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*Restoring River Connectivity in EU: Regulatory Framework, Obligations
and Key Elements for Successful Implementation*



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Restoring River Connectivity in EU: Regulatory Framework, Obligations and Key Elements for Successful Implementation

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1. *Preliminary remarks*

The aim of this paper¹ is to make some considerations on the measures contained in the *Nature Restoration Law* to protect rivers. This regulation, as is well known, profoundly innovates the European regulatory framework, not only for the breadth of its scope, but also for the transversal nature of the interventions it promotes. In fact, it follows in the wake of the Water Framework Directive (WFD) and the EU Biodiversity Strategy and aims to overcome the traditional limits of a sectoral approach, proposing an integrated model of environmental protection and restoration. This model not only prescribes binding obligations for Member States, but also calls for collaboration between public and private actors, highlighting the value of consensus and participation as essential tools for achieving regulatory objectives.

The chosen approach, involving analysis of the legal regime aimed at removing river barriers, with the goal of restoring at least twenty-five thousand kilometres of free-flowing rivers by 2050, offers a privileged perspective for the purpose of understanding the dynamics of integration between obligation and consent. Disruption of river connectivity is a major cause of degradation of aquatic ecosystems, with negative effects on biodiversity, water quality and hydraulic safety.

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¹ Paragraphs 1, 2, 3 and 5 has been authored by Carmela Leone; Paragraph 4 by Foivos Alexandros Mouchianitis.

The removal of artificial barriers, far from being a merely technical operation, implies a complex legal assessment that takes into account multiple opposing interests: environmental protection, renewable energy production, hydraulic safety and economic uses of water resources.

The present considerations aim, therefore, to explore the delicate balance between regulatory obligation and territorial consensus, highlighting how the success of the measures envisaged by the Nature Restoration Law depends not only on their correct transposition at national level, but also on the capacity of Member States to integrate legal profiles with social and economic ones and to learn from the joint work already carried out by professionals over the last few years, when preparing national restoration plans.

In other words, the preparation of the national plans must be based on competences other than the legal ones that have to be taken into account throughout this article².

² Environmental law is undoubtedly composed of numerous technical norms, at times complex to read even for the jurist, which underlie the dialogue and constant reference to the hard sciences: there are many situations in which scientific propositions and normative qualifications mix and mingle. On the relationship between law and the sciences, we refer to the contributions in issue 1/2024 of this Journal: F. DE LEONARDIS, *Il dovere di ascolto della scienza: è arrivato il momento della scrittura?*, p.4. If, therefore, the scientific approach according to which science can provide definitive data and take charge of programmatic decisions of politics and law should certainly be rejected, on the other hand, it is also not true that law should totally disregard science, even in view of the fact that scientific knowledge is necessary in order to become aware of the complexity that dominates natural phenomena. While certainly the environment cannot be regulated by scientists, likewise it cannot be doubted that they must provide a framework of possible options from which policy and administration must make a reasonable choice; M. DELSIGNORE, *Il ruolo del giudice nel decostruire l'applicazione della scienza nelle controversie di diritto ambientale*, p.133, the author highlights the link between technical knowledge, "data culture" and the technological solutions available to the administration; M. FALCONE, *Il potere conoscitivo pubblico e la tutela dell'ambiente, della biodiversità e degli ecosistemi. Riflessioni su un interesse collettivo conoscitivamente condizionato*, p.36; F. FRACCHIA, *Il giurista deve tacere sul climate change, ma deve irritarsi: problemi di confine e indicazioni metodologiche*, p. 50; E. PICOZZA, *La necessità della ricomposizione di saperi per affrontare la crisi ambientale*, p. 24. The author asks how is environmental law formed? Through the hard sciences. It is they who show the way forward, as reflected not only in the major international conventions but also in the Green Deal, European, national and, where they exist, even regional Strategies on biodiversity, sustainable development, climate and ecological and energy transition. So, in order to regain a sense of even our own existence, it is necessary to stand with humility of inquiry and solidarity in analysis. Just think of the "grandiose" biodiversity of some non-European countries, in the face of which Eurocentric and in any case Western parameters are no longer sufficient to understand the complexity, systematicity, differentiation and adaptivity of the environment.

2. The European water protection framework

The Biodiversity Strategy and the Nature Restoration Law also necessarily covered water policy³, acting as a continuation of the more general framework outlined by the Water Framework Directive (WFD, Directive

³ Water is essential for human, animal and plant life and for the economy. Its protection and management transcend national boundaries. The EU's water policy plays a crucial role in safeguarding the environment. There are laws designed to preserve water sources and both freshwater and marine ecosystems, and to guarantee the cleanliness of drinking and bathing water. The EU Water Framework Directive establishes a legal framework to protect and restore clean water and to ensure its long-term sustainable use. The EU Water Framework Directive (2000/60/EC) establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. It aims to prevent and reduce pollution, promote sustainable water use, protect and improve the aquatic environment and mitigate the effects of floods and droughts. The overall objective is to achieve good environmental status for all waters. Member States are therefore requested to draw up river basin management plans based on natural geographical river basins, as well as specific programmes of measures to achieve the objectives. The first ever European Citizens' Initiative, "Right2Water" (2013), urged the EU institutions and the Member States to ensure that all citizens enjoy the right to water and sanitation, that water supply and the management of water resources are not subject to internal market rules and that water services are excluded from liberalisation measures. For legal theory see U. POTOTSCHNIG, *Vecchi e nuovi strumenti nella disciplina pubblica delle acque*, in *Riv. Trim. dir. Pubbl.*, 1969, p. 1025; E. BOSCOLO, *Le politiche idriche nella stagione della scarsità*, Milano, 2012; C. CARROZZA, *La riforma italiana dei servizi idrici. Modi locali di governo fra continuità e rottura*, in *Rivista italiana di politiche pubbliche*, no. 1, 2008, p. 5; U. POTOTSCHNIG-E. FERRARI, *Commentario alle disposizioni in materia di risorse idriche: (leggi 5 gennaio 1994, nn. 36 e 37)*, Padova, 2000; F. CASTOLDI, *Comment on the judgment no. 779 of 26 March 2014*, TAR Lombardia, II sez., in *Rivista Giuridica dell'Ambiente*, 2014; G. CITRONI - A. LIPPI, *The politics of water services reform: institutions, processes and stakes*, in *Le istituzioni del federalismo*, no. 2, 2006, pp. 239- 275; S. GUERRA, *Disputed or Shared Territory? The Italian Experience of River Contract: New Relationship between River and its Region*, in *Planum. The Journal of Urbanism*, 27(2), 2013, pp. 31-37; F. LETTERA, *Le inondazioni: il rischio di alluvione; Direttiva 2007/60/CE e diritto interno*, in *Rivista Amministrativa della Repubblica Italiana*, no. 5-6, 2013, pp. 237-288; A. LUCARELLI, *L'organizzazione amministrativa delle nuove autorità d'ambito tra principio di sussidiarietà verticale, ruolo delle regioni e vincoli referendari*, in *Federalismi.it*, no. 8, 2014; A. MASSARUTTO, *Il settore idrico in Italia*, in E. FERRAGINA (ed.), *Acqua e sviluppo. Una politica delle risorse idriche per il futuro del Mediterraneo*, Bologna, 2003; V. MOLASCHI, *La partecipazione dei privati al governo della gestione delle acque. Riflessioni sull'attuazione della Direttiva quadro 2000/60/CE*, in M. ANDREIS (ed.), *Acqua, servizio pubblico e partecipazione*, Torino, 2015, pp. 143-162; A. MURATORI, *La gestione "all'europea" del rischio alluvioni: nuove modalità per affrontare un vecchio problema*, in *Ambiente e Sviluppo*, no. 2, 2009, pp. 105-110; M.A. SANDULLI, *Il servizio idrico integrato*, in *Federalismi.it*, 4, 2011; L.P. TRONCONI-F. RAMPULLA, *Il modello di amministrazione delle acque*, in *Rivista Giuridica dell'Ambiente*, no. 5, 2005, pp. 755-774; S. VACCARI, *Il metodo tariffario del Servizio Idrico Integrato alla luce del primo contenzioso*, in *Munus - Rivista giuridica dei servizi pubblici*, no. 2, 2014, pp. 289-310.

2000/60/EC)⁴, which already favoured the achievement of a good ecological status for all rivers, lakes, groundwater, coastal and transitional waters of the EU and the management of water resources in a sustainable way through the implementation of River Basin Management Plans (RBMPs). The main innovation of the Directive was that it remedied the fragmentation of the sectoral approach by bringing together in a single, very complex and structured text, all the rules aimed at water protection in a European context. The result was to create a regulatory framework that was more coherent and therefore easier to translate into national rules while at the same time guaranteeing discretion in the choice of the most appropriate means to achieve water protection.

⁴ 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, O.U.E. L. 327/1 of 22 December 2000 (Framework Directive or Water Directive), entered into force on 23 December 2000.-Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks, O.U.E. L. 288/27 of 6 November 2007 (Floods Directive), entered into force on 26 November 2007. See D. BALZAROLO-P. LAZZARA-P. COLONNA-G. BECCIU-G. RANA, *The Implementation of the Water Framework Directive in Italy*, in S. JUNIER-A. CIHEAM, *Options Méditerranéennes: Série A. – Séminaires Méditerranéens* 2011, n. 98, 155-167; J. BEHAGEL-S. VAN DER AREND, *What Institutions Do: Grasping Participatory Practices in the Water Framework Directive*, in B. ARTS ET AL. (edited by), *Forests and Nature Governance*, Dordrecht, 2013, pp. 69-88; R. BIN, *Chi governa i servizi pubblici?, Prefazione a Chi governa l'acqua? Studio sulla governance locale*, Soveria Mannelli, 2008; A. BLEEKER, *Does the Polluter Pay? The Polluter-Pays Principle in the Case Law of the European Court of Justice*, in *European Energy and Environmental Law Review*, 2009, pp. 289-306; A. BODART, *Transboundary Groundwater Management: Comparison between International Law Codification and EU Water Policy*, in F. KIDD-I. MUROMBO (edited by), *Water and the Law: Towards Sustainability*, Cheltenham-Northampton, 2014, pp. 108-136; C.H. BORN ET AL. *The Habitats Directive and its Environmental Law Context: European Nature's Best Hope?*, London-New York, 2016, pp. 417-434; D. EDWARDS, *Disaster Risk Assessment: An Appraisal of European Union Environmental Law*, in J. PEEL - D. FISHER, *The Role of International Environmental Law in Disaster Risk Reduction*, 2016, pp.153-186; E. ELEFThERiADOU-J. GIANNOPOULOU-S. YANNOPOULOS, *The European Flood Directive: Current Implementation and Technical Issues*, 2015; J. MYSIAK ET AL., *Flood Risk Management in Italy: Challenges and Opportunities for the Implementation of the EU Floods Directive (2007/60/EC)*, in *Natural Hazards and Earth System Science*, n. 13, 2013, pp. 2883-2890; I. GALLEG0-N. GARRIDO-F. DELGADO, *The Implementation of the Water Framework Directive and Territorial Disputes in Spanish Law*, n. 19(4), 2013, pp. 675-686; E. GAWEL, *Environmental and Resource Costs under Article 9 of the Water Framework Directive: Challenges for the Implementation of the Principle of Cost Recovery for Water Services*, Berlin, 2016; A. GOURITIN, *Water Management and Protection in France*, in M. ALBERTON-F. PALERMO (edited by), *Environmental Protection in Multi-Layered Systems. Comparative Lessons from the Water Sector*, Leiden-Boston, 2012, p.433; A. MURATORI, *Recepita con d.lgs. n. 49/2010 la "Direttiva alluvioni", sperando che non piov... , in Ambiente & Sviluppo*, 6, 2010, pp. 505-510.

To this end, it establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater, aims to prevent and reduce their pollution, promote their sustainable use, protect and improve the aquatic environment and mitigate the effects of floods and droughts⁵. Member States are, therefore, required to draw up river basin management plans⁶ on the basis of natural river basins, as well as specific programmes containing measures to achieve these objectives.

Since it is not possible here to dwell on the general framework of the provisions and their implementation in the countries of the Union, we choose to emphasise that the degradation of the water system is essentially attributable to three factors: a) at a hydrological level, excessive abstraction; b) at a chemical level, excessive pollution; c) at a physical level, the marked anthropisation of river banks and the construction of dams⁷.

With regard to the first aspect, the overview of water has changed as a result of a profound revision of the order of values⁸: water is no longer

⁵ As far as drinking water is concerned, the EU Directive 2020/2184 on the quality of water intended for human consumption was recently adopted on 6 March 2023, Legislative Decree No. 18 of 23 February 2023, "Implementation of EU Directive 2020/2184 concerning the quality of water intended for human consumption", was published. The directive defines essential quality standards for water intended for human consumption. It requires Member States to regularly monitor water quality using a method involving the establishment of sampling points. Member States are free to include additional requirements specific to their territory, provided that this results in the imposition of more stringent requirements. The directive also includes an obligation to regularly inform consumers. In addition, the quality of drinking water must be reported to the Commission every three years. The revised Directive was proposed by the Commission in February 2018, in response to a citizens' initiative entitled "Right2Water", and replaces the previous 1998 Directive. The revised Directive updates existing safety standards and improves access to safe drinking water, in line with the latest recommendations of the World Health Organisation. It also enhances transparency for consumers regarding the quality and supply of drinking water, thus helping to reduce the amount of plastic bottles and increasing consumer confidence in the consumption of tap water. Risk-based, EU-wide water safety audits help to identify and address any existing risks to water resources at the distribution stage.

⁶ Our Constitutional Court, in its ruling of 23 July 2009 no. 232, held that: «the basin plan constitutes the fundamental planning tool for soil defence, combating desertification and water protection, such that it belongs to the field of environmental protection».

⁷ E. BOSCOLO, *Le politiche idriche nella stagione della scarsità*, cit., p. 65.

⁸ *Ibidem*. In the introduction to the oft-quoted text, the author argued that as early as the 1960s, the idea that water needed to be protected first and foremost as a compositional element of the environment was established in order to ensure the protection of an irreplaceable and particularly vulnerable common good, and this by virtue of the importance assumed by the water sector in the ecosystem structure. It is only recently that this acquired sensibility has led to the structuring of a regulatory system aimed at safeguarding water and the water system as a whole due to a full perception of the environmental values concentrated in the water sector. This progress highlights

considered merely as a means of production, to be used to obtain maximum exploitation, with a view to economic efficiency, rather there is an awareness of the fact that the water system constitutes, *first and foremost*, a multifunctional environmental matrix to be protected as a fundamental ecosystem element and that water constitutes an essential resource for mankind⁹. Awareness of the scarcity¹⁰ of the “common” good water, requires a move away from the productive perspective that has been dominant for too long, in favour of an approach that requires the preservation of water from depletion and pollution with a view to sustainability, the consequences of which are the setting of strict limits on water withdrawal and a hierarchy of uses that determines a regression in economic-productive uses. This shift is well illustrated by a reading of the Commission’s 2012 document on the plan to safeguard Europe’s water resources¹¹, a long-term strategy aimed at ensuring a qualitatively and quantitatively adequate supply of water for all legitimate uses, improving the

the transition from a framework of values underlying the idea of dominion over nature within which government intervention was only oriented towards favouring the most intense exploitation of the water resource to a custodial and conservative type of approach; L. VIOLINI, *Il bene comune acqua nella prospettiva multilivello*, in S. STAIANO (ed.), *Acqua. Bene pubblico, risorsa non riproducibile, fattore di sviluppo*, Napoli, 2018, p. 199.

⁹ European Environment Agency (EEA), *Potential flood-prone area extent*, Jan. 2020 in <https://sdi.eea.europa.eu>; -European Environment Agency (EEA), *Floodplains: A natural system to preserve and restore*, at *EEA Report No 24/2019*; European Environment Agency (EEA), *European waters -- Assessment of status and pressures*, 2018, at <https://www.eea.europa.eu/publications>; European Environment Agency (EEA), *Flood risks and environmental vulnerability: exploring the synergies between floodplain restoration, water policies and thematic policies*, in *EEA Report No 1/2016*: - European Commission, documents is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39), *Biodiversity Strategy 2030 Barrier Removal for River Restoration*, in <https://environment.ec.europa.eu>. The EU 2030 Biodiversity Strategy calls for greater efforts to restore freshwater ecosystems and the natural functions of rivers. Besides calling for better implementation of existing legislation on freshwater, the Biodiversity Strategy sets the target to make at least 25 000 km of rivers free-flowing again by 2030, by removing primarily obsolete barriers and restoring floodplains and wetlands. This document aims to support Member States and other actors involved in river restoration as they seek to achieve this target. The document seeks to clarify the terms and concepts of the target and its objectives, while recognising the need for such definitions to be translated into operational terms. It also provides general principles, and examples of existing approaches and methods that could be used to select and prioritise barriers that would need to be removed in order to reach the target of at least 25 000 km of free-flowing rivers in the EU. Finally, the document sets out an overview of the different EU funding mechanisms that could support river restoration projects.

¹⁰ See M. CAFAGNO, *Principi e strumenti di tutela dell'ambiente. Come sistema complesso, adattativo, comune*, Torino, 2007, p. 137.

¹¹ E. BOSCOLO, *Le politiche idriche nella stagione della scarsità*, cit., p. 65.

implementation of existing EU water policy, integrating its objectives within other sectoral policies and filling gaps in the existing framework. This plan provides for the development by Member States of water accounting and water efficiency targets, as well as the establishment of standards for water reuse¹².

To the problem of water scarcity is added the issue of pollution. The Commission's 2012 document on the plan to safeguard Europe's water resources also highlights the main causes of negative impacts on water status. These include climate change, land use, economic activities (such as energy production, industry, agriculture and tourism, urban development and demographic change). The consequences arise in the form of pollutant emissions, overuse of water (water stress), physical changes to water bodies and extreme events such as floods and droughts, phenomena that will continue to increase unless action is taken.

An evaluation of the Water Framework Directive was conducted in 2021, during which it was determined that the directive is basically fit for purpose, but that its implementation needs to be accelerated¹³, European waters

¹² Moreover, the Communication of Commission Guidelines to support the implementation of Regulation (EU) 2020/741 establishing minimum requirements for the re-use of water 2022/C 298/01(C/2022/5489) was recently published.

Regulation (EU) 2020/741 of the European Parliament and of the Council aims to facilitate and encourage the practice of reusing water for irrigation purposes in agriculture, a sector that can be particularly vulnerable to water scarcity or intermittent supply, making the EU food system more sustainable and resilient while protecting public health and the environment. The Regulation on water reuse, applicable from 26 June 2023, establishes uniform minimum water quality requirements for the safe reuse of treated urban waste water for irrigation purposes in agriculture. The harmonised minimum requirements will also ensure the proper functioning of the single market for agricultural products and should strengthen consumer confidence. Under the regulation, urban waste water treated in accordance with the requirements of Directive 91/271/EEC concerning urban waste water treatment (Urban Waste Water Treatment Directive) must undergo further treatment in order to meet the new minimum quality standards and become suitable for use in agriculture. In addition to uniform minimum requirements concerning water quality, the regulation also sets uniform minimum monitoring requirements, rules on risk management in order to assess and address potential additional health and environmental risks, requirements concerning the granting of permits, and transparency rules, whereby key information on all water re-use projects must be made public.

¹³ *Economic data related to the implementation of the Water Framework Directive and the Floods Directive and the financing of measures, final study*, 2021. It notes that for the ecological enhancement of water bodies and to prevent or alleviate pollution, to address hydromorphological alterations, to conserve biodiversity and provide aquatic ecosystem services, to manage floods and flood risks, but also droughts and drought risk, and to anticipate and adapt to climate change, it is necessary that funding for investments grows in proportion to the importance and needs of the sector. Recently, international funding for climate-related purposes has grown significantly,

continue to be under significant pressure from diffuse pollution (e.g. generated by agriculture, transport infrastructure and atmospheric deposition), point source pollution (e.g. generated by industry or remaining wastewater discharges not yet adequately treated), over-abstraction and hydro-pollution.

Excessive water abstraction and pollution have been the two main concerns of River Restoration, but river waters are threatened by a further and no less serious problem concerning river connectivity¹⁴ disrupted by man-made

but more than 80 per cent of disbursements are for mitigation programmes in the energy and transport sectors (UNEP, 2016), with limited financial resources allocated for climate adaptation purposes, including investments in supporting resilience in water management. Adaptation to climate change is now an overarching concern that affects all water policy initiatives. The “water transition” towards sustainable water use (e.g. equivalent to the “energy transition” leading to decarbonisation) will require significant additional financial resources. Strategic funding should be designed in such a way as to provide a systematic way of thinking about a range of issues: these can improve the protection of human health and the environment from chemical hazards, or between biodiversity conservation and natural flood management, etc. actors.

¹⁴ See on this topic the articles by river barrier experts, *River Connectivity, The health of the world's rivers is severely threatened. But there is still hope if we take action*, available in *Freeflowingrivers.eu*; G. GRILL-B. LEHNER-M. THIEME ET AL., *Mapping the world's free-flowing rivers*, in *Nature*, 2019, 569, p. 215-221. The papers published there note that rivers are complex systems whose dynamics shape life on Earth, host a wide range of freshwater species, and transport sediment and nutrients. They form wetlands, deltas and floodplains that nourish flora, fauna and human communities and protect us from floods, droughts and other natural disasters. They collect water from the atmosphere and soil and replenish aquifers, which are critical to our survival. To provide these essential ecosystem services, rivers must be able to flow freely, moving unimpeded in multiple directions. However, only a small fraction of the world's rivers can still do this: a myriad of man-made works fragment, divert, restrict and regulate the flow of rivers, dramatically impacting natural functions and surrounding ecosystems. It has been noted by experts that a river needs to move freely in four dimensions: longitudinal, lateral, vertical and temporal. Longitudinal connectivity allows fauna to move from upstream to downstream and vice versa, and allows sediment and nutrients to flow freely from the headwaters to the sea. Artificial barriers such as dams, weirs and culverts can limit or completely interrupt this connectivity. Lateral connectivity means that rivers, with the exception of naturally confined upland stretches, move laterally and may periodically flood the surrounding floodplain in an exchange of water, sediment, nutrients and organic matter from the river to the floodplain and vice versa. Vertical connectivity concerns the connections between atmosphere, watercourse surface and groundwater. Water flowing under the riverbed is as important as surface runoff. It is a key habitat for many invertebrates, regulates river temperature, contributes to groundwater recharge and much more. Temporal connectivity refers to the ability of river processes, particularly related to the flow regime, to take place following the natural alternation in time typical of a certain watercourse. Free-flowing rivers are those in which all four types of connectivity are guaranteed. However, there are many potential threats to maintaining a free-flowing state from source to mouth. Human pressures affecting river dynamics are manifold, often related to urbanisation, agriculture, roads and various infrastructures built in riparian areas, water abstraction and energy production. These barriers mostly impact longitudinal connectivity, blocking or limiting the passage of fish and sediment. Some barriers, such as dams, also impact temporal connectivity, as

barriers¹⁵ and, as the reader will have understood by now, on this last profile we would like to linger a little longer, with a necessary caveat: the participation of the local communities settled along the rivers in the protection of the “commons” has proven to be decisive for the protection of rivers even before the long-awaited introduction of the Nature Restoration Law.

The Water Framework Directive already deals with participation in several points, starting from the 14th Recital that entrusts the success of the Directive to the joint and shared action by the Community, the Member States and “to the information, consultation and participation of the public”¹⁶, but also in the European Commission’s *Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document n. 7, Public Participation in relation to the Water Framework Directive* the need to

they regulate the flow of water and sediment according to human needs, rather than allowing the river to follow its natural seasonal pattern. Other types of human interventions exert pressure on lateral connectivity, for example embankments and bank protection works. These barriers are built in flood plains, parallel to the river banks. Levees are used to prevent water from flooding neighbouring land. Bank protection works, on the other hand, are built to prevent the riverbed from moving sideways, but do not necessarily prevent flooding. Artificially laterally confined rivers become channelled, losing their character as living elements that intertwine with the environment and change shape over time. This increases the risk of flooding downstream and in the event of events that overtop the banks, or their failure, can lead to catastrophic flooding even in areas that appeared 'protected'. The loss of river connectivity has an impact on biodiversity: barriers block the longitudinal and lateral movements of rivers, fragmenting habitats and making entire stretches inaccessible. For example, migratory fish may be cut off from their spawning grounds, but non-migratory fish species are also affected, unable to reach refuge habitats or feeding areas that are vital to their survival. Fish become trapped in the turbines of hydropower plants as they move downstream, or become stranded and disoriented as they move upstream.

¹⁵ The Water Framework Directive did not necessarily require Member States to remove obstacles that may disturb the natural connectivity of a river/lake system. However, many terrestrial ecosystems and several habitats and species protected by the Birds and Habitats Directives depend directly on aquatic ecosystems being in a near-natural state. The EU Biodiversity Strategy 2030 calls for intensified efforts to restore freshwater ecosystems and the natural functions of rivers. The restoration of freshwater ecosystems should include actions to restore the longitudinal and lateral natural connectivity of rivers, their riparian zones and floodplains, including through the removal of barriers, in order to facilitate the achievement of a favourable conservation status for rivers, lakes, floodplain habitats and the species living in these habitats protected by Directives 92/43/EEC and 2009/147/EC, as well as the achievement of one of the key targets of the EU Biodiversity Strategy 2030, namely the restoration of at least 25 000 km of free-flowing rivers. When removing barriers, Member States should first consider obsolete barriers, i.e. those that are no longer needed for renewable energy production, inland navigation, water supply or other uses.

¹⁶ V. MOLASCHI, *La partecipazione dei privati al governo della gestione delle acque. Riflessioni sull'attuazione della Direttiva quadro 2000/60/CE*, in M. ANDREIS (ed.), *Acqua, servizio pubblico e partecipazione*, cit., pp. 143-162.

«involve stakeholders in the development of river basin management combining quality, ecological and quantity in a common and coherent framework» is found. Even more incisive are the Commission's reflections in the subsequent document in *Guidance Document* no. 8, “*Public Participation in relation to the Water Framework Directive*”, which defines public participation as the necessary process enabling citizens to influence the outcome of plans and processes and elaborates different levels of participation, distinguished between a) information; b) analysis and evaluation of decisions; c) active participation¹⁷.

Also noteworthy is the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, opened for accession at Aarhus and ratified by Italy with law no. 108 of 16 March 2001¹⁸, which requires that all interests be taken into account from the initial phase of the decision-making process and, therefore, that the prior integration of the environmental interest in the design phase of public policies be made effective. The participation of private subjects in environmental proceedings is affirmed as an effect of the peculiar enhancement of participatory guarantees in environmental law. Their accentuation, as the doctrine has already pointed out¹⁹, is due to the complex and uncertain nature of the dynamics regulated by these proceedings and the consequent intention to make civil society co-responsible for the choices made through them. It is in these activities that the democratic function of procedural participation is essentially expressed²⁰. The latter, especially in the environmental sectors,

¹⁷ The paper emphasises that these three levels are not mutually exclusive, but rather complement each other: consultation requires that actors are first informed and active participation implies consultation. Moreover, different approaches can be useful in different ways at different stages of a process and the choice depends on aspects such as: the timing, the political and historical context in which participation takes place, the resources available, the objectives and expected benefits, and the stakeholders involved.

¹⁸ J. HARRISON, *Legislazione ambientale e la libertà di informazione: la Convenzione di Aarhus*, in *Riv. giur. amb.*, 2000, p. 27 ff.; R. MCCracken-G. JONES, *The Aarhus Convention*, in *Journ. plann. env. law*, 2003, p. 802.

¹⁹ M. COCCONI, *La partecipazione all'attività amministrativa generale*, Padova, 2010, p. 138.

²⁰ See G. BOSETTI-S. MAFFETTONE (edited by), *Democrazia deliberativa: cosa è*, Roma, 2004; L. PELLIZZONI (edited by), *La deliberazione pubblica*, Roma, 2005; U. ALLEGRETTI, *Democrazia partecipativa*, in *Enc. Dir., Annali IV*, Milano, 2011, p. 295 ff.; ID. (edited by), *Democrazia partecipativa. Esperienze e prospettive in Italia e in Europa*, Firenze, 2010; J. BOHMAN, *Reflexive Public Deliberation*, in *Philosophy & Social Criticism*, 29, 1, 2003; J. ELSTER, *Introduction*, in ID. (edited by), *Deliberative Democracy*, Cambridge, 1998; J. DRYZEK, *Deliberative democracy and beyond*, New York, 2002; L. PELLIZZONI, *Cosa significa deliberare? Promesse e problemi della democrazia deliberativa*, in ID., *La deliberazione pubblica*, Roma, 2005; P. GINSBORG, *La*

effectively contributes to the formation, by the deciding authority, of the administrative choice²¹. It is precisely this significant openness to interests that takes place in such procedures that results in progressive resolution of overcoming of the conflictual logic between administration and citizens²² and, consequently, of a participation conceived in purely defensive terms²³ in favour of the affirmation of shared administration²⁴.

3. *The European regulatory framework for the protection of nature restoration*

The Nature Restoration Law, approved on 18 August 2024²⁵, is part of a comprehensive international²⁶ and European legal framework²⁷ that includes strategies and action plans to protect nature and restore habitats

democrazia che non c'è, Torino, 2006, p. 72; Y. SYNTOMER, *Il potere al popolo. Giurie cittadine, sorteggio e democrazia partecipativa*, Bari, 2009.

²¹ M. COCCONI, *La partecipazione all'attività amministrativa generale*, cit. p.4.

²² On the contrary, the logic between administration and citizens can be marked by solidarity, thus P. CHIRULLI, *I beni comuni, tra diritti fondamentali, usi collettivi e doveri di solidarietà* (*Common goods, between fundamental rights, collective uses and duties of solidarity*), available on the *Gustamm.it* website, 2012.

²³ On the discipline of administrative procedure as the very essence of democracy destined to flank, precisely through the direct participation of citizens in the formation of acts, the indirect mechanisms of political representation. See G. SALA-R. VILLATA, *Procedimento amministrativo (ad vocem)*, *Dig. disc. pubbl.*, XI, Torino, 1996.

²⁴ F. GIGLIONI, *Consolidamento e futuro dell'amministrazione condivisa*, in *Federalismi.it*, 2022; G. ARENA, *Nuove risorse e nuovi modelli di amministrazione*, in M. BOMBARDELLI (edited by), in *Prendersi cura dei beni comuni per uscire dalla crisi*, in *Quaderni della facoltà di giurisprudenza*, 2016, pp. 83-305; L. GIACHI-F. PROIA, *Amministrazioni alla prova dell'art.118 c. 4 della Costituzione: prassi per un'amministrazione condivisa*, in *Federalismi.it*, 2022, p. 180; C. TUBERTINI, *Sviluppare l'amministrazione condivisa attraverso i principi di sussidiarietà (verticale) e leale collaborazione: riflessioni e proposte*, in *Ist. fed.*, 2019, p. 971 ss; P. CHIRULLI, *Sussidiarietà e collaborazione «amministrata» nei beni comuni urbani*, in P. CHIRULLI-C. IAIONE (edited by), *La co-città*, Napoli, 2018, p. 55 ff.; G. ARENA, *I custodi della bellezza*, Milano, 2020; M. BOMBARDELLI, *La cura dei beni comuni: esperienze e prospettive*, in *Gior. dir. amm.*, 2018, p. 559 ff.

²⁵ Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869, at <https://eur-lex.europa.eu>, which was approved following a long and tortuous legislative process. On 22 June 2022, the European Commission started the legislative process with a proposal for a Nature Restoration Law to contribute to the long-term restoration of deteriorated natural environments in land and marine areas of the EU, on 12 July 2023 the European Parliament approved the Nature Restoration Law, on 30 November 2023, the members of the ENVI (Environment, Public Health and Food Safety) Committee of the European Parliament voted in favour of the Nature Restoration Law.

Some time ago, the Commission presented the European Green Deal²⁸, a set of measures aimed at enabling the EU to achieve carbon neutrality by 2050, which does not end with the Commission's Communication presented in 2019, but runs through a complex regulatory process that also includes an EU Biodiversity Strategy for 2030²⁹. Thus, it has already been pointed out that «from the Commission's perspective, the macro-objective of a climate-neutral Europe should be realised through various interconnected measures, cutting across and linking different public policies, from energy to biodiversity protection, from industrial policy to transport, from agriculture to buildings»³⁰.

The EU Biodiversity Strategy represents a further building block in the complex framework of climate neutrality³¹ it commands the attention of

²⁶ In 2010, under the International Convention on Biological Diversity (CBD, 1992), parties adopted a strategic plan with 20 targets to «take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020, ecosystems are resilient and continue to provide essential services, ensuring the diversity of life on the planet and contributing to human well-being and poverty eradication». The principles of the CBD are also integrated into the UN Sustainable Development Goals (SDGs) up to 2030. Specifically, for aquatic ecosystems, SDG 6 advocates the protection and restoration of water-related ecosystems, SDG 15 calls for the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, promoting the integration of ecosystem and biodiversity values into national values and local planning, and SDG 14 aims at the conservation and sustainable use of coastal and marine resources.

²⁷ F. DE LEONARDIS, *Il diritto dell'economia circolare e l'art. 41 Cost.*, in *RQDA*, no. 1, 2020, pp. 65 ff. Most recently, ID., *Lo stato ecologico, Approccio sistemico, economia, poteri pubblici e mercato*, Torino, 2023.

²⁸ COM(2019) 640 *Final communication from the commission to the European Parliament, the European Council, the Council, the European economic and social committee and the committee of the regions*. For comments please refer to D. BEVILACQUA-E. CHITI, *Green Deal, Come costruire una nuova Europa*, Bologna, 2024; E. CHITI, *Managing the Ecological Transition of the EU: The European Green Deal as a Regulatory Process*, in *Common Market Law Re-view*, 2022, p. 19 ff.; A. BONGARDT-F. TORRES, *The European Green Deal: More than an Exit Strategy to the Pandemic Crisis, a Building Block of a Sustainable European Economic Model*, in *Journal of Common Market Studies*, 2021, p. 170 ff.; C. HAMILTON, *Earthmasters: The Dawn of the Age of Climate Engineering*, in *New Haven-London*, 2013. For a legal construction on climate change and public law, see the interesting paper by B. TONOLETTI, *Cambiamenti climatici come problema di diritto pubblico universale*, in *Rivista giuridica dell'ambiente*, 2021, p. 37.

²⁹ COM(2020) 380, *Final communication from the commission to the European Parliament, the European Council, the European economic and social committee and the committee of the regions EU biodiversity strategy for 2030 bringing nature back into our lives*.

³⁰ D. BEVILACQUA-E. CHITI, *Green Deal, Come costruire una nuova Europa*, cit., p. 20.

³¹ E. CHITI, *Oltre la disciplina dei mercati: la sostenibilità degli ecosistemi e la sua rilevanza nel Green Deal europeo*, in *Rivista della Regolazione dei Mercati*, 2002, p. 468. The author considers that the protection of biodiversity is not a component that immediately captures the attention of observers, but remains in the shadows, almost hidden, compared to the four main (and most

scholars not only because it highlights the main causes of biodiversity loss which, as is well known, are to be found in the continuous anthropogenic pressures on natural systems, such as intensive agriculture, land consumption, pollution, unsustainable forestry practices and climate change³², but also because it emphasises the need to safeguard healthy ecosystems, which provide food and food security, clean water, carbon sinks and protection from natural disasters caused by the climate crisis.

Despite international and EU initiatives, the loss of biodiversity and the degradation of ecosystems has not come to a halt, as reflected in the reports of the Intergovernmental Panel on Climate Change (IPCC), the Aichi Progress Report, and the *Economics of Biodiversity: The Dasgupta Review*³³. The IPCC's 2022 Report³⁴ emphasised that the world and Europe have a short and rapidly depleting margin to ensure a liveable future, as the exploitation of natural and human systems beyond their adaptive capacity has led to an increase in extreme weather and climate events that have caused some irreversible consequences³⁵.

studied) guidelines of the economic and social reform project that the European strategy for climate neutrality brings with it, which include: the prevalence of the interest in decarbonisation, the circularity of the economy and the social sustainability of the transition. For a reflection on these latter components see E. BRUTI LIBERATI, *La strategia europea di decarbonizzazione e il nuovo modello di disciplina dei mercati alla prova dell'emergenza ucraina*, in *Rivista della Regolazione dei Mercati*, 2022, pp. 3 ff.

³² See M. CAFAGNO, *Principi e strumenti di tutela dell'ambiente. Come sistema complesso, adattativo, comune*, cit., p.124.

³³ The *Economics of Biodiversity: The Dasgupta Review* (available in *Final Report - The Economics of Biodiversity: The Dasgupta Review - GOV.UK*) states that: healthy ecosystems provide food and food security, clean water, carbon sinks and protection from natural disasters caused by climate change and, therefore, are essential to our survival, well-being, prosperity and long-term security as they underpin Europe's resilience.

³⁴ The Summary for Policymakers of the IPCC Working Group II report, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, a text available in *Intergovernmental Panel on Climate Change*, was endorsed on 27 February 2022 by 195 IPCC member governments. It states that increasing heat waves, droughts and floods are already exceeding the tolerance thresholds of plants and animals, causing mass mortality in some species including trees and corals. These extreme weather events are occurring simultaneously, causing cascading impacts that are increasingly difficult to manage. The extreme events have exposed millions of people to severe food and water insecurity, especially in Africa, Asia, Central and South America, small islands and the Arctic. To avoid increasing loss of life, biodiversity and infrastructure, ambitious and accelerated action is needed to adapt to climate change and, at the same time, rapidly and deeply reduce greenhouse gas emissions. To date, the report says, progress on adaptation is uneven and there is a widening gap between what is being done and what needs to be done to address the growing risks of climate change. This gap is most pronounced among low-income populations.

³⁵ M. CAFAGNO, *Cambiamenti climatici tra strumenti di mercato e potere pubblico*, in G.F. CARTEI (edited by), *Cambiamento climatico e sviluppo sostenibile*, Torino, 2013, p. 105 ff.

Global warming has caused and will continue to cause more frequent extreme weather events (such as floods, droughts, intense rainfall and heat waves), forest fires, disappearing glaciers and rising sea levels, loss of biodiversity, plant diseases and pests, shortages of food and drinking water, and desertification. The warning is to take urgent action by implementing measures to restore degraded ecosystems and mitigate the impacts of climate change, in particular by restoring degraded wetlands, rivers, forests and agricultural ecosystems.

It is clear from reading such documents that the biodiversity crisis and the climate crisis are intrinsically linked: climate change accelerates the destruction of the natural world through droughts, floods and fires, while the loss and unsustainable use of nature are themselves key drivers of climate change. But, as repeatedly stated in the European strategy just mentioned, just as crises are linked so are the solutions. Nature is a key ally in the fight against climate change: the protection and restoration of wetlands, peatlands and coastal ecosystems, the sustainable management of marine areas, forests, grasslands and agricultural soils, and river connectivity are essential for reducing emissions and adapting to climate change. The specific objective is to restore degraded ecosystems across the EU (e.g. wetlands, forests, marine environments, agro-ecosystems, rivers and lakes, and floodplain habitats) and in particular those that have the greatest potential to capture and store carbon and to prevent and reduce the impact of natural disasters.

It has been stated that the European Union has legal frameworks, strategies and action plans to protect nature and restore habitats and species, but it has been repeatedly emphasised that protection has been incomplete, restoration has been small-scale and implementation and enforcement have been insufficient.

In this context, the Nature Restoration Law, which is an integral part of the European Green Deal and the European Biodiversity Strategy, aims to create a legislative framework necessary for the restoration and conservation of European ecosystems in line with the European Union's climate objectives. The new Regulation is characterised by its transversality: it aims to implement climate change mitigation and adaptation strategies; it concerns the Common Agricultural Policy (CAP), where agriculture, forestry and fisheries benefit from natural ecosystems; it addresses biodiversity and marine environment strategies; it provides for the restoration of habitats within Natura 2000; and last but not least, it complements the Water Framework Directive.

It is worth outlining the overall framework of the new regulation and then considering just one part of the equation for further study. The common theme is the ambition to remedy the alterations caused by anthropisation and, therefore, the Nature Restoration Law finds its greatest application the more man has changed the original natural conditions that pre-date settlement and the exploitation of nature. The Regulation therefore places itself at the centre of urban and regional planning where it explicitly intervenes on urban greenery. Among the key measures, binding on European countries, the law stipulates that restoration actions covering 20% of the EU's marine and terrestrial territory should be implemented by 2030³⁶. The overall objective is described in Article 1: to contribute to the continuous, long-term and sustainable recovery of biodiversity and nature resilience in all land and marine areas of the EU by restoring ecosystems. In particular, Member States will be required to implement restoration measures (collectively covering at least 20 % of land and marine areas) in the EU through actions aimed at increasing pollinator populations, halting the loss of urban green spaces by 2030; increasing biodiversity in agricultural and forest ecosystems and removing river barriers to ensure that at least twenty-five thousand kilometres of rivers are free-flowing by 2050. Reflection will focus precisely on this last aspect, which is closely linked to the profiles highlighted above.

In fact, interruption of water flow by human activities has a negative impact on ecosystems: dams and barriers are obstacles to fish migration, degrade water quality, have a high risk of failure and result in large economic watercourses, disconnect floodplains and aquifers³⁷.

³⁶ N. HOEK, *A Critical Analysis of the Proposed EU Regulation on Nature Restoration: Have the Problems Been Resolved?*, in *European Energy and Environmental Law Review* October 2022, p. 320; J. VERSCHUUREN, *Restoration of Protected Lakes Under Climate Change: What Legal Measures Are Needed to Help Biodiversity Adapt to the Changing Climate? The Case of Lake IJssel, Netherlands*, in SSRN, 2019, p. 5; N. HOEK, *The Habitats Directive and Heath: The Strain of Climate Change and N Deposition*, in SSRN, 2022, p. 42; R. J. BIJLSMA ET AL., *Defining and Applying the Concept of Favourable Reference Values for Species and Habitats Under the EU Birds and Habitats Directives*, in *Wageningen Environmental Research*, 2019; J. CORTINA-SEGARRA ET AL., *Barriers to Ecological Restoration in Europe: Expert Perspectives*, in *Restor. Ecol.*, 2021, p. 49; A. PILLAI-D. HEPTINSTALL, *Twenty Years of the Habitats Directive: A Case Study on Species Reintroduction, Protection and Management*, in *Envtl. L. Rev.*, 2013, p. 42; A. TRUCHY ET AL., *Habitat Patchiness, Ecological Connectivity and the Uneven Recovery of Boreal Stream Ecosystems from an Experimental Drought*, in *Global Change Biology*, 2020, p. 3455.

³⁷ See: <https://damremoval.eu/wp-content/uploads/2024/07/Factsheet-Final.pdf>

After all, discussion on the new regulation has clearly shown that the elimination of artificial obstacles, which limit river connectivity in Europe, was not only necessary, but had to foresee a broad participation by the communities concerned so as to create a close link between the resource that comes from the river as a common good and the reference community. The necessarily “participatory” character of the action emerges in the case studies that will now be taken into consideration, it is a matter of a methods for the management of the water as a common good and of actions for the evaluation of management results, it is a matter of flanking the traditional actions by the public authorities with instruments of further legitimisation, also with a view to strengthening the administration and its role in the care of public interests³⁸.

4. *River fragmentation and dam removals: status, citizen participation and case studies*

Artificial longitudinal river barriers are «any built structures that interrupt or modify the flow of water, the transport of sediments, or the movement of organisms and can cause longitudinal discontinuity»³⁹ and can be categorized into six main types (dam, weir, sluice, ramp/bed-sill, culver and ford) based on their features and impact on water flow and the fluvial habitats⁴⁰. The first pan-European estimation of river fragmentation in Europe caused by artificial barriers was conducted as part of the EC-funded Horizon 2000 “*Adaptive Management of Barriers in European Rivers*” (AMBER) project⁴¹

³⁸ For further references on participation and shared administration, allow me to refer to C. LEONE, *I contratti di fiume negli argini del diritto amministrativo*, Napoli, 2024. For more general environmental reflections on the necessary action of the various public and private actors operating in the area and, therefore, action in a multilevel and multi-stakeholder context peculiar to and peculiar to a network governance system, see: G. GARDINI, *Alla ricerca della “città giusta”*. *La rigenerazione come metodo di pianificazione urbana*, in *Federalismi*, 2020, 44; F. GIGLIONI, *Verso un diritto della città. La città oltre il comune*, in E. CARLONI-F. CORTESE (edited by), *Diritto delle autonomie territoriali*, Padova, 2020, p. 267 ff.; L. GIANI-M. D’ORSOGNA, *Diritto alla città e rigenerazione urbana. Esperimenti di resilienza*, in *Scritti in onore di Eugenio Picozza*, III, Napoli, 2019, 2005.

³⁹ B. BELLETTI ET AL., *More than one million barriers fragment Europe’s rivers*, in *Nature*, 2000, 588, 436–441. <https://doi.org/10.1038/s41586-020-3005-2>

⁴⁰ C. GARCIA DE LEANIZ-J.R O’HANLEY, *Operational methods for prioritizing the removal of river barriers: Synthesis and guidance*, in *Science of the Total Environment*, 2022, 848: 157471. <https://doi.org/10.1016/j.scitotenv.2022.157471>.

⁴¹ AMBER was a research project seeked to apply adaptive management to the barriers in European rivers to effectively and efficiently restore river connectivity.

and reported the existence of at least 1.2 million barriers in 36 European countries (with a mean density of 0.74 barriers per kilometer), 15% of which (~200000) are considered obsolete. However, the real magnitude of river fragmentation at the pan-European scale is mostly unknown, while in many countries there is only a limited overview of existing barriers. This information deficiency hampers well informed decisions about prioritization and execution of barrier removals.

The contribution of private individuals in mapping barriers in Europe's rivers has proved decisive through initiatives that harness the power of citizen science⁴², a continuously growing practice that involves the public in scientific research and scientific knowledge production through field-based observations of the natural world and can be employed by decision makers, research organizations, the scientific community, etc. Probably the best example is the AMBER Barrier Tracker⁴³, a free and user-friendly app that allows users to report the location, features, and status of river barriers and to upload photos of these structures. It was created to raise awareness among citizens about the different types of river barriers and to be used as a tool towards an ever-growing inventory⁴⁴ of barriers fragmenting European rivers with continuously increasing accuracy. All this information can be used to pinpoint obsolete barriers and help prioritize their potential removal, and can be utilized by policy makers, water management authorities and conservationists so they make well-informed river management decisions and also locate barriers which do not appear in their official inventories.

River barriers cause habitat degradation and biodiversity loss, and they alter the natural nutrient flow. They also modify the natural sedimentation and thus amplify the erosive power of water downstream. Barriers also modify the water level and impact the recharge of the aquifer. Low-head barriers (e.g. weirs) also pose a threat to human lives and are thus known as drowning machines, while barriers that have outlived their useful lives and now remain obsolete are at risk of structural failure. In that respect, barrier removal is recognized as an effective and useful river restoration tool in Europe. Dam

⁴² UK app called "River Obstacles" & French web application called "GEOBS – ROE".

⁴³ <https://portal.amber.international>

⁴⁴ <https://amber.international/european-barrier-atlas>

Removal Europe (DRE)⁴⁵ is monitoring barrier removals executed Europe-wide to evaluate the progress and impact of this river restoration measure and has reported more than 8000 removals since the 1950s. The number of barrier removals increases year after year⁴⁶ and new European countries are starting to implement this practice to restore river connectivity and ecological continuity. Most barrier removals occurred in western and northern Europe, where barrier density is highest, but this restoration tool is gaining attention in other European regions too, like the Balkans. For example the “*Scaling up dam removal: implementation plan for Southeastern (SE) Europe*” project⁴⁷ aims to mainstream barrier removal in countries that have yet to implement such measures through developing supportive policies, providing new expertise and tools. Croatia, Greece, Romania, and Slovakia will lead the way in this project, but impacts expected across the whole southeastern Europe. The project is funded by the European Open Rivers Programme (ORP)⁴⁸, a grant giving organization dedicated to restoring endangered European rivers by supporting interventions that lead to the removal of barriers and the restoration of river flow and biodiversity.

Communication and awareness raising and development of solid narratives about the benefits of barrier removal with good examples and materials are imperative in the efforts to establish this river restoration tool in the mindset of policy makers, river managers, funders, and the general public. The importance of consultation with all relevant stakeholders in a successful river connectivity restoration action becomes apparent in the removal of the Llangollen Lower Weir at River Dee in Wales, UK⁴⁹. Multiple parties from the national and regional level and the private sector collaborated from the start to decide the terms and actions within this project and agreed upon a plan to

⁴⁵ DRE (<https://damremoval.eu/>) is a coalition of six organizations: the World Wildlife Fund, The Rivers Trust, The Nature Conservancy, the European Rivers Network, Rewilding Europe and Wetlands International Europe. The overall ambition of DRE is to restore the free-flowing state of rivers and streams in Europe. In that respect, DRE aims to establish barrier removal as a restoration tool and to mainstream this practice. Through a bottom-up process DRE has created a continuously growing European network and it is working towards a holistic approach to remove barriers.

⁴⁶ F.A. MOUCHLIANITIS, *Dam Removal Progress*, World Fish Migration Foundation, 2023 (https://damremoval.eu/wp-content/uploads/2024/04/Web-version_DRE-Report-2023.pdf).

⁴⁷ <https://openrivers.eu/projects/202304425-scaling-up-dam-removal-implementation-plan-for-south-eastern-europe>

⁴⁸ <https://openrivers.eu>

⁴⁹ <https://damremoval.eu/portfolio/llangollen-wales>

partially remove this weir. All stakeholders were eventually satisfied with the achieved compromise as everyone's interest was taken into consideration from the designing phase of the project. In particular, fish migration was re-established, while water velocity and level were minimally impacted, which were imperative for the continuation of recreational activities. In addition, the modifications to the weir did not increase the flood risk or posed any threat to the local protected species. Finally, the historical significance of the feature, that was built back in 1805, was protected, as the weir was only notched and not removed completely.

The removal of the Dalloz Weir at River Grosdar in France is another perfect example of successful synergy between the public and the private sectors⁵⁰. This weir, built in the 1900s, was owned by a private sun lenses production company and was used to supply water for various purposes (e.g., for cleaning tools). Due to this, the water amount and flow in a 400-m river stretch had been drastically diminished and the water quality degraded, while fish migration was blocked. The removal of the weir reopened 3 km and the benefits for fish species were evident immediately after the completion of the in-river works. The private company who owned the weir was also satisfied with the outcome of the project and committed to a continuous collaboration with the public authorities towards the goal of having zero impact on the river.

Traditionally, most barrier removal projects are initiated by public authorities in order to comply with national/European legislation or out of necessity (e.g., under the risk of failure). However, lately, non-governmental organizations have been leading many such projects Europe-wide, since funding mechanisms became available, like ORP and EU-funded LIFE projects. Barrier removals are taking place in countries with no precedent like Montenegro⁵¹, Ukraine⁵², Portugal⁵³, and Latvia⁵⁴.-In Italy an ORP-funded project was recently implemented at River Giovenco in the heart of Central Apennines, where five barriers were removed in a critical step towards restoring the natural dynamics

⁵⁰ <https://damremoval.eu/portfolio/dalloz-france>

⁵¹ <https://damremoval.eu/portfolio/vezisnica-barriers-river-vezisnica-montenegro>

⁵² <https://damremoval.eu/portfolio/bayurivkadam-ukraine>

⁵³ <https://damremoval.eu/portfolio/agedavouga-portugal>;
<https://damremoval.eu/portfolio/galaxes-weir-removal-portugal>

⁵⁴ <https://damremoval.eu/portfolio/beja-dam-removal-latvia>

of this river system⁵⁵. This first of its kind in the Apennine region project reopened 11 km and will deliver significant ecological and socio-economic benefits. The migration of protected and vulnerable aquatic species, such as the white-clawed crayfish and Mediterranean trout will be restored, while riparian vegetation will reclaim previously inaccessible habitats, delivering wider benefits to other animal species, particularly the European otter. These removals will also allow the River Giovenco to resume its natural processes of erosion and sedimentation, creating meanders and diverse habitats.

Despite the progress made Europe-wide in implementing river connectivity restoration through the demolition of artificial barriers, such projects often face opposition. Barriers can be related to people's livelihoods, everyday practices and memories, and/or can be seen – by local communities and/or public authorities – as monuments representing engineering grandeur of the past that need to be protected. In that respect, barrier removals can potentially become an assault on a person, a tradition, and/or a long-held belief system. The proposed demolition of the Toranes Dam in eastern Spain is the perfect example as it faced great opposition that attracted significant media and political attention, as the dam is considered by the locals «a piece of history; a place for communal work and interaction; the possibility for attractive living in the valley and thereby a tool for the repopulation of the area; a sustainable local food supply; and a greening lifeline throughout the area»⁵⁶. The opposition against the removal of the Toranes Dam has thus «become to be portrayed as the defense of local place identity and practices, even though at the core of this is – technically speaking – not the dam itself but the irrigation water that it provides for local orchards»⁵⁷. Similarly, many residents were associating the Wilkówka Dam in Poland with critical services such as water supply, flood regulation, and cultural significance⁵⁸. The dam was removed urgently due to engineering failures occurred during its construction. Despite environmental concerns that justified the removal, many residents opposed the decision,

⁵⁵ <https://rewildingeurope.com/news/rewilding-apennines-leads-pioneering-removal-of-river-barriers>

⁵⁶ L. HOMMES, *The ageing of infrastructure and ideologies: Contestations around dam removal in Spain*, in *Water Alternatives*, 2022, 15(3): 592-613.

⁵⁷ *Ibidem*.

⁵⁸ M. HABEL ET AL., *Dammed context: Community perspectives on ecosystem service changes following Poland's first dam removal*, in *Land Degradation & Development*, 2024, 35, 2184-2200.

feeling also excluded from the process. Such examples underscore the complexities of barrier (especially dam) removals, showing that communities often perceive such projects as resulting in a net loss of benefits. This emphasizes the need for better communication and participatory decision-making when implementing such projects.

Consultation with the relevant stakeholders prior to any barrier removal and open communication throughout can significantly expedite the process. At the same time, it prevents disinformation narratives and false accusations to be widely disseminated misleading the general public. A perfect example of how misleading information – intentionally or accidentally created – can spread swiftly and uncontrollably followed the flash flooding in Valencia, Spain, in October 2024. In the days following the catastrophic events that claimed more than 200 lives, social-media users blamed dam removals for the disaster, and even circulated fake evidence to support their allegation. The claim and fake evidence were debunked⁵⁹, but hundreds of thousands of people had already viewed them and were – potentially – misguided on the matter and on the importance/effects of barrier removals in general. In conclusion, close collaboration with local communities, key economic sectors and authorities aiming to co-develop win-win solutions is imperative from the initial steps of any barrier removal project, while wide dissemination of the beneficial outcomes of such projects will warrant the widespread acceptance of this practice.

5. *Brief concluding remarks*

It is necessary at this point in the discussion to identify a common thread that allows the different parts of the paper to be brought together. It is believed that it can be identified in a substantial change in the attitude towards the protection of the environment in general, and of rivers in particular⁶⁰, a

⁵⁹ C. GARCIA DE LEANIZ-F. A. MOUCLIANITIS, *Claims that dam removals were to blame for Valencia floods are false*, in *Nature*, 2024, 636, 299.

⁶⁰ The writer is not unaware that the debate on common goods has close links with the debate on public goods, public property and the ways in which it can or should be managed. In part, this link can be explained as suggested by F. CORTESE, *Che cosa sono i beni comuni?*, in M. BOMBARDELLI, in *Prendersi cura dei beni comuni per uscire dalla crisi*, cit. 5. Also A. LUCARELLI, *Beni comuni. Contributo per una teoria giuridica*, in *costituzionalismo.it*, 2015. On public goods see M. RENNA, *La regolazione amministrativa dei beni a destinazione pubblica*,

change of perspective in the approach to the *commons*⁶¹, which are increasingly perceived directly by individuals and are shared at a collective level as fundamental to everyone's existence and, therefore, to be supported by way of active participation⁶². It has been said that the time has perhaps come to overcome the "great dichotomy"⁶³, the distinction between public and private, and that there is conceptual movement towards a law that is able to ensure decision-making techniques are no longer based solely on representation, but also on deliberative and participatory democracy.

At a time dominated by the scarcity of resources and the need for conscious use of water resources, it is necessary, on the one hand, that individuals no longer present themselves as a sum of indistinct alterities⁶⁴, but as a set of subjects who are connected to each other and capable of assuming their own responsibility for their correct use, also with a view to conservation for future generations. On the other hand, it is desirable for local communities to implement active participation behaviours in the manner so brilliantly

Milan, 2004, M. OLIVI, *Beni demaniali ad uso collettivo. Conferimento di funzioni e privatizzazione*, Padova, 2005, and B. TONOLETTI, *Beni pubblici e concessioni*, Padova, 2008; A. LALLI, *I beni pubblici. Imperativi del mercato e diritti della collettività*, Napoli, 2015.

⁶¹ M. CAFAGNO, *Principi e strumenti di tutela dell'ambiente. Come sistema complesso, adattativo, comune*, cit., p. 129 ff.

⁶² M. BOMBARDELLI, *La cura dei beni comuni come via di uscita dalla crisi*, in M. BOMBARDELLI, *Prendersi cura dei beni comuni per uscire dalla crisi*, in *Quaderni della facoltà di giurisprudenza*, 2016; M.R. MARELLA, *Introduzione. Per un diritto dei beni comuni*, in ID. (edited by), *Oltre il pubblico e il privato. Per un diritto dei beni comuni*, Ombre Corte, Verona, 2012, p. 17 ff.; A. GAMBARO, *Note in tema di beni comuni*, in *Aedon*, 2013; F. CORTESE, *Che cosa sono i beni comuni?*, in M. BOMBARDELLI (edited by), in *Prendersi cura dei beni comuni per uscire dalla crisi*, in *Quaderni della facoltà di giurisprudenza*, cit.; F. CORTESE, *Dalle Valli da pesca ai beni comuni: la Cassazione rilegge lo statuto dei beni pubblici?*, in *Giornale dir. amm.*, 2011, p. 1170; P. CHIRULLI, *I beni comuni, tra diritti fondamentali, usi collettivi e doveri di solidarietà*, cit.; A. LUCARELLI, *La democrazia dei beni comuni*, Roma-Bari, 2013; U. MATTEI, *Beni comuni. Un Manifesto*, Roma, 2011; S. RODOTÀ, *Beni comuni e categorie giuridiche. Una rivisitazione necessaria*, in *Questione Giustizia*, 2011, p. 237.

⁶³ V. CERULLI IRELLI-L. DE LUCIA, *Beni comuni e diritti collettivi. Riflessioni de iure condendo su un dibattito in corso*, in *Giustamm*, 2013; N. BOBBIO, *Dalla struttura alla funzione*, Roma-Bari, 2007, p. 122 ff., spec. p. 126 f. 11; A. SOMMA, *Democrazia economica e diritto privato. Contributo alla riflessione sui beni comuni*, in *Materiali per una storia della cultura giuridica*, 2011, p. 461 ff, spec. p. 462 ff. In general, R. BIFULCO, *Democrazia deliberativa e democrazia partecipativa*, in *Enc. Dir., Annali*, Milano, 2011, IV, p. 271 ff; M. R. FERRARESE, *La governance tra politica e diritto*, Bologna, 2010, p. 29.

⁶⁴ M. BOMBARDELLI, *La cura dei beni comuni come via di uscita dalla crisi*, in M. BOMBARDELLI (ed.), in *Prendersi cura dei beni comuni per uscire dalla crisi*, cit., p. 22.

advocated by Ostrom⁶⁵, within a legal framework that indicates the ways in which the various potential users must relate to common-pool resources and communicate with each other. Proximity to common-pool resources makes it possible to identify the most efficient and effective ways of using them.

What has been said must serve as a premise and a warning to develop a National Restoration Plan capable of respecting nature that a) requires the necessary coordination with water and biodiversity policies, b) is attentive to social profiles, with particular attention to participation), c) provides for the necessary economic funding; d) makes use of the expertise and work already developed by the main dam removal organisations.

It is at this point that the law must be able to identify the necessary steps for the development of a national plan that primarily clearly identifies all possible synergies with other relevant EU policies and laws, in relation to water policy, climate change and renewable energy, or in the context of agricultural, forestry, marine and fisheries policies⁶⁶. This will ensure that restoration measures are well coordinated and provide significant benefits not only for biodiversity, but also for other important EU policy areas and society as a whole. Ensuring such policy coherence is crucial to the success of the EU Nature Restoration Regulation, as many of the restoration actions cut across different policy areas and build on existing laws and strategies.

Secondly, it must be ensured that the preparation of the restoration plan is open, transparent and inclusive, and that the public, including all stakeholders, are provided with timely and effective information for all the reasons that have already been outlined in this discussion. Member States have two years, until 1 September 2026, to prepare and submit their draft Recovery Plan. This preliminary timeframe will allow them to carry out the necessary preparatory work to help identify the most urgent and feasible restoration

⁶⁵ See E. OSTROM, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge (UK), 1990.

On the topic of the debate between Hardin and Ostrom and for subsequent studies, in addition to the indispensable work just cited, see also G. HARDIN, *The tragedy of the commons*, in *Science*, 1968, p. 1243; D. FEENY-F. BERKES-B. J. MCCAY-J. M. ACHESON, *The Tragedy of the Commons: Twenty-Two Years Later*, in *Human Ecology*, Vol. 18, No. 1, 1990; FRISCHMANN ET AL., *Retrospectives: Tragedy of the Commons after 50 Years*, in *Journal of economic perspectives*, vol. 33, no. 4, fall 2019, pp. 211 ff.

⁶⁶ E. PICOZZA, *La necessità della ricomposizione di saperi per affrontare la crisi ambientale*, cit., 16. Environmental law is the best demonstration that we need to go beyond those boundaries, those fences, that marginalise the discipline.

measures to be implemented by 2032, and to develop a strategic overview of the additional measures that will be needed to achieve all the restoration goals, by 2050 at the latest. This preparatory work will include, among other things, the mapping of all areas that are in poor condition, the identification of areas to be considered for restoration and the restoration measures needed, as well as a timetable for their implementation and estimated financial needs. To ensure the effectiveness of restoration, the regulation requires Member States to involve all stakeholders, including local communities, environmental organisations, farmers and water managers, in a transparent and participatory process. This approach aims to reduce the risk of social and political opposition and to maximise the benefits of removing artificial barriers, including improved water quality, reduced flood risk and increased biodiversity. Above all, it allows us to build on the expertise already developed.

The WWF, through its *Rivers2Restore* initiative, has already identified eleven priority projects in Europe aimed at restoring some 2,200 km of rivers, thus contributing to the goal of the European Biodiversity Strategy. As an example in Italy, the project on the Adige River includes the removal of more than 38 km of side barriers, the demolition of a dam in Parcines and the removal of a further 43 small dams. Such projects should be included in the National Restoration Plan, facilitating authorisation procedures and securing the necessary funding. The expertise developed by Open Rivers, which offers grants to support interventions aimed at the removal of small dams and the restoration of river flow, and the Dam Removal Europe initiatives should be adequately developed. These initiatives and programmes offer significant opportunities to obtain funding for dam removal projects in Europe, contributing to the restoration of river ecosystems and the improvement of biodiversity.

Thirdly, the various EU funding programmes, national budgets and funding initiatives and private investments need to be identified. As far as EU funding is concerned, there is already a wide range of possible funding sources within the current Multiannual Financial Framework (2021-2027), such as the Common Agricultural Policy (CAP), the European Maritime, Fisheries and Aquaculture Fund (EMFF), the European Regional Development Fund (ERDF), the Cohesion Fund, Horizon Europe or the LIFE programme.

Last but not least, it is necessary to avoid the mistakes of the past by overcoming the critical issues related to the removal of the dams concerning different regulatory, technical, economic and social profiles.

ABSTRACT

Carmela Leone, Foivos Alexandros Mouchlianitis - *Restoring River Connectivity in EU: Regulatory Framework, Obligations and Key Elements for Successful Implementation*

The study analyses measures for the restoration of European rivers, with a focus on the removal of artificial barriers and the restoration of ecosystems. It examines the regulatory framework, the role of public participation and the importance of territorial consensus. Through case studies, it highlights legal, social and economic challenges, underlining the need for an integrated approach between environmental policies, local communities and funding instruments for effective implementation.

KEYWORDS: *River Connectivity; Barrier Removal; Water Governance; Public Participation; Ecosystem Restoration.*

Carmela Leone, Foivos Alexandros Mouchlianitis - *Ripristinare la connettività fluviale nell'Unione europea: quadro normativo, obblighi ed elementi chiave per un'attuazione di successo*

Lo studio analizza le misure per il ripristino dei fiumi europei, con particolare attenzione alla rimozione delle barriere artificiali e al ripristino degli ecosistemi. Esamina il quadro normativo, il ruolo della partecipazione pubblica e l'importanza del consenso territoriale. Attraverso casi di studio, evidenzia le sfide legali, sociali ed economiche, sottolineando la necessità di un approccio integrato tra politiche ambientali, comunità locali e strumenti di finanziamento per un'attuazione efficace.

PAROLE-CHIAVE: *Connettività fluviale; Rimozione delle barriere; Governance delle acque; Partecipazione; Ripristino degli ecosistemi.*