Book Chapter

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Chapter 9
The Management of International River Basins: The Case of Transboundary Water Cooperation Between Italy and Its Neighbours

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Keywords International river basins · Transboundary cooperation · International water law principles · International legal framework · EU legal framework

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9.1 Introduction

The management of international watercourses is often thought of as conflict management (Rieu-Clarke and Wolf 2009). Hydro-climatic changes that make river flow variability more and more unpredictable, transboundary floods, altered precipitation patterns, but also phenomena such as population growth, economic development and pollution have a huge impact on the global hydro-political balance and make co-riparian relations increasingly unstable and conflictive. Thus, the role played by inter-State cooperation becomes fundamental and the need for shaping a common approach in transboundary water resources management is evident.

Many are the reasons that encourage States to engage in cooperative and interdependent relationships: hydraulic interconnectedness; actual and potential economic, social and ecological benefits; concerns of national security; information and data exchanges, in particular in case of emergency; climate change concerns. All these factors have pushed States to adopt common principles and rules in the management and protection of shared water resources. International water law sets out a comprehensive corpus of rules defining what States can and cannot do with respect to transboundary water resources, and fosters the durability, predictability and peaceful nature of their relationships. International water law includes (i) treaty law, which is composed of bilateral and multilateral agreements signed by States, (ii) customary international law, or widely-shared rules crystallised over time, and (iii) various principles, mainly deriving from domestic laws and case law.

Contemporary international water law includes these different sources of international law and ensures a sustainable management and protection of shared water resources. Cooperation in matter of transboundary water resources is also characterised by principles and norms established at different levels including universal agreements such as the UN Convention on the Law of the Non-Navigational Uses of International Watercourses (hereinafter, the Watercourses Convention) and the Convention on the Protection and Uses of Transboundary Watercourses and International Lakes (hereinafter, the Water Convention) as well as agreements concluded at the regional and basin levels.

This contribution analyses the norms and principles concerning the management of transboundary waters under international law, as well as the provisions of UE Directive no. 2000/60/EC (Water Framework Directive – WFD) on the same issue under European Union law. This general legal framework influences the bilateral relationships on shared waters between Italy and its neighbours, enhancing transboundary cooperation and environmental protection. The chapter focuses on the hydrographical situation of Italy and the waters the country shares with neighbouring States. As it will be seen, unlike other European countries, Italy does not share major watercourses or water bodies with other States. However, in at least a couple of cases (Lake Maggiore and Lake Lugano shared with Switzerland, and River Isonzo/Soča shared with Slovenia), joint management and control systems, which pre-date the WFD by many years, are in force.

9.2 International Water Law and the Regulation of Transboundary Water Cooperation

The need for regulating the management of transboundary water resources is not only the result of a process of consideration of interests and benefits. It also derives from the intrinsically dynamic nature of the water cycle, which puts under discussion two essential attributes of the State under international law: territorial sovereignty and territorial integrity. Both principles, stemming from that of State sovereignty, evoke "the supreme, absolute, and uncontrollable power by which any independent State is governed" (Black 1990, p. 342). On the one hand, absolute territorial sovereignty means that the State can exercise its full powers within its territory without any restrictions. On the other hand, territorial integrity stands for the State's right to prohibit any impacts on its territory arising from the territory of another State.

9.2.1 The Theory of Limited Territorial Sovereignty

The first and most widely accepted principle that qualifies the relationship between international water law and State's territory is that territorial sovereignty is limited. The importance of this principle should be understood in light of two other conflicting doctrines: the theory of absolute territorial sovereignty and the theory of absolute territorial integrity. The former, also known as the Harmon Doctrine, affirms that every nation can utilise the waters of an international watercourse flowing through its territory regardless of the possible negative consequences that it would cause in co-riparian countries (McCaffrey 1996). The latter, the theory of absolute territorial integrity, assumes that the lower riparian State has the right to "a full flow of water of natural quality, and interference with the natural flow by the upstream State requires the consent of the downstream riparian" (Rahaman 2009, p. 210).

Since both theories result in huge privileges for either the upstream State (theory of absolute territorial sovereignty) or the downstream State (theory of absolute territorial integrity), they have been dismissed and have been progressively replaced by the theory of limited territorial sovereignty.

This doctrine, which was adopted and reaffirmed in several international treaties,[1] claims that every State has the right to use shared rivers flowing through its territory, but that such utilisation should not cause a damage or prejudice to the rights and interests of co-riparian States. This shows that the concept of territorial sovereignty is subject to limitations in the management of shared water resources, and sanctions

[1] See for example Arts. 4 and 7 of the 1995 Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin; Arts. 7 and 9 of the 2002 Framework Agreement on the Sava River Basin; Art. 2 of the 1995 Protocol on Shared Watercourses Systems of the Southern African Development Community (SADC).

the international water law principle that sovereignty over shared water resources is restricted by the sovereign rights of the other riparian countries. Based on that, all co-riparian States, upstream and downstream, have mutual rights and obligations: they are all entitled to a reasonable use of water resources and equitable share of their benefits and simultaneously uphold the obligation not to deprive other co-riparian States of their own right to a reasonable and equitable utilisation (Boisson de Chazournes 2013). This is the widely accepted and solid basis of modern international water law, from which all other principles and rules derive. The principle of limited territorial sovereignty is thus the cornerstone of the management and protection of shared water resources between Italy and its neighbours.

9.2.2 The Principle of Equitable and Reasonable Utilisation

A pillar of customary international law and first affirmed by the International Court of Justice in the *Gabcikovo-Naymaros* case,[2] the principle of equitable and reasonable utilisation provides that each co-riparian State is entitled to a reasonable and equitable share of water resources for the beneficial uses within its own territory. Its universal acceptance as a binding rule is confirmed by its inclusion in many international agreements and non-binding instruments, as well as by its recognition by decisions of courts and tribunals and the doctrine.[3]

Although the wording may be a little misleading, the principle does not stand for an equal share of waters. Instead, the definition of "equitable" and "reasonable" should be understood on a case-by-case basis, taking into consideration concrete factors pertaining to the international watercourse in question, as well as the needs and uses of the watercourse States concerned. Relevant factors include, but are not limited to, the geography and hydrology of the water resource, the population depending on it, the climate affecting the basin, the past utilisations of the waters as well as the economic and social needs of each watercourse State (Caflisch 2018).[4] As noted by the commentary to Draft Article 6 on the Law of the Non-Navigational Uses of International Watercourses, the implementation of the principle of equitable and reasonable utilisation depends therefore on the weighing of all relevant factors

[2] International Court of Justice, *Gabcikovo-Nagymaros Project* (Hungary/Slovakia), judgment of 25 September 1997, ICJ Reports, 7.

[3] Arts. IV, V, VII, X, XXIX of the 1966 Helsinki Rules on the Uses of the Waters of the International Rivers ("Helsinki Rules") of the International Law Association (ILA); Arts. 5, 6, 7, 15, 16, 17, 19 of the 1997 UN Watercourses Convention; Art. 2 of the SADC Protocol on Shared Watercourses Systems; Arts. 7, 8, 9 of the Framework Agreement on the Sava River Basin; Arts. 4, 5, 6, 26 of the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin; Arts. 3, 7, 8, 9 of the 1996 Mahankali River Treaty between India and Nepal; Arts. 10(1), 12, 13, 14 of the 2004 Berlin Rules on Water Resources ("Berlin Rules") of ILA; Art. 2(2)(c) of the 1992 UNECE Water Convention.

[4] See Art. 6 of the UN Watercourses Convention and Art. V of the Helsinki Rules.

and circumstances.[5] Although this principle is not expressly affirmed in the bilateral treaties between Italy and Switzerland and Italy and Slovenia, this rule plays an important role in ensuring an equitable share of transboundary waters.

9.2.3 The Obligation Not to Cause Significant Harm

The obligation not to cause significant harm, also expressed in the maxim *sic utere tuo ut alienum non laedas* ("use your own property in such a manner as not to injure that of another"), requires co-riparian States to refrain from a utilisation of the international watercourse that may cause significant harm to other basin States, to the environment, to human health or safety, and to the living organisms of the watercourse systems. The obligation is enshrined in most modern international water conventions as well as in international environmental conventions and declarations and can be considered as part of customary international law.[6] As a customary principle, Italy, Switzerland and Slovenia are bound by this obligation.

One of the major misunderstandings about international water law is that harm can only be caused by upstream riparians to those downstream, because it can only "travel" downstream with the flow of the waters. This misconception is not preposterous: it derives from the fact that it is more evident that riparian States downstream can be harmed by the physical impacts of changes in water quantity and quality caused by riparian States upstream. Such reduced quantity of water in downstream countries may also create tensions among competing users (Salman 2010). It is much less obvious that the upstream riparian States can be affected or even harmed by the use of water made by downstream riparian States, as it is difficult to understand that this use might cause negative effects such as the foreclosure of future use of water. However, projects on shared water resources such as dams, mining or irrigation works carried out by downstream riparians might create "historical" or "prescriptive" rights foreclosing future utilisations by upstream countries. Current uses of water resources – by both upstream and downstream users – could create expectations of future quantities of water allocation. Therefore, it is necessary to consider that harm is a two-way matter. Cooperation and goodwill of all riparians,

[5] See Draft Articles on the Law of the Non-Navigational Uses of International Watercourses and Commentaries Thereto and Resolution on Transboundary Confined Groundwater, *Yearbook of the International Law Commission*, Vol II, Part Two, 1994, p. 101.

[6] Arts. V, X, XI, XXIX(2) of the Helsinki Rules; Arts. 7, 10, 12, 15, 16, 17, 19, 20, 21(2), 22, 26(2), 27, 28(1), 28(3) of the UN Watercourses Convention; Art. 2 of the SADC Protocol on Shared Watercourses Systems; Arts. 2 and 9 of the Sava River Basin Agreement; Arts. 3, 7, 8 of the Mekong Agreement; Arts. 7, 8, 9 of the Mahankali River Treaty; Arts. 8, 10(2), 16 of the Berlin Rules; Arts. 2(1), 2(3), 2(4), 3 of the UNECE Water Convention. Moreover, this principle is also acknowledged by modern international environmental conventions and declarations, such as in Principles 21 and 22 of the 1972 Stockholm Declaration of the UN Conference on Human Environment; Principles 2, 4, 13, 24 of the 1992 Rio Declaration on Environment and Development; and Art. 3 of the 1992 Convention on Biological Diversity.

upstream as well as downstream, ensure the efficient use and sound management of shared watercourses.

9.2.4 The Principles of Notification, Consultation and Negotiation

Every riparian State has the right to prior notice, consultation and negotiation in all cases where the use of a shared water resource proposed by another riparian State may cause serious harm to its rights or interests. The rationale for this obligation comes from the assumption that allocating shared water resources should be the result of a cooperative process. Therefore, all interested parties should cooperate to put in place a system of mutual information and consultation, which offers a strong and effective tool to co-riparian States to communicate and peacefully "reconcile any competing interest" (Rieu-Clarke 2014).

When planning a measure in a transboundary water resource, a riparian State is required to notify and consult with other riparians (Sangbana 2018).[7] Notification and consultation both refer to the idea of keeping all relevant parties informed before an action is implemented or taken. The duty to notify entails that the planning State communicates its project to the other parties, while the duty to consult requires all States that are likely to be affected by the planned projects to engage in a dialogue. These two obligations foster the creation of a platform where the planning State can demonstrate the positive impact of its project for the shared watercourse on the one hand, while the other co-riparian States can raise their concerns, ask questions and make suggestions on the other. The planning State will then have the possibility to adjust the project – where needed – according to the comments and points raised by the co-riparian States, which in turn will have the possibility of taking an informed and conscious decision on the project itself. These principles, now considered part of customary international law, are included in many international water agreements, international environmental conventions and declarations.[8] It is also worth noting that they are embodied in regional and basin agreements, such as the Revised Protocol on Shared Watercourses in the South African Development

[7] It should be noted that the procedure of notification and consultation concerns the situation where a State (or a person under its jurisdiction) plans measures or activities, including a new use or change in existing use, of an international watercourse that may cause a significant adverse transboundary environmental effect to other States.

[8] Arts. XXIX(2), XXIX(3), XXIX(4), XXX, XXXI of the Helsinki Rules; Arts. 3(5), 6(2), 11–19, 24(1), 26(2), 28, 30 of the UN Watercourses Convention; Art. 2(9)–(10) of the SADC Protocol on Shared Watercourses Systems; Art. 22 of the Sava River Basin Agreement; Arts. VII(2) and VIII of the 1960 Indus Waters Treaty; Arts. 5, 10, 11, 24 of the Mekong Agreement; Arts. 6 and 9 of the Mahankali River Treaty; Arts. 57, 58, 59, 60 of the Berlin Rules; Art. 10 of the UNECE Water Convention. Moreover, this principle is also acknowledged by modern international environmental conventions and declarations, such as in Principles 18 and 19 of Rio Declaration on Environment and Development; and Art. 21(1) of the Convention on Biological Diversity.

Community (1995), the Senegal River Water Charter (2002) and the Nile Basin Cooperative Framework Agreement (2010). As we will see, Italy is engaged in negotiations with Switzerland to ensure the regulation of the Maggiore and Lugano lakes. The principles of notification, consultation and negotiation play a central role in the decisions concerning new projects which may have a negative impact.

9.2.5 The Principles of Cooperation and Exchange of Information

The principles of cooperation and information-exchange require each riparian State to cooperate by exchanging data and information regarding the status of the watercourse, and its current and future uses that the State is planning. As in the previously mentioned principles of notification, consultation and negotiation, the purpose of the duty of cooperation and exchange of information is to encourage an open dialogue between co-riparian States, to prevent conflicts and possible damages to the environment.

The concept of cooperation among States crosses all domains of international law and is evoked in many international instruments, including the UN Charter[9] and a UN General Assembly Resolution of 1970,[10] as well as in international conventions and multilateral agreements.[11] The principle of cooperation applies beyond international water law, and has a particular importance in transboundary cooperation as it is aimed at preventing and settling conflicts of interests among several parties. For example, the 1973 Convention concerning the Protection of Italo-Swiss Waters against Pollution provides that Italy and Switzerland should exchange information on the origin and nature of pollution as well as carry out joint assessment on the data concerning the quality of waters (Article 3).[12]

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[9] Arts. 1(3), 55, 56 of the 1945 Charter of the United Nations.

[10] Progressive Development and Codification of the Rules of International Laws Relating to International Watercourses, GA Res 2669, UN GAOR, 25th, supp No. 8, UN Doc A/8028 (1970).

[11] Arts. XXIX(1), XXIX(2), XXXI of the Helsinki Rules; Arts, 5(2), 8, 9, 11, 12, 24(1), 25(1), 27, 28(3), 30 of the UN Watercourses Convention; Arts. VI–VIII of the Indus Waters Treaty; Arts. 2–5 of the SADC Protocol on Shared Watercourse Systems; Arts. 3–4, 14–21 of the Sava River Basin Agreement; Arts. 6, 9, 10 of the Mahankali River Treaty; Preamble and Arts. 1, 2, 6, 9, 11, 15, 18, 24, 30 of the Mekong Agreement; Arts. 10, 11, 56, 64 of the Berlin Rules; Arts. 6, 9, 11, 12, 13, 15, 16 of the UNECE Water Convention. The principles of cooperation and information exchange are also acknowledged by modern international environmental conventions and declarations, e.g. in Principles 13, 22, 24 of the Stockholm Declaration of the UN Conference on Human Environment; Principles 7, 9, 12, 13, 17, 27 of the Rio Declaration on Environment and Development; and Arts. 5, 17 of the Convention on Biological Diversity.

[12] Convention for the Protection of the Italian-Swiss Waters against Pollution (20 April 1972). www.admin.ch/opc/it/classified-compilation/19720079/197308070000/0.814.285.pdf

9.2.6 Peaceful Settlement of Disputes

Under international law, States are required to settle their disputes by peaceful means.[13] However, unless they have agreed otherwise, there is no obligation to resort to a specific mechanism. They may choose between diplomatic and judicial means.[14] Rivers may serve several purposes: from agriculture to domestic uses, from transportation of people and goods to connecting countries and communities, from municipal uses to fisheries, from hydropower to recreational purposes. This broad set of uses makes conflicts of interest and disputes very likely to happen among co-riparian States. Thus, the principle of peaceful settlement of disputes aims to build bridges and break the barriers that may arise between riparian States regarding shared water resources management, as it requires all co-riparian States to seek a peaceful settlement of disputes through diplomatic or judicial means. In the context of the relationship between Italy and its neighbours, bilateral commissions such as the Commission for the Protection of Italo-Swiss Waters against Pollution (CIPAIS) and the Permanent Italian-Slovenian Commission for Water Management also play an important role in the prevention and resolution of disputes.

9.3 Transboundary Water Cooperation in the Pan-European Region

One of the most successful examples of water management and protection throughout the world comes from the European continent. Europe has a considerably high number of river basins and a dense system of basin treaties and agreements. Cooperative water resources management is thus a widely shared political priority.

9.3.1 The Convention on the Protection and Use of Transboundary Watercourses and International Lakes

The Water Convention was adopted in 1992 under the auspices of the United Nations Economic Commission for Europe (UNECE) and entered into force in 1996. Originally, it was only open to member States of the United Nations within the UNECE region. In 2003, the Parties adopted an amendment aimed to extend the Convention's geographic scope.[15] According to this amendment, entered into force

[13] See Art. 33 of the UN Charter.

[14] The diplomatic mechanisms include negotiation, good offices, mediation, inquiry and conciliation. Judicial mechanisms include the submission of a dispute to the International Court of Justice and arbitration.

[15] See UNECE, "Amendment to Arts. 25 and 26 of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes", UN Doc ECE/MP.WAT/14 (12 January 2004).

in 2016, all UN member States may accede to the Convention. The objective of this amendment is to allow as many States as possible to ratify the Convention in order to expand the reach of its regulatory framework.

Like the UN Watercourses Convention, entered into force in 2014, the UNECE Water Convention is a framework agreement. Both conventions should be used as a basis for the development of more specific instruments. At the basin level, the UNECE Water Convention acted as a catalyst and frame of reference for the adoption of agreements such as the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River and the 1999 Convention on the Protection of the Rhine.

A significant aspect of the UNECE Water Convention is the establishment of an institutional framework where all Parties can cooperate, consult and exchange information, elaborate joint objectives and action programs, share their knowledge and provide mutual technical and legal assistance (Bernardini 2015). The functioning of this robust institutional system is also ensured by regular meetings of the Parties, as well as the existence of working and expert groups, joint bodies, a Secretariat and an implementation mechanism (Tanzi and Contartese 2015).

The Convention sets out two types of obligations: the first, enshrined in Part I, includes the duties generally applied to all Parties (obligations *erga omnes partes*) that aim to protect the common interests of the community in the preservation of the environment. Conversely, in Part II, the Convention defines the obligations addressed to all riparian States that are Parties to the Convention and share common transboundary waters. The role of this Convention is particularly important in the case of the waters shared by Italy, Switzerland and Slovenia since the three countries are parties to this agreement. This framework enhances the cooperation between these States and reinforces the environmental protection of their transboundary water resources.

9.3.2 Water Governance in the European Union

The majority of European countries are also members of the European Union (EU) or candidates for its accession. Over the years, the EU has played an increasingly important role in defining common objectives and policies and has provided a comprehensive and harmonised framework in many different domains, from customs unions to monetary policy, from the conservation of marine biological resources to common commercial policy, and others.[16] The implementation of water policy falls under the broad category of environmental policy as set out in one of the EU funding treaties, the Treaty on the Functioning of the European Union (TFEU). Therefore, it is subject to the principles and mechanisms typical of the EU environmental policy, that is, the ordinary legislative procedure. Accordingly, legislation is adopted by the joint decision of the Council of Ministers and the European Parliament. However,

[16] Art. 3 of the consolidated version of the Treaty on the Functioning of the European Union.

there is a major exception to this rule that concerns the measures having an impact on the quantitative management and availability of water resources. In this case, a special procedure is applied where the Council unanimously decides and the European Parliament is only consulted.[17] This mechanism, whose purpose is to safeguard the right of Member States to regulate the flow of water as they wish, results in the huge power attributed to the Council of Ministers to block legislation through its veto power and the *de facto* exclusion of the European Parliament from the decision-making process (Baranyai 2019).

As said before, the implementation of water-related policies is shared between the European Union and its Member States. This implementation at two levels implies that the EU defines minimum standards while Member States are left the freedom to establish stricter and more detailed protection measures. The discussions on water law at European level started in 1973 with the adoption of a directive prohibiting the sale and use of certain detergents with a low level of biodegradability.[18] Since then, the legislation has considerably evolved.

A milestone of the current EU water legal framework is the Water Framework Directive. Adopted in 2000 after five years of negotiations, the Directive first defined the key elements to achieve an effective and comprehensive water governance at the EU level. Its broad scope suggested a remarkable change in EU water legislation from the protection of particular waters of special interest, to the protection of all waters, including all inland freshwater bodies within the territory of the EU as well as coastal waters and wetlands, and all terrestrial ecosystems directly depending on water. The WFD establishes environmental objectives called "good water status" that have a slightly different meaning according to what they refer to. For surface waters, "good status" means good ecological and chemical status, including any deviation from the aquatic biodiversity found or estimated to exist under conditions where there has been a minor human impact.[19] The "good status" of groundwater, instead, stands for groundwater quality and quantity that does not negatively affect surface water status or the ecology of terrestrial ecosystems. In this regard, Member States are called to use geological data to identify volumes of water in underground aquifers, in order to detect and stop any pollution of groundwater.

One of the pillars of the WFD consists in the organisation and regulation of water management through the so-called river basin management plans (RBMPs) (Götz 2016). Starting from the assumption that rivers do not stop at national frontiers but flow on through different countries, the Directive considers natural geographical and hydrological units as managements units, instead of using administrative or political boundaries. Acknowledging that unilateral measures cannot be successful

[17] Art. 192(2) TFEU.

[18] Council Directive 73/404/EEC of 22 November 1973 on the approximation of the laws of the Member States relating to detergents.

[19] The ecological status is determined by biological, hydro-morphological and physico-chemical quality elements, and takes into consideration the abundance of aquatic flora and fish fauna, the availability of nutrients, and aspects like salinity, temperature and pollution by chemical agents, but also quantity, water flow, water depths, and others.

without taking account what happens upstream and downstream, the Directive proposes a holistic approach to protecting the whole body of water. Therefore, the EU and its Member States have divided the river basins and associated coastal areas into 220 river basin districts, 40 of which are international and cross borders. The river basin districts comprise the area of land and sea, together with their associated ground and coastal waters, so every decision having whatever impact on the aquatic system within the river basin district should be taken in consideration in an integrated and coordinated manner. Accordingly, Member States will designate one or more competent authorities within their territory or, for international waters, in coordination with other States (Articles 3(2) and 13, and Annex I, of the WFD). Beside this mechanism for coordinated management, Member States shall hold broad consultations with the public and all relevant stakeholders to determine the problems and then find the solutions to be included in the RBMPs (Preamble, Recitals 14 and 46, and Article 14 of the WFD). This happens through a comprehensive consultation process that allows European citizens to play a key role in implementing the Directive and in helping governments balance the social, environmental and economic issues to be taken into account. It is well established that the success of the WFD comes from its exemplary legal system that binds together fragmented environmental legislation, vast public consultation and planning processes.

Europe is the home of a complex web of bilateral and multilateral freshwater agreements. The legal frameworks governing shared water resources between Italy and its neighbouring countries are an example of the specificities of these relationships. Although these agreements rely on the general principles of international water law analysed in the previous sections, they also have specific features, as we will see in the rest of the chapter.

9.4 Transboundary Water Cooperation Between Italy and Its Neighbouring Countries

Italy shares a negligible part of the basins of the Danube,[20] Rhine[21] and Rhone[22] rivers. The most important river basin shared with neighbouring countries is the Po river basin. This basin is shared by France (230 km^2), Italy (70,000 km^2) and Switzerland (4118 km^2) and is the longest river in Italy (UNECE 2011). The 652-km-long River Po has its source at Mount Monviso and flows through Northern

[20] According to UNECE (2011, pp. 170, 182 and 191), Italy shares 0.25% of the entire Danube basin. In particular, Italy shares with Austria, Germany and Switzerland the River Inn which is the third largest tributary of the Danube by discharge. It also shares the River Drava, another tributary of the Danube, with Austria, Croatia, Hungary and Slovenia.

[21] According to UNECE (2011, p. 315), the Rhine covers less than 100 km^2 of the Italian territory. Italy shares with France the River Roya which is a tributary to the Rhone (European Commission 2019).

[22] According to UNECE (2011, p. 254), the Rhone only covers 50 km^2 of the territory of Italy.

Italy, discharging into the Adriatic Sea. Near the outflow to the sea, the river forms a wide delta area, which presents a habitat of precious environmental and landscape value. In 1995, the area comprising the urban centre of Ferrara and adjoining agricultural lands within the ancient and vast Po river delta was included in the UNESCO World Heritage List. Moreover, there are five biosphere reserves which are part of the UNESCO programme "Man and Biosphere" along the River Po, from the sources to the delta, including two transboundary sites between Italy and Switzerland (Ticino Val Grande Verbano) and Italy and France (Monviso) (UNESCO, Ministero dell'ambiente e della tutela del territorio e del mare and Italian MAB National Committee 2019). The Po river basin also includes two transboundary lakes, namely Lake Lugano and Lake Maggiore.

While the Po river basin is managed by a District Basin Authority in accordance with the EU Water Framework Directive, the protection of the quality of the waters of the Lugano and Maggiore lakes are covered by an international agreement concluded by Italy and Switzerland in 1972.[23] Among the first agreements between Italy and Switzerland, the Agreement Concerning the Concession of Hydraulic Forces of the Reno di Lei concluded in 1949[24] and the Convention for the Utilisation of the Hydraulic Forces of the Spöl of 1957,[25] should be mentioned. Both instruments focus on the sharing of hydropower energy. The 1949 convention ensures that a single company is holder of the concession contract and carries out the works necessary to create a water reservoir in the Valley of Lei. This reservoir is to be used to produce energy attributed to Switzerland for 70% and to Italy for the other 30% (Article 5). The 1957 treaty regulates the development and management of the derivation works of the River Adda and the creation of an accumulation basin in Livigno. Switzerland agreed that Italy deviates a section of the River Spöl, flowing in the Swiss and Italian territories, to produce hydroelectric energy (Article 1).

9.4.1 The Po River Basin

The Po river basin includes two big Alpine lakes, the transboundary Lake Lugano (also called Lake Ceresio) and the Lake Maggiore (also called Lake Verbano), shared by Italy and Switzerland. The most significant transboundary river is the Ticino, also shared by Italy and Switzerland. The River Po and its tributaries flow through several cities in Northern Italy. The main water management problems in the basin are surface and groundwater pollution (including drinking water contamination) and changes in land use coupled with climate change effects (floods

[23] Convention for the Protection of the Italian-Swiss Waters against Pollution (20 April 1972). www.admin.ch/opc/it/classified-compilation/19720079/197308070000/0.814.285.pdf

[24] Agreement Concerning the Concession on Hydraulic Forces of the Reno di Lei (18 June 1949). www.admin.ch/opc/it/classified-compilation/19490145/index.html#fn1

[25] Convention for the Utilisation of the Hydraulic Forces of the Spöl (27 May 1957). www.admin.ch/opc/it/classified-compilation/19570089/index.html

and landslides). These problems derive from pressures from agriculture, industry and urban areas.

The plan for the management of the hydrographic district of the River Po operationalises the WFD. It was prepared by the Authority of the Po River Basin District and includes all necessary measures to achieve good ecological and chemical status and to reduce the pollution of surface and groundwater in the district. The plan, adopted in 2016, points out the measures for the reduction of nutrient, organic compound and pesticide pollution, preservation of mountain basins and improvement of land use in order to mitigate hydrogeological risk and improve environmental status of water bodies. Following this plan, current actions include saving and using water resources sustainably, especially in agriculture.

Climate change has had important effects in the Alpine part of the Po basin, in particular the effect of modifying the run-off regime. This is why the Authority of the Po River Basin District has also identified in the Water Balance Plan of 2016 some adaptation measures for dealing with these impacts of climate change. Although the pollution of the Po is significant in some areas (ISPRA 2017), the management of the Po River Basin District represents a useful guidance for Italy on how to implement the WFD and to develop effective, efficient and integrated water policies.

9.4.2 The Lugano and Maggiore Lakes

Lake Lugano has a surface of 48.72 km^2, of which 18 km^2 are located in Italy. The catchment basin covers 368 km^2, of which 60% are in the Swiss territory. The administrative division is rather complex and the lake extends between the Canton of Ticino (Switzerland) and the Provinces of Como and Varese (Italy). Particular is the position of Campione d'Italia, historic Italian enclave surrounded by Swiss territory. The three main tributaries are the Cassarate, the Vedeggio and the Cuccio. From the western part of the lake the River Tresa begins; it belongs to the river basin of the Ticino and flows into Lake Maggiore.

Regulation of the outflow of Lake Lugano is ensured by a transboundary agreement between Italy and Switzerland, concluded in 1955 and entered into force in 1958,[26] that is implemented through a surveillance commission composed of six members.[27] The Convention provides for the construction of hydraulic works for the

[26] Convention Between Italy and Switzerland on the Regulation of the Lugano Lake (17 September 1955). www.admin.ch/opc/it/classified-compilation/19550154/index.html

[27] *Ibid*., Art. VI. The Commission is composed of three members appointed by the Swiss Federal Council and three members appointed by the Italian Government (Para. 1). During the construction period, the Commission had the tasks of approving the regulation works that the Cantonal Council of Ticino submitted to it, of supervising the implementation of the works, of deciding, if necessary, any modification of the projects, of submitting to the two Governments periodic reports on the progress of the work, as well as on the compliance with the agreed-upon terms. Since the

regulation of the waters; such works had to be carried out by the Canton of Ticino soon after the adoption of the Convention[28] and are operational since 1963. The objectives of these works are to regulate the quantity of the outflows from Lake Lugano and reduce the probability of floods. Yet, already during the first years of their functioning, the positive impacts of the hydraulic works appeared to be limited, both in terms of management of the low levels of the lake and the regulation of floods. In particular, the events of 2002 have reawakened the interest of policy makers and the local population in revising the regulation of the outflows of the lake (Riva 2003).

Lake Maggiore is the second largest lake in Italy, after Lake Garda. It covers 212 km^2 and most of its surface lies in Italy (80%). However, the catchment area of the lake, amounting to about 6599 km^2, is shared in roughly equal parts between Italy (3229 km^2) and Switzerland (3370 km^2). The largest tributaries are the Ticino, the Maggia, the Toce and the only emissary is the Ticino, flowing from the lake to Sesto Calende.

The construction of the Miorina dyke during World War II by the Consortium of Ticino has allowed to regulate the waters of the lake.[29] In a concession issued in 1940 by Italy, the width of the adjustment range was set, within which the Consortium can freely decide the water flows.[30] The regulation of the levels of the lake had the positive impact of increasing the utilisations for agriculture and the industrial uses downstream.

9.4.2.1 The Regulation of the Level of Lake Maggiore

The level of Lake Maggiore has been at the centre of a bilateral dialogue between Switzerland and Italy since 1938. The first two meetings took place in 1941 in Bern and in 1943 in Basel. In the first meeting, the discussions concerned the relationships between the water levels at the various hydrometers and the heights of the hydrometric zeros, as well as the Swiss proposals regarding the flood reporting service. The state of implementation of the arrangement was also assessed and it

completion of the works, the Commission has the competence to examine and resolve any question concerning the regulation of the levels of the lake, the functioning of the dam, and the maintenance of the works. It supervises the execution of its decisions and submits to the approval of the two Governments the changes it deems useful to make to the regulation (Paras. 2 and 3).

[28] The hydraulic works for regulating the levels of the lake include: the correction of the strait of Lavena, the regulating barrier at the Rochetta and the correction of the Tresa between Ponte Tresa and Madonnone (Art. II of the 1955 Convention).

[29] The dyke started to function in 1942.

[30] During the summer period (16 March – 31 October), the limitations are between −0.5 m and +1 m in respect to the hydrometric zero calculated at Sesto Calende. During the winter time (1 November – 15 March), the limitations are between −0.5 m and +1.5 m in respect to the hydrometric zero calculated at Sesto Calende. Interview with Dr. Francesco Puma, General Secretary of the Authority of the Po River Basin District, 8 July 2019. See the Concession Specifications of 24 January 1940 and Royal Decree no. 3344 of 6 June 1940.

was decided to provide information on the regulation of the manoeuvre of the mobile crosspiece.[31]

In the second meeting of 1943, the examination concerned the relationships between limnometric heights in Brissago, Angera and Sesto Calende and the operation of the telegraphic flood signalling system, while other discussions dealt with the methods of transmitting reports on executed manoeuvres and daily outflows. The Italian delegation undertook the commitment to transmit the approved variant plans for the adjustment works and the exercise programme with the new flow curve.[32]

After World War II, on 21 October 1947, the Swiss and Italian delegations met to examine the request presented to the Italian Government by the Consortium of Ticino – a consortium between the Provinces of Milano, Novara and Pavia promoting the regulation of the levels of Lake Maggiore. The request sought to obtain the concession to increase the invasion limit of Lake Maggiore during the winter months from 1 m to 1.50 m, with reference to the Sesto Calende hydrometer. The Swiss delegation pointed out that it had no capacity to take the necessary decisions. The Italian delegation stated that if no objections were raised by the Swiss side it would have immediately proceeded to experiment the regulation proposed by the Consortium.[33]

On 17 February 1971, almost 24 years after the last meeting, an Italian-Swiss Commission for the regulation of Lake Maggiore met in Milan. The head of the Swiss delegation clarified that the Commission's mandate was very limited and that the objectives of the meeting solely concerned the problem of water economy, and excluded other issues such as navigability, fishing and pollution. The Italian representatives recalled the results of the previous meetings, in particular the acceptance by the Swiss side of the winter boost up to the quota of 1.50 m on the zero of the Sesto Calende hydrometer. They also evoked the new request of the Consortium to raise the level of withholding from +1 m to +1.50 m, with a linear trend from 1 m to 1.50 m from 1 June to 15 June and return to 1 m by 15 September. For experimental purposes, they proposed to immediately reach the height of 1.20 m. The Swiss representatives raised the issue of the failure to build the subsidiary channel for the rapid flare that appeared in the original project, which could have solved some water problems that had affected, in November 1968, the riparian communities of the Piano del Magadino and the water treatment plant of Locarno. As to the experimentation, the Swiss delegates affirmed that they could not give an answer without adequate prior studies. It was ultimately decided to set up a working group with the aim of proceeding to the necessary assessments for both sides to take an informed decision.[34]

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[31] See the proceedings of the meeting of 1941, available at www.adbpo.it/PAI/Attuazione_del_Piano/Piani_Laminazione/ANNESSI/Lago_Maggiore/Conferenza_Italo-svizzera_1938.pdf

[32] See, *ibid*., the proceedings of the meeting of 1943.

[33] See, *ibid*., the proceedings of the meeting of 1947.

[34] See, *ibid*., the proceedings of the meeting of 1971.

Fifteen years later, a new meeting was held in Bern on 12 March 1986, during which the existing problems were discussed, notably the increase in outflow capacity from the lake, and the need to identify other lines for regulating the lake and to realise a modern system of hydrological surveys. Both delegations identified the necessity, on the one hand, to conduct new studies, and on the other hand, to experimentally adopt a regulation line 20 cm lower than the reference meter from mid-June to late August and from beginning of September to the end of November.[35]

The subsequent meeting of the Commission was held in Parma in September 1988. It discussed the increases in outflow capacities, the verification of the lake regulation line and the verification of the state of implementation of remote sensing. The Commission decided to continue with the experimentation. It was also noted that some measurement stations and a data processing centre were built by the Ticino Consortium, and a project was approved for the installation of a network of rain gauges in the Italian part. The connection of the Italian network with the Swiss network was envisaged, together with the preparation of a general project.[36]

On 2 March 1995, after the disastrous flood of 1993, a meeting was held in Bellinzona between a Swiss delegation composed of seven members and an Italian one consisting of only three members. The studies undertaken were examined in order to identify the most useful interventions to reduce the damage caused by the floods of the lake. The Swiss presented a study aimed at increasing the outflow in Sesto Calende. The Italian delegation pointed out the need for a global solution to the problem that would take into account the possibility of rolling upstream, in hydroelectric basins, and the constraints present downstream, particularly in the city of Pavia.[37]

During the subsequent meetings of November 1995 in Golasecca, of May 1996 in Cadenazzo and of July 1997 in Mezzana-Balerna, the progress of the studies was presented, but the results did not appear to be completely satisfactory. Indeed, discussions revealed remaining complex problems and risks. These issues, the participants noted, could be better determined downstream by realising rolling hydroelectric reservoirs.[38]

In July 2014, the River Po Basin Authority approved the implementation of the regulation to increase the levels of the lake during summer.[39] Moreover, a binational

[35] See, *ibid*., the proceedings of the meeting of 1986.

[36] See, *ibid*., the proceedings of the meeting of 1988.

[37] See, *ibid*., the proceedings of the meeting of 1995.

[38] See, *ibid*., the proceedings of the meetings of 1995, 1996 and 1997.

[39] In particular, the levels of the regulation in the summer period from 1 m to 1.50 m in respect to the hydrometric zero of Sesto Calende were approved. Decision no. 1/2014 of the Institutional Committee of the Po River Basin Authority (22 July 2014). www.ticinoconsorzio.it/attachments/article/13/d%20Delibera%20Comit.%20Istituz.%20Po%20n%c3%82%c2%b0%201%20del%202014%20-%20Avvio%20sperimentazione%20regolazione%20estiva%20Lago%20Maggiore.pdf. The decision to increase the levels of the lake was renewed on 12 May 2015 for a five-year period (2015–2020). See Decree no. 96/2019 of the General Secretary of the Po River Basin Authority (6 May 2019). https://adbpo.gov.it/wp-content/uploads/2019/08/96_06.05.2019.pdf

Commission composed of Swiss and Italian members (*Commissione italo-svizzera* (or *italo-elvetica*) *per l'idrovia Adriatico-Lago Maggiore e la sistemazione del Lago Maggiore – Commission italo-suisse pour la navigation Adriatique-Lac Majeur et la régularisation du Lac Majeur*) was created to monitor the levels of the lake. To date, the Commission has held four meetings to discuss its mandate and tasks. Despite the continuing dialogue between Switzerland and Italy on the level of Lake Maggiore, the relationship remains strained. In particular, Switzerland considers the decision to increase the levels of the lake as unilateral and points out the risks to the ecosystem of the Bolle di Mogadino (Franciolli 2019).

9.4.2.2 The Commission for the Protection of Italo-Swiss Waters Against Pollution

During the 1940s and the 1950s, the Italian-Swiss Fisheries Commission (CISPP) started to study the issue of pollution of the two countries' transboundary waters. This new interest derived from the events that were affecting the lacustrine ecosystems in those years, such as the decrease and the deaths of fish in Lake Lugano and the increase in algal blooms in Lake Maggiore via the River Tresa. The first studies promoted by the CISPP highlighted that the chemical and biological characteristics of Lake of Lugano were going to progressively worsen with an accelerated evolution towards eutrophy. Thus, for the first time, CISPP found itself dealing with the new phenomenon of eutrophication, which from then on strongly influenced the history of the Maggiore and Lugano lakes. Between 1945 and 1965, pollution also affected watercourses. Indeed, massive industrial discharges gave rise to serious episodes of fish mortality and worsened the quality of the shared waters, that suffered from eutrophication.

In 1960, the CISPP established a first Italian-Swiss Commission for the Protection of the Waters, composed of experts from the two countries. The Commissioners, endowed with operational autonomy on the technical and scientific plan, had the task of drafting periodic information reports to the Commissioners for fisheries on the "health studies of the Ceresio and Verbano lakes and their tributaries, as well as on the assessment of the sources of pollution" (CIPAIS 2018).

Over the years, the membership of this new Commission increased with the involvement of other experts gathered in technical sub-commissions and working groups. This body recognised the need to address the topic of the quality of the waters in a more comprehensive and autonomous way. It underlined the need to put in place research programmes aimed at identifying the causes of pollution and formulating concrete proposals for the protection of common waters. In 1965, the Fisheries Commission, based on the experiences of similar treaties adopted for Lake Constance (27 October 1960), Lake Geneva (11 November 1962) and the River Rhine (29 April 1963), submitted a draft convention to the two States. This draft also included the proposal to create an international body endowed with adequate financial resources to promote in-depth research on common waters, and suggested a set of necessary measures to reduce and prevent existing and future pollution. In

1972, Italy and Switzerland signed the Convention for the Protection of the Italo-Swiss Waters against Pollution, which entered into force the subsequent year.

This instrument covers the surface and groundwaters of the Lugano and Maggiore lakes as well as the rivers crossing the borders between Italy and Switzerland, notably the Doveria, Melezza, Giona, Tresa, Breggia, Mera, Poschiavino and Spöl rivers. The scope of application also includes the tributaries, which may contribute to the pollution of the common waters (Article 1).

As noted above, the 1972 Convention established a Commission (CIPAIS) which includes representatives of the respective central administrations, as well as of the Regions of Lombardy and Piedmont and of the Cantons of Ticino, Valais and Grisons.[40] The tasks of the Commission are: to examine any problem inherent to the pollution or any other alteration of the Italo-Swiss waters; to organise and carry out any necessary research to determine the origin, nature and importance of pollution, and assess the data obtained; to prepare an annual financial plan for this research work, to be submitted to the two Governments for approval; to propose to the contracting Governments the necessary measures to prevent and reduce existing pollution; and to propose to the contracting governments a draft regulation to ensure the quality of the Italo-Swiss waters (Article 3).

In 2018, the CIPAIS adopted a second Action Plan, covering the years from 2019 to 2027 (CIPAIS 2018). A specific tool called "Control Panel", consisting of a set of environmental indicators, monitors the quality of the waters of the Lakes Maggiore and Lugano and their main tributaries. The Control Panel has permitted to adopt an integrated operational strategy to verify the achievement of the Action Plan's objectives. The Control Panel is also conceived as a dissemination instrument used by CIPAIS to circulate information on the status of water bodies (CIPAIS 2018).

It should be noted that the 1972 Convention does not expressly cover the Adige/Etsch river basin.[41] However, the documents of the Commission refer to it. The cooperation focuses on the restoration of the natural state and functioning of the river. As pointed out, the cooperation on the Lugano and Maggiore lakes focuses on the control, prevention and reduction of pollution. The development of a set of common indicators by the two countries may be a useful tool to monitor the quality of the waters of these two water bodies.

[40] The Commission also includes a Sub-Commission which carries out studies on specific technical and scientific issues. This body also proposes updates to the Action Plan and formulates proposals and recommendations to the Commission to ensure an efficient protection of the shared waters. Finally, the Commission also includes a Secretariat entrusted with administrative and financial tasks (Art. 4(3)).

[41] Only 1% (approximately 186 km^2) of the catchment of the Adige/Etsch is in Switzerland, the remaining 99% of the catchment lying in Italy.

9.4.3 *The Permanent Italian-Slovenian Commission for Water Management*

The 138-km-long River Isonzo/Soča is situated in the Adriatic River Basin District in Slovenia and in the Eastern Alps District in Italy, and flows through western Slovenia and north-eastern Italy. It has its source in the Upper Trenta Valley in Slovenia and it discharges into the Panzano Gulf in the North Adriatic Sea near Monfalcone/Tržič in Italy. The basin area is characterised by the presence of groundwater bodies related to different transboundary aquifers (UNECE 2011, p. 262). The total area of the shared catchment is about 3400 km^2, of which about 1150 km^2 are in Italy and 2340 km^2 in Slovenia (European Commission 2019, p. 295).

The Osimo Agreement on the Development of Economic Cooperation concluded between Italy and the former Yugoslavia in 1975 established a Permanent Italian-Slovenian Commission for Water Management to study water problems of common interest and to propose appropriate solutions. The Commission should ensure the improvement of water and electricity supplies (Article 2).

Slovenia and Italy attach particular importance to regulating the waters of the Isonzo/Soča, Judrio/Idrija and Timavo/Timav river basins and utilising them for the production of hydroelectric power, for irrigation and for other public purposes. To that end, the two Governments agreed on the joint construction and utilisation of power generation facilities. Of particular interest in this context is the construction near Salcano of a dam on the Isonzo/Soča and of a hydroelectric plant. The purpose of the dam is the regulation of the flow and the irrigation of the land situated in the Italian territory south of Gorizia (Article 3). However, the compensation reservoir near Gorizia, part of the technical installation and to be used as source of water in case of dry periods, has not been built yet.[42] This may have transboundary impacts on the availability of water in Italy.

Water from the Isonzo/Soča is withdrawn for hydroelectric, industrial and agricultural uses, creating pressure in particular during the drought period. In both countries, there are dams along the river that can create pressure on natural river discharges. The Solkan/Salcano and Kanal/Canale dams are situated in Slovenia, and the Crosis dam in Italy.[43] While one of the main purposes of the dams situated in Slovenia is the production of hydropower, their reservoirs have an impact on the downstream discharge, in particular on the agricultural uses in the Italian part of the basin.

The Permanent Italian-Slovenian Commission for Water Management entrusted an expert group with the task of preparing a road map for the implementation of the first Italian-Slovenian Isonzo/Soča Common Management Plan. A wide monitoring network has been set up in order to define the quality and quantity of water bodies in accordance with the WFD and Directive no. 2007/60/EC (Flood Directive) since

[42] Interview with Dr. Aleš Bizjak, Slovenian Water Agency, 8 July 2019.

[43] This dam is situated on a tributary of the river Isonzo/Soča: interview with Dr. Aleš Bizjak, Slovenian Water Agency, 8 July 2019.

2015. In that year, a meeting of experts under the Commission concluded that the Parties "agreed a programme of actions to be systematically implemented in 2016 and beyond to coordinate the technical details of implementation of the plans in the shared international river basins" (European Commission 2019, p. 297).

9.5 Conclusion

The 1972 Convention between Italy and Switzerland and the 1975 Convention between Italy and Slovenia offer good examples of cooperation between riparian countries. The establishment of joint bodies has helped address environmental challenges such as the impacts of climate change. For example, the CIPAIS has pointed out the need to collect data for a better understanding of extreme events such as droughts and floods. The scientific studies carried out by the Commission have allowed to conduct ecological assessments on the Maggiore and Lugano lakes and determine future trends in the quality of waters. Moreover, these studies also represent a reference to put into place river rehabilitation and restoration measures.

In the case of the cooperation between Slovenia and Italy, projects of water management have been financed under the EU European Territorial Cooperation programme (better known as INTERREG),[44] which includes the Vipava/Vipacco and Other Transboundary River Basin Flood Risk Management (VISFRIM)[45] and the Green Infrastructures for the Conservation and Improvement of the Condition of Habitats and Protected Species Along the Rivers (GREVISLIN)[46] projects, aiming at decreasing the flood risk and developing green infrastructure (including natural retention areas, green corridors and fish ladders) in the Isonzo/Soča river basin (European Commission 2019, p. 297). Data sharing and joint monitoring activities are also planned in order to strengthen the technical capacity to address common water issues between Italy and Slovenia.

It should be noted that as a non-EU member, Switzerland is not bound to implement the WFD. However, the Swiss legal system sets comparable targets regarding water protection and management (European Environment Agency 2018, p. 16). In contrast to the WFD, which is based on planned periods with precise deadlines, the Swiss legislation formulates binding requirements including a set of

[44] The objective of the INTERREG V-A Italy-Slovenia programme is to promote sustainability and cross-border governance. It includes the development of environment-friendly technologies for the improvement of water management. Further information on the programme is available at www.keep.eu/programme/2014-2020-interreg-v-a-italy-slovenia

[45] The VISFRIM project aims to manage risk in transboundary basins by developing methodologies and technological tools for the implementation by 2021 of existing flood risk management plans as required by the EU Floods Directive. The website of the project is available at www.ita-slo.eu/en/visfrim.

[46] The objective of this project is the strengthening of integrated ecosystem management for sustainable development in cross-border areas. The website of the project is available at www.ita-slo.eu/en/grevislin.

national limits which must be met at all times. As a member of the CIPAIS, Switzerland collaborates with Italy to achieve water protection goals and to implement WFD objectives. Therefore, Switzerland could benefit from referencing to EU directives when establishing water policies, especially as it would help manage transboundary water bodies according to a river basin approach, overcoming political and administrative boundaries.

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