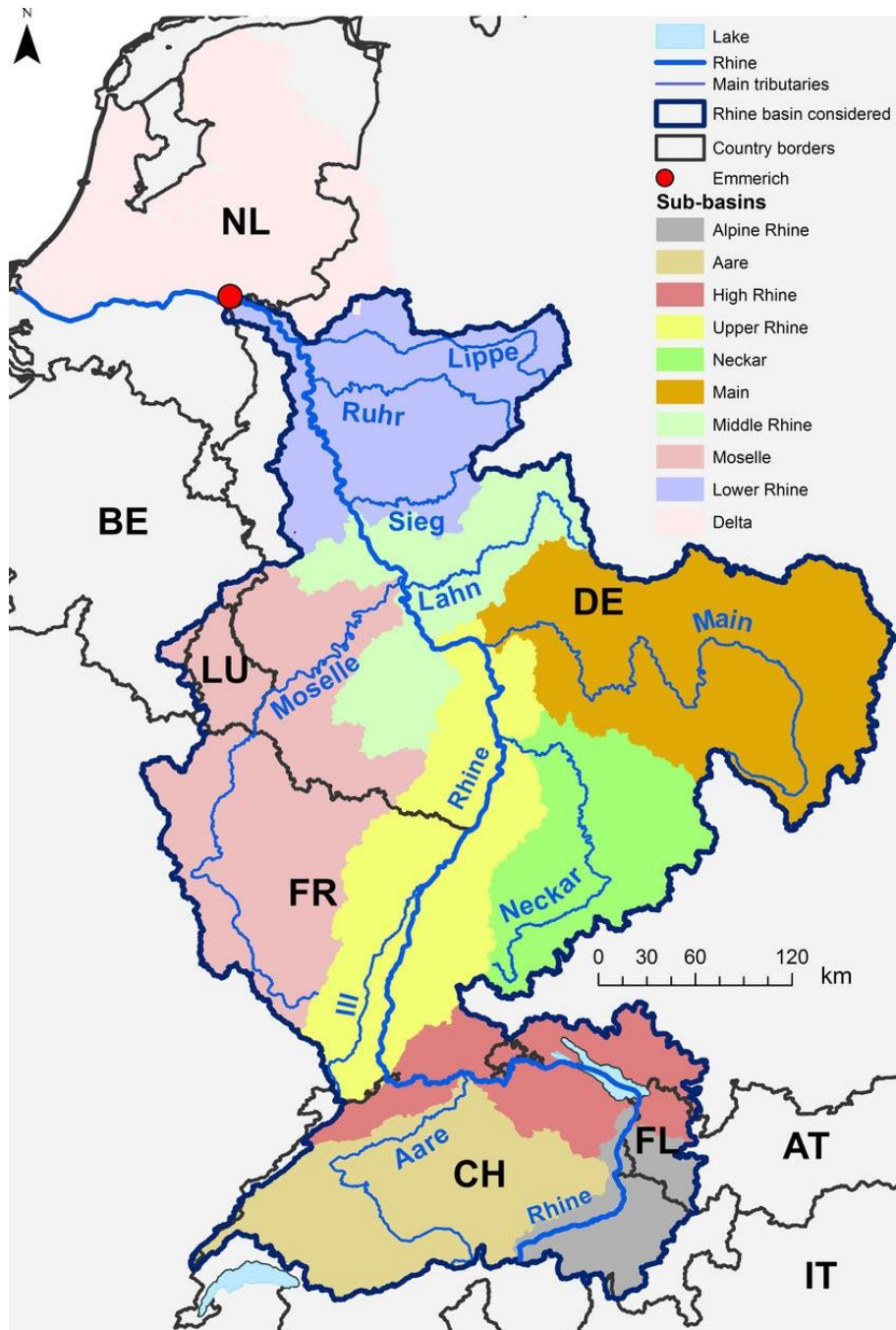


Figure 1: The Rhine, its basins, and its catchments.<sup>467</sup>

<sup>467</sup> Moser, 2018, Figures.

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