

# Does ownership to water still matter? A peek into European models of groundwater resources ownership and some of their implications for public access to water and sustainable use

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Gunnhild Storbekkrønning Solli<sup>1</sup>

Abstract:

In this time of public administration and regulation of groundwater resources – does ownership still matter for public access to water and sustainable use?

During the last decades, several European national legislations changed groundwater ownership models from private to publicly controlled ownership models. The study shows that private ownership of groundwater rights is more common in the northern parts of Europe whilst in the middle and the southern parts, state ownership or ownership by the citizens is more widely used. All ownership models have imperfections regarding public access and protection of groundwater, and achieving these aims will require some sort of societal control beyond what an ownership model alone can offer. The paper demonstrates, especially through examples from Nordic legislation, that public access and control of groundwater can be exercised in countries with private ownership of the resource.

## 1. Introduction

The UN World Water Development Report from 2015 states that “*water is at the core of sustainable development. Water resources, and the range of services they provide, underpin poverty reduction, economic growth and environmental sustainability*”<sup>2</sup>

There is growing concern worldwide about water scarcity and sustainable use. Globally, groundwater accounts for 95% of freshwater available.<sup>3</sup> In several countries, groundwater is the

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<sup>1</sup> Research Fellow, University of Oslo, [g.s.solli@jus.uio.no](mailto:g.s.solli@jus.uio.no). For comments and suggestions, I especially thank Joyeeta Gupta, Ole Kristian Fauchald, Endre Stavang, Erling Berge and Dean Lueck for their input on an earlier draft. All errors are of course mine. I worked on this manuscript during a stay in Copenhagen under the inspirational guidance of Anita Rønne. She passed away before publication. Her insights and enthusiasm will be sorely missed.

<sup>2</sup> Access to water is goal number 6 in the UN Sustainability goals. Water is also an important aspect of several of the other goals, for instance zero hunger and ensuring sustainable consumption and production patterns.

<sup>3</sup> Groundwater is water found underground in the cracks and spaces in soil, sand and rock located in the saturation zone below the water table.

main source of drinking water.<sup>4</sup> Since the 1970s, the attention to groundwater has increased due to overexploitation or degradation of the surface water.<sup>5</sup> Even though we all need fresh water and access to water is regarded as a human right,<sup>6</sup> we do not all own the property right to this resource. Different approaches to water rights and regulation of water have evolved in national law. Some cultures understand water as a communal asset to be used for the benefit of the people<sup>7</sup> whilst other cultures regard water as a private right for the landowner to enjoy. In Europe, five different models of ownership have evolved in national law and some even exist within the same jurisdiction: Public ownership, private ownership, *res nullius/res communis*, common ownership and a hybrid ownership model. During the 1990s, several European countries drafted new legislation that either established new ownership models or confirmed existing ones. For instance, Italy established groundwater as a public domain in 1994 whilst Norway in 2000 concluded that groundwater was private property for the landowner. At the same time, national law regulates most natural resources and thereby imposes restrictions on property rights.

This study will briefly look into the following questions: How do the examples from Italy and Norway fit with the development of ownership to groundwater in other countries in Europe? The different ownership models have substantially different starting points, but what for public access to water and sustainable management of the groundwater might result from a model of private ownership versus one of public ownership?<sup>8</sup> In this time of public administration and regulation of groundwater resources – does ownership still matter?

## 2. On evolution of the ownership to water resources

As an introduction to the different ownership models, some brief comments will be made on the evolution of national water law.<sup>9</sup> Why private property and other ownership models exist today, must be understood on a contextual and historical background. To a certain extent hydrological

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<sup>4</sup> Information from Norwegian Geological Survey (NGU) at <http://www.grunnvanninorge.no/grunnvann.php>

<sup>5</sup> William Blomquist and Helen Ingram, "Boundaries Seen and Unseen: Resolving Transboundary Groundwater Problems," *Water International* 28, no. 2 (2003).

<sup>6</sup> Access to water is considered a human right in; inter alia, the UN General Assembly Resolution 64/292, the Human Right to Water and Sanitation.

<sup>7</sup> For instance, Muslim jurists consider water to be beyond ownership in Islamic law, see Thomas Naff, "Islamic Law and the Politics of Water," in *The Evolution of the Law and Politics of Water*, ed. Joseph W. Dellapenna and Joyeeta Gupta (Dordrecht: Springer Netherlands, 2009), 441..

<sup>8</sup> Social need for water and ecological preservation of the resource are prioritized factors for use of water, see for instance UN Watercourses convention Article 6. This convention only applies to groundwater to the extent that an aquifer is connected hydrologically to a system of surface waters, parts of which are situated in different states (Art. 2(a) (b)).

<sup>9</sup> For a more comprehensive introduction to the history of water law, see for instance Joseph W. Dellapenna, Joyeeta Gupta, and SpringerLink (Online service), *The Evolution of the Law and Politics of Water* (Dordrecht: Springer Netherlands, 2009).

conditions such as scarcity or excess of water surely must have been of importance in framing regulation. In addition, national water law regimes have evolved under the influence of such diverse forces as religions, conquests, political ideologies, international codifications, epistemic communities and globalization.<sup>10</sup> For instance, Roman law or Islamic law may influence legal cultures today – both developing principles built on the concept that because of the importance of the resource, a single individual cannot own water.<sup>11</sup> Shifts on a political level also play a role in the prevalent ownership models as for example in Russia during the Russian revolution and after the Soviet period. Until the Russian revolution in 1917, water law presupposed that water was an object of private ownership. During the Soviet period, most natural resources – water included – were the exclusive property of the state and the state held a monopoly over the use of natural resources. In the post-Soviet period after the reforms in the 1990s, water resources in Russia again became subject to private property rights.<sup>12</sup>

When assessing the influence of water history on different jurisdictions today, it is important to keep in mind the difference between the history of surface water and groundwater. For centuries, groundwater was a hidden resource and its role in the hydrological water cycle was unknown until the late 17th Century.<sup>13</sup> The legal Roman doctrines *res extra commercium* and *res communis omnium*, both holding that certain things cannot be the object of rights, never applied to groundwater as they did to surface water. Both in the Civil Code system and the Common Law tradition, groundwater regulations greatly depended on the regulations of the overlying land. Therefore, most European legislations originally prescribed private ownership to groundwater rights regardless of the civil law/common law connotation.<sup>14</sup> Even today, regulations on groundwater and surface water differ in both national and international law. However, the reasons for this legal distinction can be questioned. International lawyers argue that the surface legislation also should apply to groundwater, with some additions specific to the characteristics of the resource.<sup>15</sup> The UN International Law Commission (ILC) made the Draft Articles on the Law of the Transboundary Aquifers based on this reasoning.<sup>16</sup>

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<sup>10</sup> Joyeeta Gupta and Joseph W. Dellapenna, "The Challenges for the Twenty-First Century: A Critical Approach " in *The Evolution of the Law and Politics of Water*, ed. Joyeeta Gupta and Joseph W. Dellapenna (Dordrecht: Springer, 2009); Joseph Dellapenna and Joyeeta Gupta, "Toward Global Law on Water," *Global Governance: A Review of Multilateralism and International Organizations* 14, no. 4 (2008).

<sup>11</sup> In Roman law, water could also be the property of the state or of private individuals.

<sup>12</sup> Vladimir Kotov, "Russia: Historical Dimensions of Water Management," in *The Evolution of the Law and Politics of Water*, ed. Joyeeta Gupta and Joseph W. Dellapenna ([Dordrecht]: Springer, 2009). Today, groundwater is owned by the state - see; OECD, "Economic Instruments for Water Resources Management in the Russian Federation," (2013).

<sup>13</sup> See for instance T. N. Narasimhan, "Groundwater: From Mystery to Management," *Environmental Research Letters* 4, no. 3 (2009).

<sup>14</sup> S Burchi and M Nanni, "How Groundwater Ownership and Rights Influence Groundwater Intensive Use Management," *Intensive use of groundwater: Challenges and opportunities* (2003): 228.

<sup>15</sup> Dante Augusto Caponera and Marcella Nanni, *Principles of Water Law and Administration*, 2nd ed. ed. (The Netherlands Boca Raton, Fla.: Taylor & Francis, 2007), 260.

<sup>16</sup> Dellapenna and Gupta, "Toward Global Law on Water," 447. An aquifer is an underground rock layer containing water that can be extracted.

### 3. Ownership models and use of the term ‘water rights’

This section explores the existing models of ownership to groundwater rights in Europe today.

First, the term *water rights* must be clarified. Water rights are normally understood as the legal right to abstract and use groundwater. In most countries, the water itself is not a subject of ownership unless it is captured in for instance a bottle. Therefore, water rights entail a usage right to the present water at any time within the owner’s domain rather than an outright ownership to the water.<sup>17</sup> In the scope of this article, *public access* refers to the opportunity for the community at large to utilize the groundwater. *Sustainable use* refers to a use that meets the need of the present without compromising the ability of future generations to meet their own needs.<sup>18</sup>

Based on a literature study, I have identified five types of ownership models of groundwater ownership models in 39 European legislations today (see land information and sources in annex 1).

**Table 1: Different models of ownership in groundwater rights in Europe today**

Type of ownership	Meaning	Examples (references to sources in annex 1)
<b>Public ownership</b>	Groundwater owned by federal, state, regional or local government.	Italy, Spain, Hungary, Switzerland, Slovenia
<b>Private ownership</b>	Individuals or legal entities own the water resources.	Norway, Sweden, Finland, Iceland, Latvia, Belgium, Malta, Portugal, Ireland, United Kingdom, Austria
<b>Res nullius/res communis</b>	Neither the state (public), a specific group nor individuals can own the groundwater and the resource is used for the benefit of the people.	Netherlands, Luxembourg, Czech Republic, Croatia, Bosnia-Herzegovina
<b>Common ownership</b>	A group or a community owns a water resource together and develop a system	This ownership model coexists with other models in Europe today. A rather famous example

<sup>17</sup> Right to the groundwater can be linked to the ownership of the land but not necessarily. If linked to the land, there are many resemblance with the relationship between land and wildlife as described in Dean Lueck, "The Comparative Institutions Approach to Wildlife Governance," (Presented in a seminar at the University of Oslo 22.06.2018).

<sup>18</sup> Gro Harlem Brundtland, *Our Common Future* (Oxford: Oxford University Press, 1987), 21.

	for management. No single member is specially privileged.	of a common property water system is the irrigation system in Valencia, Spain. <sup>19</sup>
<b>Hybrid</b>	Mixed elements of public and private ownership created by legislation, e.g. concession is required to obtain a right to abstract water.	Most European countries authorize extraction of water through governmental concession or other licensing regimes – e.g., Norway, Sweden, Denmark, and Germany. <sup>20</sup>

Different ownership models may exist within one jurisdiction. To give an example, the Norwegian Water Resources Act establishes private property as the main model but two other models are also regulated by the same act: a statutory common ownership model where all surface landowners share the same groundwater body under their land and a hybrid model based on concessions from the public authority to utilize the groundwater.<sup>21</sup> Hybrid ownership may be established through a concession regardless of whether the owner is a private entity, the state or a common ownership. Further, the category private ownership does not exclude the possibility that the state can own groundwater resources the same way that private persons or entities do, like in Portugal where both landowners and the state can own groundwater as part of the land. Ownership models can be complex and therefore the categorization of property models is to a large extent based in either the work of national academics or reports from international organizations. It is clear that correct categorization can be debated, for instance for the model of France.<sup>22</sup>

Some of the labels set on the different property models used in Table 1 need further explanation.

*Common ownership* can refer both to open access (meaning no exclusion of users) and restricted access to a group (meaning exclusion only of users outside the group). This paper is based on the last approach – which implies that common ownership refers to collective property rights for a specific group.

*Res nullius and res communis* are both property models derived from Roman law. The meaning of *res nullius* in Roman law was that a thing had no owner and could be occupied by everyone. *Res communis* meant that certain resources were common to humankind like the air, running

<sup>19</sup> The irrigation system is based on surface waters but also use groundwater and grey water. Guillermo Palau-Salvador Mar Ortega-Reig, Maria Josep Cascant i Sempere, Javier Benitez-Buelga, David Badiella, Paul Trawick "The Integrated Use of Surface, Ground and Recycled Waste Water in Adapting to Drought in the Traditional Irrigation System of Valencia," *Agricultural Water Management* 133 (2014).

<sup>20</sup> Gerd Winter, "Property and Environmental Protection. An Overview," in *Environmental and Property Protection in Europe* (Groningen: Europa Law Publishing, 2016).

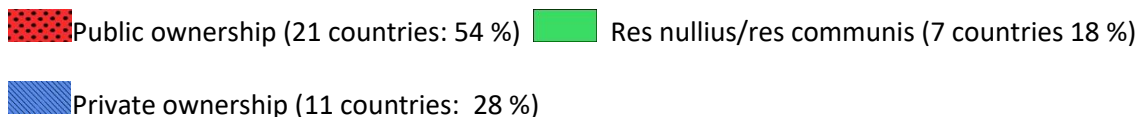
<sup>21</sup> Article 44 in Act No 82 of 24 November 2000 relating to river systems and groundwater (Water resources Act) <http://app.uio.no/ub/ujur/oversatte-lover/data/lov-20001124-082-eng.pdf>

<sup>22</sup> French legislation is further commented on page 7.

water, the sea, and the shores of the sea. Applying property models from Roman law like *res communis* and *res nullius* to modern legal systems may be a treacherous journey to undertake. Neither of these categories fits perfectly on the existing groundwater models today because national legislation regulates groundwater. *Res nullius* does not fit because private individuals cannot occupy groundwater as they would need to in order to fit the category in its original form. *Res communis* does not fit because groundwater today is restricted in use by public authority. Today, both terms describe a model where groundwater is considered to belong to the citizens, restricted in use by public authority, protected by the law and not permitted to be the subject of occupation. Some authors categorize this construct as *res nullius* because no one owns the resource,<sup>23</sup> others as *res communis* because it is considered to belong to the citizens.<sup>24</sup> Both categories exist in European national law today. For the scope of this article, I discuss these two categories together because their content is so similar in practice.

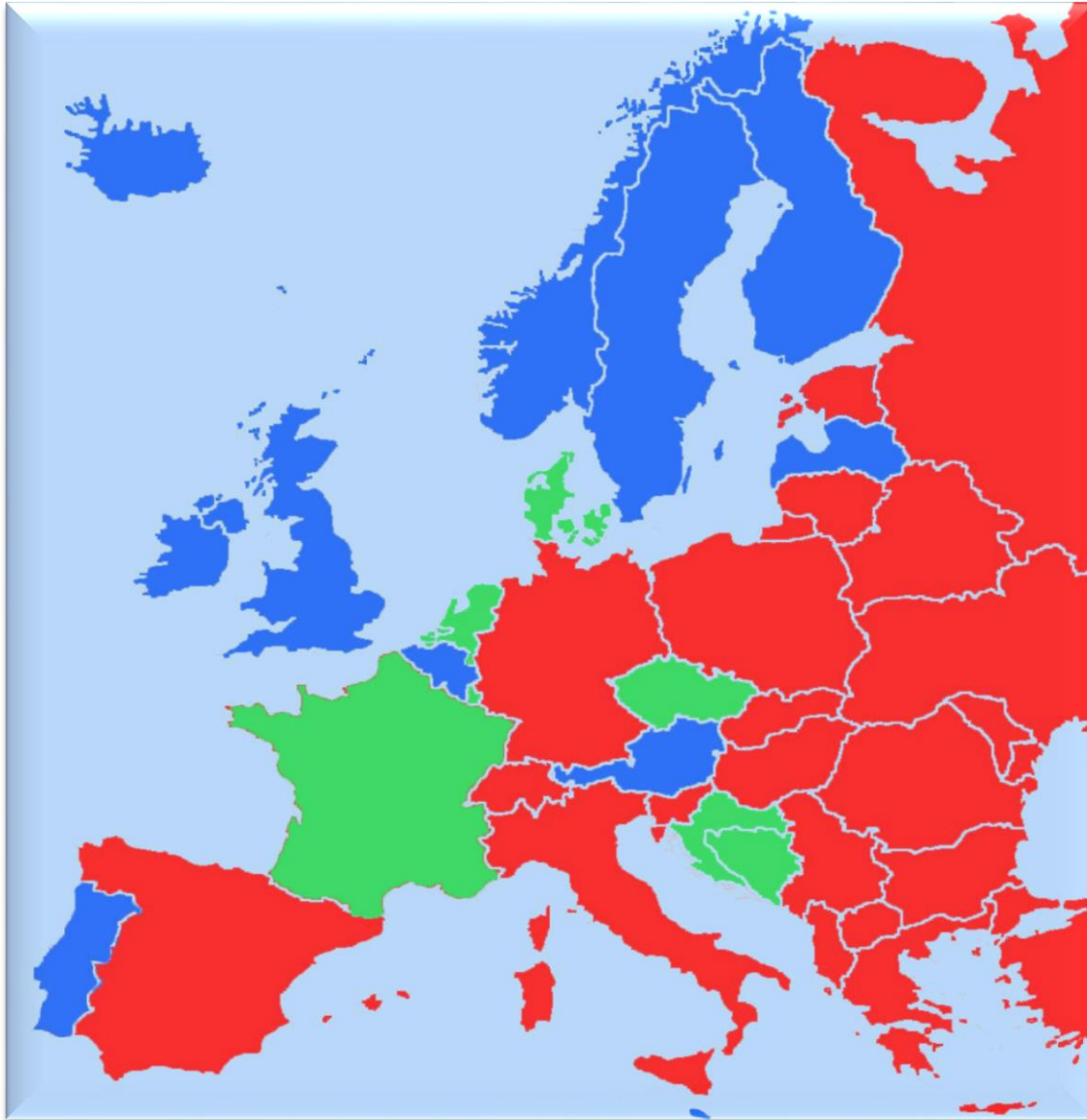
Based on the literature study referred to in Annex 1, I have “colored” Europe blue, red and green. Each color represents one of the three main ownership models of private ownership, public ownership or *res nullius/res communis* (see Figure 1).

**Figure 1: Map illustrating main ownership models in Europe (sources can be found in annex 1)**



<sup>23</sup> Like Kuks defines ownership model in Netherlands as *Res Nullius*, see Stefan Kuks, "The Evolution of the National Water Regime in the Netherlands," in *The Evolution of National Water Regimes in Europe : Transitions in Water Rights and Water Policies*, ed. Stefan Kuks (Dordrecht: Kluwer Academic, 2004)..

<sup>24</sup> Pagh defines the Danish model in Peter Pagh, *Omsætning Og Regulering Af Fast Ejendom* (Karnov Group, 2009). p. 18.



According to a report from the FAO from 1964, the only European countries with public ownership of groundwater were Israel, Yugoslavia, Romania and Turkey.<sup>25</sup> This survey supports findings that there has been a shift in Europe since 1964 in favor of more public ownership and publicly controlled models of *res nullius/res communis*.<sup>26</sup>

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<sup>25</sup> FAO, "Groundwater Legislation in Europe " FAO. Legislative series (no. 5) (1964 ).

<sup>26</sup> A shift from private ownership rights to public control has been pointed out by several authors, including Burchi and Nanni, "How Groundwater Ownership and Rights Influence Groundwater Intensive Use Management." and A. N. Charalambous, "Groundwater and the Law," *Quarterly Journal of Engineering Geology and Hydrogeology* 44, no. 2 (2011)..

Further, the map illustrates a finding of a significantly *different approach* to groundwater rights in southern/eastern parts of Europe in contrast to northern countries. Most northern European countries prescribe private ownership models whilst middle and southern European countries favor public ownership or *res nullius/res communis*<sup>27</sup> To give an example, Italy and France carried out reforms in 1992 and 1994 to increase public control and ownership whilst Norway in 2000 and Iceland in 1998 passed laws concluding that groundwater was private property. Even though these regulations are from approximately the same period, from the same continent and regulating the same resource, they still differ fundamentally when it comes to ownership models.

In France, groundwater was declared subject to common national heritage by law on January 3, 1992, but formally, ownership was not transferred from private to public.<sup>28</sup> According to the Civil Code Article 552, the groundwater is still associated with the owner of the ground on the surface, but its utilization is subject to public permission and the water is generally considered public.<sup>29</sup> The legislature declared water as a national heritage to be better able to protect the resource – both the quality and quantity.<sup>30</sup>

In Germany, public ownership of groundwater follows the jurisprudence of the constitutional court, as in the so-called Groundwater Case 58 BVerfGE 300 (1981). The court ruled that private property rights did not include the groundwater because groundwater is public in its nature – not private. The reason was that water is one of the most important resources that people, animals and plants depend on to survive, and that it is important to protect water from use that could harm the resource.<sup>31</sup> Therefore, introducing licensing rules for the use of groundwater under landowners' property was not in breach of the constitutionally protected property right.

In Italy, an act from 1994 declared that the water must be protected for future generations and used in a sustainable way, and that this principle requires all water to be public property – including groundwater.<sup>32</sup> Essential to the law was the prerequisite that public ownership must be managed and protected so that it benefits the people.

In Spain, all water resources, including groundwater, became public by law in 1985, and the

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<sup>27</sup> Except Portugal and Malta – in which both countries groundwater is privately owned.

<sup>28</sup> I. Sangaré and C. Larrue, "The Evolution of the Water Regime in France," in *The Evolution of National Water Regimes in Europe : Transitions in Water Rights and Water Policies*, ed. Ingrid Kissling-Näf and Stefan Kuks (Kluwer, 2004), 230.

<sup>29</sup> *Ibid.*, 203.

<sup>30</sup> *Ibid.*, 230.

<sup>31</sup> Gregory S. Alexander, "Property as a Fundamental Constitutional Right? The German Example," *Cornell Law Review* 88, no. 3 (2003): 754-58.

<sup>32</sup> Nicola Lugaresi Alessandra Goria, "The Evolution of the Water Regime in Italy," in *The Evolution of National Water Regimes in Europe*, ed. Ingrid Kissling-Näf and Stefan Kuks (2004), 282.



reason for the change was that the water was considered to be of a public nature. The law sought to balance private and public interests by allowing former owners of groundwater long-term usage rights for the extraction of groundwater within their property.<sup>33</sup>

In Norway, many of the existing regulations on *surface water* in the Norwegian Water Resource Act<sup>34</sup> are based on ancient laws dating back from the Viking era. These historic provisions prescribed water rights to the landowner and were mainly intended to regulate fishing and transportation on water. However, the right to *groundwater* was not regulated in Norway before the Water Resource Act of 2000. At that time, both the government and the national assembly concluded that groundwater did not belong to anyone, leaving the legislature leeway to allocate the rights without interfering with established rights. The expert group drafting the new Act on Water Resources suggested public ownership of the groundwater but the legislature did not follow this advice. The act states that groundwater is held by the owner of the overlying land – a regulation much influenced by the ancient regulation on surface water regulating a different use of the water.

The different approaches to groundwater ownership can be partly understood as a manifestation of dissimilar legal traditions – Nordic legal systems are usually recognized as a separate legal family distinct from both civil law and common law systems.<sup>35</sup> In France and Italy, the importance of public control and an ideological approach legitimated public ownership. Perhaps also some explanation can be found in the difference of total available freshwater resources per inhabitant (see Figure 2).

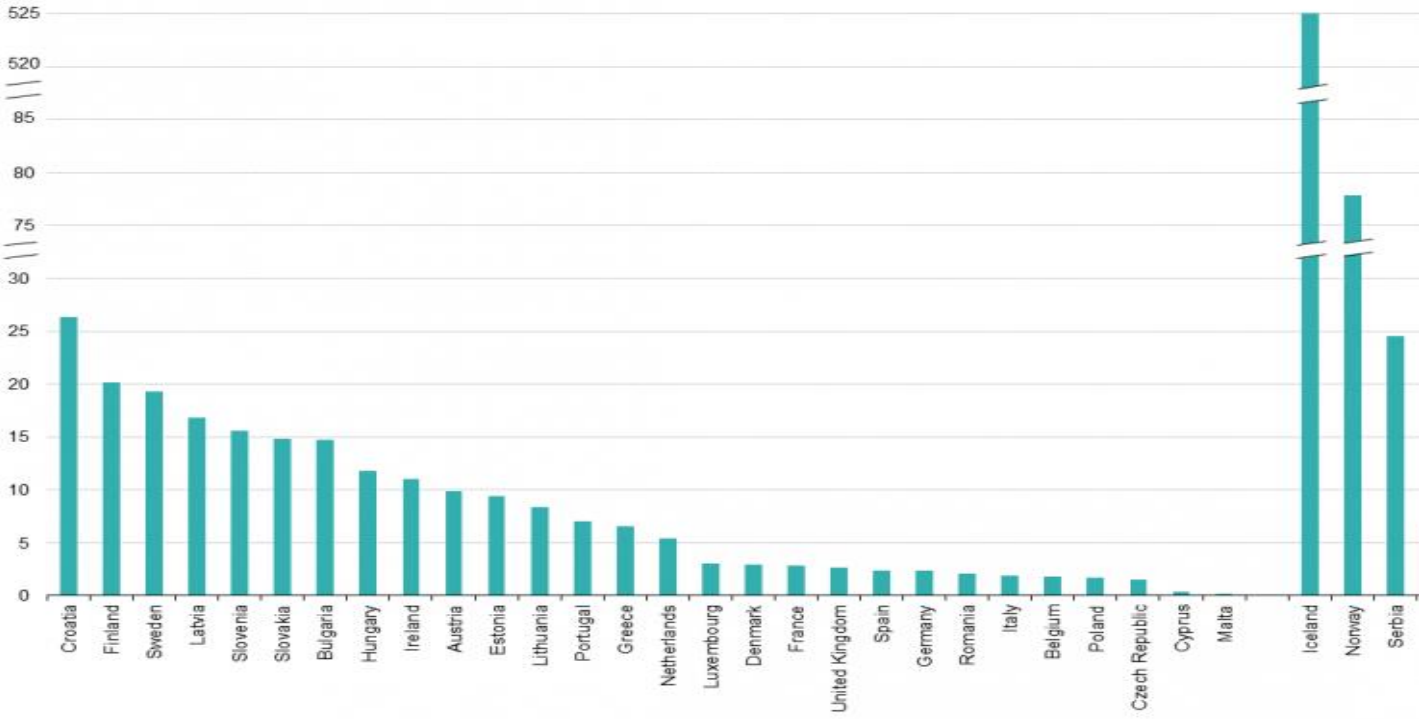
**Figure 2 from Eurostat:** Freshwater resources per inhabitant — long-term average (1) (1 000 m<sup>3</sup> per inhabitant) for 2017

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<sup>33</sup> Nuria Font Meritxell Costejà, Anna Rigol, Joan Subirats, "The Evolution of the Water Regime in Spain," in *The Evolution of National Water Regimes in Europe : Transitions in Water Rights and Water Policies*, ed. Ingrid Kissling-Näf and Stefan Kuks (Dordrecht: Kluwer Academic, 2004), 245-47.

<sup>34</sup> Article 44 in Act No 82 of 24 November 2000 relating to river systems and groundwater (Water Resources Act).

<sup>35</sup> Anita Rønne, "Public and Private Rights to Natural Resources and Differences in Their Protection?" in *Property and the Law in Energy and Natural Resources*, ed. Aileen McHarg (Oxford University Press, 2010), 61.



Note: The minimum period taken into account for the calculation of long term annual averages is 20 years.  
 Source: Eurostat (online data code: env\_wat\_res)

According to Eurostat, freshwater resources per inhabitant is an important indicator for measuring the sustainability of water resources.<sup>36</sup> Comparing the available freshwater resources and ownership models, my taking is that there is a tendency towards private ownership for countries with the richest freshwater resources. The countries with the least freshwater resources mostly prescribe public ownership. This is not entirely true because a country like Malta has a private ownership model even though the country has minimal freshwater resources. These statistics underline the relevance also today of Benjamin Franklin’s words two centuries ago: *‘When the well runs dry, we shall know the value of water.’*<sup>37</sup>

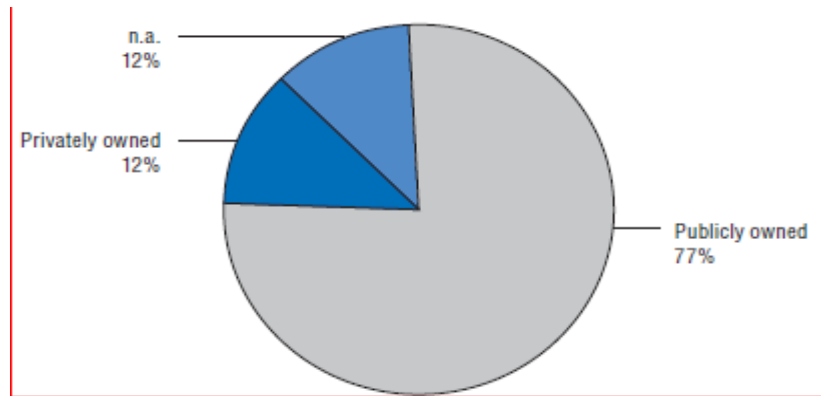
The results from the study of European ownership models can be compared with results from a worldwide OECD study “Water Resources Allocation - Sharing Risks and Opportunities”(see figure 3).<sup>38</sup>

**Figure 3:** Global ownership of groundwater resources from the OECD study “Water Resources Allocation – Sharing Risks and Opportunities” page 63 (“n.a.” under is an abbreviation for res nullius)

<sup>36</sup> Freshwater resources per inhabitant (see Figure 2) is an important indicator for measuring the sustainability of water resources.

<sup>37</sup> <http://www.goodreads.com/quotes/812714-when-the-well-is-dry-we-know-the-value-of>

<sup>38</sup> <http://www.oecd.org/env/water-resources-allocation-9789264229631-en.htm>



The OECD study based itself on reports from 27 countries from all over the world. Only 12 of these were European countries. The OECD study indicates a higher number of public ownership models globally (77%) than in Europe (54%). Europe has a higher number of private ownership models.

The OECD study identified the models of *res nullius*, common, private and public ownership.<sup>39</sup> In addition to these models, I think it is essential to take into account the significance of the hybrid model. All European legislation seems to require concession or license for groundwater usage even if the groundwater is owned by private entities. Thereby it also opens up the possibility *hybrid ownership* by granting usage rights through the concession act or agreement. Therefore, the hybrid model coexists with the main ownership model. For instance, the Norwegian Water Resource Act prescribes both private ownership and co-ownership to groundwater. Consequently, none of the national regimes prescribes either entirely private or public ownership of groundwater.<sup>40</sup>

#### 4. Some general implications of the different ownership models

This section looks into some of the general implications of different models of ownership. In doing so, it is important to keep in mind that ownership is only a piece of the puzzle that constitutes the institutions governing public access to water.<sup>41</sup> Most European states have also legislated restrictions on the use of natural resources.<sup>42</sup> In order to understand the implications of

<sup>39</sup> OECD., *Water Resources Allocation- Sharing Risks and Opportunities* (OECD Publishing, 2015), 42.

<sup>40</sup> Elinor Ostrom and Daniel H. Cole, "The Variety of Property Systems and Rights in Natural Resources," in *Elinor Ostrom and the Bloomington School of Political Economy*, ed. Michael D. McGinnis and Daniel H. Cole (London Lexington Books, 2015).

<sup>41</sup> Institutions are the framework within which human interactions take place – analogous to the rules of the game in a sport, see Douglass C. North, *Institutions, Institutional Change and Economic Performance*, The Political Economy of Institutions and Decisions (Cambridge: Cambridge University Press, 1990), 4.

<sup>42</sup> Winter, "Property and Environmental Protection. An Overview."

ownership, one must study the whole picture puzzled together of both ownership and other regulations concerning use and control of the resource.

The natural characteristics of groundwater are also important to take into account when assessing the implications of the different models. Michael Hanemann describes water as an economic good with the following characteristics: Mobility of water makes it costly to track and impractical to exclude other individuals' water property rights, the water flow varies, water is costly to transport and it is capital-intensive to establish necessary infrastructure, water is underpriced, water is essential to all and water can be used in many ways creating different benefits to its users.<sup>43</sup> In addition to these characteristics that apply to water in general, groundwater is a hidden resource and often interlinked with other water resources. Some aquifers do not constitute a part of the hydrological circle, as they do not recharge.<sup>44</sup> In general, it is difficult to establish the groundwater body and to monitor effects of water use.

Property in a broad sense is as an institution governing the use of things. One main feature of property is excludability – the holder's authority to exclude other persons from the thing.<sup>45</sup> Other typical characteristics are the right to use, manage and trade the resource. From these features of ownership alone, one can conclude that ownership does matter for access to water because only the owner is entitled – within the limits of the law – to enjoy the fruits of his rights and protect his rights through the judiciary system. Economists argue that when a resource has no owner, nobody has a strong incentive to protect it from overexploitation or quality degradation.<sup>46</sup> Ronald Coase is of the opinion that a private-enterprise system cannot function properly unless property rights are created in resources.<sup>47</sup> Another argument for the concept of property is that environmental assets lack a value in the market and that a value can be best expressed through property rights.<sup>48</sup>

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<sup>43</sup> W. Michael Hanemann, *The Economic Conception of Water* (2005).. Also referred to in OECD (2015) page 39.

<sup>44</sup> Gabriel Eckstein and Yoram Eckstein, "Hydrogeological Approach to Transboundary Ground Water Resources and International Law, A," *Am. U. Int'l L. Rev.* 19 (2003): 233.

<sup>45</sup> Harold Demsetz, "Toward a Theory of Property Rights," *The American Economic Review* 57, no. 2 (1967): 347; Richard Barnes, *Property Rights and Natural Resources*, vol. vol. 22, Studies in International Law (Oxford: Hart, 2009), 22-24.

<sup>46</sup> For instance pollution of a lake because it is not clear who has the rights to use the lake Barry C. Field and Martha K. Field, *Environmental Economics : An Introduction*, 6th ed. ed., The McGraw-Hill Series Economics (New York: McGraw-Hill/Irwin, 2013), 195.

<sup>47</sup>R. H. Coase, "The Federal Communications Commission," *Journal of Law and Economics* 56, no. 4 (2013): 891. Coase argued that in a regime of zero transaction costs negotiations between the parties would lead to allocation of property rights that would maximize wealth and this irrespective of the initial assignment of rights (The Coase Theorem), Ronald H Coase, "The Problem of Social Cost," in *Classic Papers in Natural Resource Economics* (Springer, 1960). Lueck is of the opinion that this contractual approach to property rights is limited because the assets like groundwater are complex and physically connected, Dean Lueck, "Property Institutions and the Limits of Coase," *Journal of Institutional Economics* 13, no. 4 (2017).

<sup>48</sup>Lee Godden, "Governing Common Resources: Environmental Markets and Property in Water," in *Property and the Law in Energy and Natural Resources*, ed. Barry Barton Aileen McHarg, Adrian Bradbrook and Lee Godden (Oxford University Press, 2010), 424.

To assess the implication of an ownership model, a starting point must be established for an ideal or beneficial property model to assess its benefits and disadvantages. For the purpose of this study, an ideal property system would naturally provide incentives to realize access to public water and sustainability without any need for governmental intervention through for instance regulation or taxation.

In the following, I will present some of the advantages and disadvantages of the existing models of groundwater ownership in Europe today based on general knowledge on groundwater and on general literature especially on effects of ownership.<sup>49</sup>

We can assume that ownership of groundwater rights empowers the owner to control this resource and control third parties' access. Thus, the public access to groundwater in a private property model is subject to the good will (or bad) of the private owner acting out of his or her self-interest. Groundwater is an economic good that can be of important value to the owner. Proponents of private property argue this allows efficient use of the resource and the best allocation if the rights are tradable without restrictions. Private property is for instance a tool to obtain environmental protection in the climate convention,<sup>50</sup> where states can trade emission caps. Hence, adoption of property rights and creating a market for CO2 emissions can prevent environmental damage by encouraging emission reductions.<sup>51</sup> A market-based allocation of tradable rights stimulates efficient use by the highest-value user and thereby internalizes the cost of environmental externalities.

An issue is control of the resource: Groundwater is a "shared resource" if a groundwater body crosses borders under several landowners' land – the groundwater body does not necessarily follow the boundaries of the above-land ownership. Some authors reason that private ownership in general leads to efficient control of the resource.<sup>52</sup> In my view, this argument does not fit as well with groundwater because in many cases, such as in Norway, it is difficult to establish accurate information about the resource and the extension of the rights of each owner. As a result, monitoring and managing can be costly. Many argue that private owners would be tempted to exploit the resource to the fullest – consequently private ownership might lead to overexploitation

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<sup>49</sup>Daniel H Cole et al., "The Variety of Property Systems and Rights in Natural Resources," (2010); Field and Field, *Environmental Economics : An Introduction*; Erling Eide and Endre Stavang, *Rettsøkonomi* (Oslo: Cappelen akademisk forl., 2008); Daniel H. Cole, *Pollution and Property : Comparing Ownership Institutions for Environmental Protection* (Cambridge: Cambridge University Press, 2002); Godden, "Governing Common Resources: Environmental Markets and Property in Water."; Harold Demsetz, "Toward a Theory of Property Rights Ii: The Competition between Private and Collective Ownership.(the Evolution of Property Rights: A Conference Sponsored by the Searle Fund and Northwestern University School of Law)," *Journal of Legal Studies* 31, no. 2 (2002); Burchi and Nanni, "How Groundwater Ownership and Rights Influence Groundwater Intensive Use Management."; Ostrom and Cole, "The Variety of Property Systems and Rights in Natural Resources."

<sup>50</sup> The Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC) adopted on May 9, 1992.

<sup>51</sup> Godden, "Governing Common Resources: Environmental Markets and Property in Water," 413, 16.

<sup>52</sup> Harold Demsetz, "Toward a Theory of Property Rights Ii: The Competition between Private and Collective Ownership," *The Journal of Legal Studies* 31, no. S2 (2002).

and hinder sustainable use of the water.<sup>53</sup> Taken into account that access to water is a human right and an environmental protection in most European national law, private property will not be a satisfactory regulation alone without any incentives, restrictions or obligations to ensure the protection of these public interests.

It has been discussed to what extent privatization of water rights affects a country's control over the resource under international trade agreements such as the GATT Agreement.<sup>54</sup> For instance, if a country decides to accept trade of water,<sup>55</sup> legal experts disagree if the state will be able to impose restrictions on, for example, export of water abroad.<sup>56</sup> Trade in water was brought around by neoliberalism and development policies in the 1990s altering both the rights to and the regulation of water.<sup>57</sup> The Dublin Statement in Water and Sustainable Development (the Dublin Principles) from 1992 recognized water as an economic good and this led to privatization and commercialization of water rights in several countries.<sup>58</sup> In this light, Pierre Thielbürger discusses the effect privatization may have on people's access to water. He considers that tribunals may hesitate to give full effect to the human right to water. As a result, he advises states to take special care for the protection and promotion of the right to water of their people long before any disputes arise, namely during all phases of privatization.<sup>59</sup>

Garrett Hardin in "Tragedy of the Commons" raised the threat of overexploitation as a critique against resources without owners.<sup>60</sup> Groundwater under a res nullius/res communis model can be overexploited because individuals have no incentive to reduce the rate of use and to conserve it. Even though this model gives access to all initially without any special privileges to the resource, it might not be a sustainable model in the long term. When res nullius/res communis exists as the ownership model in European national water legislation today, strict legislation to ensure sustainability and monitoring by the state follows. Therefore, this model shares many of the same features as public ownership.

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<sup>53</sup> Godden, "Governing Common Resources: Environmental Markets and Property in Water," 434; Marcella Nanni, "Legislation as a Tool in Support of Adaptive Water Management in Response to Climate Change," *Water International* (2012).

<sup>54</sup> General Agreement on Tariffs and Trade 1994 (GATT) under the World Trade Organization (WTO).

<sup>55</sup> Trade in water rights has been introduced in only a few countries like Chile, Mexico, Australia, Armenia, England and Wales and western parts of USA, see Charalambous, "Groundwater and the Law," 156.

<sup>56</sup> See for instance literature referred in Robert Glennon, "Water Scarcity, Marketing, and Privatization," *Tex L. Rev.* 83 (2004). note 63 page 1889-1890

<sup>57</sup> Bronwen Morgan, *Water on Tap : Rights and Regulation in the Transnational Governance of Urban Water Services* (Cambridge: Cambridge University Press, 2011), 24-25.

<sup>58</sup> The Dublin Principles were adopted at the International Conference on Water and the Environment (ICWE) in Dublin, 26-31 January 1992. Karen Bakker, "The "Commons" Versus the "Commodity": Alter-Globalization, Anti-Privatization and the Human Right to Water in the Global South," *Antipode* 39, no. 3 (2007): 430-31.

<sup>59</sup> Pierre Thielbürger, "The Human Right to Water Versus Investor Rights: Double-Dilemma or Pseudo-Conflict?," in *Human Rights in International Investment Law and Arbitration*, ed. Ernst-Ulrich Petersmann Pierre-Marie Dupuy, and Francesco Francioni (Oxford University Press, 2009).

<sup>60</sup> Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (1968).

Common ownership may be a successful model for regulating shared natural resources.<sup>61</sup> The formal or informal organizations regulating the common property normally consist of a stable group of participants and common use of the resource gives valuable access for the members of the group. Costs and risks associated with production and management can be shared between them. However, this model is no guarantee for public access to groundwater and the question is if the model is suitable for groundwater ownership. Elinor Ostrom has pointed at seven features present in communities that enhance the performance of the common property rights system:<sup>62</sup> accurate information about the resource, a common understanding about potential benefits and risks, shared norms of reciprocity and trust among participants, a stable user group, participants who live and work in the area for a long time, collective choice rules used by participants, and the ability of participants to develop monitoring and sanctioning arrangements. These characteristics seem to suit a system developed by a culture/society over time.

In my taking, Ostrom's characteristics can be difficult to fit to groundwater for the following reasons: It is a hidden resource, not easy to define in body or production, not easily monitored, information is costly to gather (high transaction costs) and a particular group of users is not predefined or is difficult to establish as the groundwater body may extend across a large geographical area.<sup>63</sup> For instance, the Norwegian Act on Water Resources § 44 establishes statutory co-ownership for landowners sharing the same water body. This regulation is not effective, easily managed or even initiated from the co-owners themselves – in most cases they would not be able to define the water body/aquifer they share or even know that they share a common pool resource. Research by Ostrom and others concludes that successful common property management can be achieved also for groundwater.<sup>64</sup> William Blomquist and Helen Ingram describe the formation of institutions during a period of 70-80 years in Los Angeles, California, to resolve groundwater conflicts. The paper gives the impression that water use conflicts can be settled and information can be gained but it is a costly and time-consuming process to reach agreements among the participants.<sup>65</sup> Nevertheless, the status of California

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<sup>61</sup> For instance in Elinor Ostrom, "Tragedy of the Commons," *The New Palgrave Dictionary of Economics* (2008).

<sup>62</sup> Ostrom and Cole, "The Variety of Property Systems and Rights in Natural Resources," 146.

<sup>63</sup> Smith, Garrido and Livingston point at different features making common ownership management of groundwater challenging, see Z.A. Smith, "Groundwater Collective Management Systems: The United States Experience," in *Intensive Use of Groundwater: Challenges and Opportunities*, ed. Ramón Llamas and E. Custodio (Lisse: Balkema, 2003), 268; A. Garrido and M.L. Livingston, "Economic and Financial Perspectives on Intensive Groundwater Use," *ibid.*, 216.

<sup>64</sup> Ostrom studied how water producers in the West Coastal Basin of Southern California organized themselves to manage and protect their groundwater. She concluded that the system worked – even if it was not perfect, see Elinor Ostrom, "A Long Polycentric Journey," *Annual review of political science* 13 (2010): 6.. Also referred to in Alison Clarke, "How Property Works: The Complex World View.(the Life and Work of Elinor Ostrom)," *Nottingham Law Journal* 22 (2013): 145-46.

<sup>65</sup> Blomquist and Ingram, "Boundaries Seen and Unseen: Resolving Transboundary Groundwater Problems."

groundwater shows that water producers have over-pumped groundwater resources and thus contributed to the pending water crisis.<sup>66</sup>

In public ownership, the state or a regional or local body owns the groundwater resources. This model allows the government to manage and protect groundwater resources in the interest of the public. As Aoife Haney and Michael Pollitt see it, due to the cost of capital investments in infrastructure projects, public ownership can also be the only conceivable solution to fund significant capital investments with poor prospects of investment return. The European bank crisis underlined that the market cannot always deliver a sound and safe economic framework for investment projects.<sup>67</sup> An objection against public ownership is often that it may lead to ineffective use and free riding.<sup>68</sup> Further, public ownership and management does not necessarily reflect the potential or preferred use of the resource. It can also be a complicating factor if the owner of the surface is different from the owner of the groundwater if access to the groundwater only can take place through someone else's property or use may affect the property of others. On the other hand, this is often the case with respect to other resources such as oil and gas. Several state-owned groundwater resources, as for instance Russia and Switzerland, prescribe tariffs for use of the water. Groundwater extraction can be a source of income for the states involved.<sup>69</sup>

A rationale behind both private and common ownership can be the benefits for the owners involved. Public access to water and environmental considerations cause costs or externalities for the owners and giving public access may not be their preferred utilization of the groundwater. As public ownership is not based on individual benefits, this model might therefore better address external cost of the social distribution through water access and preserving the ecosystem for future generations. Because economic benefits for the users are not a requirement, public ownership may also allow non-effective use and cost of social distribution. A public ownership can be easier to adapt to shifting public needs in comparison with models like private ownership. Hence, one may argue that this model better provides public control.

Several scholars have pointed out tendencies in national legislation to separate the right to own and the right to use a resource.<sup>70</sup> This policy shift gives rise to the hybrid ownership model. In most cases, restrictions on use and governmental concessions for use aim at achieving sustainable development and ensuring public water access. The model can therefore provide efficient use in accordance with the policy of the public authority. The hybrid model raises two main objections:

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<sup>66</sup> <http://blogs.ei.columbia.edu/2015/08/03/the-growing-groundwater-crisis/> See also an analysis of stress of the 37 largest aquifers in the world in Alexandra S. Richey et al., "Quantifying Renewable Groundwater Stress with Grace," *Water Resources Research* 51, no. 7 (2015).

<sup>67</sup> Aoife Brophy Haney and Michael G. Pollitt, "New Models of Public Ownership in Energy," *International Review of Applied Economics* 27, no. 2 (2013): 177.

<sup>68</sup> Field and Field, *Environmental Economics : An Introduction*, 198-99.

<sup>69</sup> In case of Russia see OECD, "Economic Instruments for Water Resources Management in the Russian Federation," 37. and for reference to Switzerland see the Federal Constitution Article 76 (4)

<sup>70</sup> Caponera and Nanni, *Principles of Water Law and Administration*, 21; Philippe Cullet, *Water Law for the Twenty-First Century : National and International Aspects of Water Law Reform in India* (London: Routledge, 2010).



One is that the right of the owner of the groundwater can be in conflict with the right derived from the legislation or concession. Another reason is that concessions give rights to third parties – the concessionaires – and the concession system can lead to a less flexible management if concessions cannot be altered or suspended at lower water flow or by changing priorities.

It might be difficult to withdraw concessions if it leads to major deficits for the concessionaire due to the high investment costs to utilize the groundwater. In addition, some concessions can be tradable and lack explicit “land” connection<sup>71</sup> leading to a quite complex management system with many potential parties involved.

## 5. Examples from national groundwater legislation

In this section, private property models in Nordic countries exemplify how access and sustainability can be addressed through the national legislation.

As earlier referred to, the Norwegian Water Resources Act establishes a private, a common and a hybrid ownership model. Given that other rights holders of the underground, such as those who have rights to mineral resources and tunnels, may claim that groundwater extraction interferes with their rights, the scene is set for conflicts. Regarding access to the groundwater, the Norwegian legislation differs between usage without a concession requirement and usage that requires authorization by the public authorities through a concession. A landowner may extract, without a concession, groundwater for the household and domestic animals on the property. Concession is required if groundwater measures such as extraction of drinking water may result in a significant environmental damage or disturbance.

To compare with another form of ownership model, Denmark has a *res nullius/res communis* model<sup>72</sup> in combination with a hybrid ownership model requiring concessions for utilization of groundwater such as that found in the Water Supply Act.<sup>73</sup> As well in Denmark, the landowner is entitled to privileges to the groundwater and the legislation resembles the Norwegian rule on landowner usage. According to section 18 of the Danish Water Supply Act, the landowner whose property is located outside a natural supply area of a public water supply is justified to acquire groundwater on his/her own premises for household use. Smaller water acquisition that supplies up to four households with household water and water needed for farming (irrigation of agricultural crops excluded) can, according to section 20 (2) of the Act, only be refused a

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<sup>71</sup> Godden, "Governing Common Resources: Environmental Markets and Property in Water," 419.

<sup>72</sup> Pagh categorize the system as *Res Communis* in Pagh, *Omsætning Og Regulering Af Fast Ejendom*, 18. In **IUCN, "Final Report Study on the Economic Value of Groundwater and Biodiversity in European Forests," (2009)**. the Danish system is categorized as *res nullius*.

<sup>73</sup> Act last revised 26 of January 2017 No. 125 – main Act from 1978 No. 299.

concession if it is practically possible to obtain another suitable water supply on economically reasonable terms or because of the poor quality of the water.

Irrespective of ownership models, other European countries normally require a permit or concession for use of groundwater.<sup>74</sup> A study from the International Union for Conservation of Nature shows that most countries – regardless of ownership – accept a concession-free limited use of the groundwater without damaging effects – typically for animal stock and domestic household purposes.<sup>75</sup>

Consequently, ownership models do not seem to have substantial effects on either the requirement to obtain a public concession for use or for the usage privileges of the landowner. However, a concession alone does not necessarily give the concessionaire a right to utilize the groundwater. In Norway, the concessionaire is responsible for entering into necessary compensation agreements with the private owner before start-up of the groundwater extraction. As a principle, when granting usage concession the public authority does not get involved in conflicts and claims regarding for instance water rights. Private rights must be sorted out between the parties. If an agreement cannot be reached between the concessionaire and the owner, public taking or expropriation can be an option also for establishing private rights – provided sufficient legal basis can be found in the legislation. Experience shows that expropriation lawsuits are expensive and time consuming. Normally, there would be a legal basis in Norwegian law for expropriation in order to establish a water plant for public purposes. Finland seems to give more effect to their concessions: The authority can give the applicant a right to extract a limited amount of groundwater on another's property and even place equipment for extraction on his/her ground if it does not interfere with the owner's own use of the groundwater.<sup>76</sup> In Iceland, a prospecting concession can be granted to a third party regardless of whether the owner of the land has begun such surveying or prospecting or even permitted such surveying or prospecting to others.<sup>77</sup> Further, the landowner does not have precedence to a utilization concession on his or her land, but the landowner must be compensated before the holder of a utilization concession begins to extract resources from a private land.<sup>78</sup>

Regarding sustainable use of the groundwater, it appears to be a pre-emption for granting a concession that extraction will be consistent with a sustainable use. In countries with private ownership models like in Norway, Sweden and Finland, even the owner's privilege to extract water without a concession can be set aside after an assessment. An outcome can be that

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<sup>74</sup> For instance see International Union for Conservation of Nature (IUCN), "Final Report Study on the Economic Value of Groundwater and Biodiversity in European Forests " in *0707307/2007/486510*, ed. Chantal van Ham Thomas Greiber, Gerben Jansse & Marta Gaworska (Brussels2009), 26. with reference to 16 EU member states

<sup>75</sup> *Ibid.*, 26-27.

<sup>76</sup> The Finish Water Act 2011 No. 587 Chapter 4 § four.

<sup>77</sup> The Icelandic Act on the survey and utilization of ground resources 1998 No. 57 Article 4.

<sup>78</sup> *Ibid.* article 6 and 7.

concession as well as extraction can be denied if it might damage the groundwater body.<sup>79</sup> Sustainability is therefore taken into due consideration in legislation regulating the private ownership models.

## 6. Reflections on the importance of ownership to groundwater

The implications of different ownership models as outlined in section 4 above suggest that ownership of groundwater matters: the models give dissimilar possibilities and require dissimilar regulation of the public administration of the groundwater. For instance, from the very general implication of ownership, we can learn that a private ownership model must be regulated to ensure public access to groundwater. A public ownership may result in ineffective use and be less sensitive to potential for new usage of the resource. Knowledge of the imperfections of the different ownership models is essential to regulate their effects through, for instance, legislation to ensure public access to water and sustainable use of water.

Assessing the implication of the ownership models, it is my taking that the answer to promote public access and preserve groundwater cannot be private property, common property or *res nullius in their original forms*. For instance, an absolute ownership doctrine is incompatible with these ambitions because it offers no guarantee for public access or protection of the groundwater. The examples from Norway, Sweden and Finland illustrate that a private ownership model also may take due consideration of public access and sustainability. The current trend where the legislation either 1) vests all water resources in the state or 2) recognizes the state's superior right to the management of water resources seems to satisfactorily address the need for public access to water and the need for environmental protection. Anita Rønne argues that the traditional role of private property rights becomes less important due to the rapidly growing body of public administrative law and regulation.<sup>80</sup> Another way of phrasing this is that the *content of property water rights* is subject to change corresponding to the public regulations.

Today, traditional ownership models are challenged and a modern approach is to look at water rights as usufructuary – meaning that the rights holder has the right to use the water and derive all benefits from the use but the ownership is vested in the state.<sup>81</sup> Marcella Nanni and Stefano Burchi conclude that groundwater is fast losing the intensive private property connotation it has traditionally held and that individual rights in it no longer accrue from ownership of overlying

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<sup>79</sup> The Norwegian Water Resource Act § 45 (in force 1 of January 2018), the Swedish Environmental Act 1998 N. 808, chapter 11 §§ 10 and 11, the Finnish Water Act 2011 No. 587 Chapter 4 § 2.

<sup>80</sup> Anita Rønne, "Public and Private Rights to Natural Resources and Differences in Their Protection?," in *Property and the Law in Energy and Natural Resources*, ed. Aileen McHarg (Oxford University Press, 2010), 78.

<sup>81</sup>Charalambous, "Groundwater and the Law," 155.. The ownership may shift after extraction of water into inter alia bottles or pipelines.

land but from a concession/permit of the government and the courts.<sup>82</sup> Even countries with a principle of absolute ownership doctrine, like the UK, have moved towards a system of concessions for extraction.

The importance of groundwater also points toward either public ownership and/or one of the other ownership models under strict public surveillance/regulation through concessions and restrictions on use. As Lee Godden points out, “property alone cannot solve entrenched problems of resource use and common pool management.”<sup>83</sup> Ownership is an important element in the puzzle of achieving sustainable integrated water resource management. As access to water is considered to be a human right and vital for communities, states are under an obligation to ensure access to water – regardless of the model of ownership.

From an international perspective, laws addressing ownership issues on groundwater are rare, leaving regulation of ownership to national states in accordance with a traditional approach of the sovereignty principle. Joseph Dellapenna and Joyeeta Gupta point at a global trend in environmental law to focus on the rights and duties of the states within their borders but this trend is not evident in groundwater law yet.<sup>84</sup> For the moment, there seems to be a gap in international law between the recognition of the human right to water and regulations establishing rights and duties for states on how to achieve water access such as regulations on ownership and use of water. National water regimes are therefore of importance.

The ECE Charter on Groundwater Management Article 5 recommends that groundwater should be in the public domain or that authority should be vested in government to restrict, in the public interest, the rights accruing from its private ownership.<sup>85</sup> This is a non-binding recommendation only. Not even the EU water directive addresses ownership issues.<sup>86</sup> On the contrary, there has been a movement through the European Citizens’ Initiative (ECI) claiming that water supply and management of water resources should not be subject to ‘internal market rules’ and that water services should be excluded from liberalization.<sup>87</sup>

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<sup>82</sup> Burchi and Nanni, "How Groundwater Ownership and Rights Influence Groundwater Intensive Use Management," 239. Also other authors underline that the exploitation of natural resources in Europe today requires license, see Martha Roggenkamp et al., "Energy Law in Europe," *MR Roggenkamp, Energy Law in Europe* (2007): 1280.

<sup>83</sup> Godden, "Governing Common Resources: Environmental Markets and Property in Water," 435.

<sup>84</sup> Dellapenna and Gupta, "Toward Global Law on Water," 448.

<sup>85</sup> United Nations Economic Commission for Europe ("ECE") adopted the charter at its forty-fourth session (1989) by decision E (44) 1989 E/ECE/1197 ECE/ENVWA/12.

<sup>86</sup> EU funded the EUWARENESS program as part of the work leading up to the EU Water directive, where one of the objectives was to consider the how the resources regimes are established to balance rival use in a sustainable way. This work did not specifically address issues of ownership.  
[http://www.euwareness.nl/results/Case%20study%20comparison%20\\_final\\_.pdf](http://www.euwareness.nl/results/Case%20study%20comparison%20_final_.pdf) context.

<sup>87</sup> A European citizens' initiative is an invitation to the European Commission to propose legislation on matters where the EU has competence to legislate. A citizens' initiative needs support from at least one million EU citizens, coming from at least 7 out of the 28 member states. A minimum number of signatories is required in each of those 7 member states, see further on <http://ec.europa.eu/citizens-initiative/public/basic-facts>. "Right2Water" is the first

If the answer is either public or restricted/regulated ownership regimes, the next question becomes, if it is possible to change existing ownership models or impose restriction on the use of the ownership rights. As property rights in Europe enjoy constitutional protection and are human rights, governments cannot freely take property, regulate property or even act freely in order to ensure public access to water.<sup>88</sup> Most European states acknowledge that some restrictions on the use of natural resources can be so harsh that they equal the full taking of property.<sup>89</sup> Certainly, restrictions are in general more acceptable if their rationale is environmental protection rather than economic benefits for the state. The public interest in the protection of groundwater as a drinking source will often prevail over the vested property rights of individuals and entities.<sup>90</sup> Full taking of property rights entitles the owner to just compensation,<sup>91</sup> so consequently it can be very costly to pay to get access to water. Thus, the courts must undertake a balancing act between these potential conflicts of interest. Nanni and Burchi point at case law from the USA, Italy and Spain indicating that challenges of unconstitutionality and attendant compensation claims have failed and new regulatory legislation has been upheld by the courts.<sup>92</sup> To give an example, the Spanish 29/1985 Water Act changed the property regime for all waters (also groundwater) from private property to public property. The pre-existing rights will first expire 50 years after the adoption of the law.<sup>93</sup> After the end of the 50-year period, the previous owners can apply for an administrative concession to use the water. The *Groundwater Case* from the German Constitutional Court confirms the wide margin of appreciation given to the legislators.<sup>94</sup> The court concluded that private rights in land end where they reach the water level.<sup>95</sup> However, in the *Groundwater Case* the Supreme Court concluded that the applicant was entitled to compensation justified by the reasoning that the governmental action sacrificed an individual for the benefit of the public.<sup>96</sup> If public access to or regulation of groundwater requires that financial compensation be paid, this could be a practical barrier to such public intervention.

A report from the International Union for Conservation of Nature (IUCN) concludes that regulation of groundwater as public, private or *res nullius* seems to have little impact on whether

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European Citizens' Initiative to have met the requirements set out in the Regulation of the European Parliament and the Council on the citizens' initiative.

<sup>88</sup> For instance, Article 1 Protocol No. 1 of the European Charter of Human Rights, which entitles individuals rights to peaceful enjoyment of their possessions, calls for property protections from unlawful deprivation of property.

<sup>89</sup> Winter, "Property and Environmental Protection. An Overview," 17.

<sup>90</sup> IUCN, "Final Report Study on the Economic Value of Groundwater and Biodiversity in European Forests." The report was on groundwater and biodiversity in European forests in some of the EU members today.

<sup>91</sup> Winter, "Property and Environmental Protection. An Overview," 16-17.

<sup>92</sup> Burchi and Nanni, "How Groundwater Ownership and Rights Influence Groundwater Intensive Use Management," 232. Hendry observes that none of the groundwater users challenges new Scottish regulations restricting groundwater abstractions under Article 1 Protocol 1 of the European Convention on Human Rights, see Sarah Hendry, "Private Rights and Public Responsibilities: Recent Development in Scots Water Law", ed. Justice and Society The Foundation for Law (<http://www.fljs.org/content/private-rights-and-public-responsibilities-recent-developments-scots-water-law2013>), 4.

<sup>93</sup> Meritxell Costejà, "The Evolution of the Water Regime in Spain," 246.

<sup>94</sup> *The Groundwater Case* 58 BVerfGE 300(1981) German Federal Constitutional Court

<sup>95</sup> Alexander, "Property as a Fundamental Constitutional Right? The German Example," 757.

<sup>96</sup> *ibid.*, 762-63.

the status of the groundwater resources were in risk of overexploitation or not.<sup>97</sup> The report does not give any explanation on why ownership might have so little impact on the protection of the resource in practice. From my point of view, also the efficiency of the concession system and other regulations to give access and protect the groundwater must be taken into account. Managing and monitoring groundwater has proven itself a difficult task regardless of ownership.

As we have seen, several countries changed the property model from private to public property on ideological grounds – reasoning that the groundwater should belong to everyone. Furthermore, national security and control over vital national resources provide reasons in favor of public ownership – especially in countries with water scarcity. Even if modern legislation like the examples given on the Nordic countries above can provide access to water and sustainable use also for private property models, the ownership restrictions imply that the state does not have *immediate* control over the resource as in the public ownership model. Control over the publicly owned groundwater resources also depends on factors such as how water utilization concessions are formulated, for instance whether and to what extent they are time limited and if they may be changed and even withdrawn without compensation.

## 7. Conclusion

During the last decades, several European national legislations changed groundwater ownership models from private to publicly controlled ownership models. Today 72 % of European countries prescribe either public, *res nullius* or *res communis* ownership whilst 28 % regulate for private property. Regardless of ownership model, the concept of water as a common good influences how nations regulate the resource. Who owns the groundwater is of less importance in our day because of the public administration and regulation of the resource requires sustainable use and public access to the resource. Still, ownership matters at present for both for the owner and the people. Primarily three features are most prominent in this context: 1) Ownership to groundwater may be part of the constitutionally protected property right that may exclude third-party interventions. If public expropriation is a possibility, ownership can turn into primarily an economic claim for compensation. 2) Different ownership models require different public regulation. Several ownership models within a jurisdiction generate a complex regulation regime. 3) The need for immediate control of the groundwater is important for many countries because of water scarcity or vulnerability of the water resources. On these grounds, ownership will still have a role to play for future groundwater management.

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<sup>97</sup>IUCN, "Final Report Study on the Economic Value of Groundwater and Biodiversity in European Forests," 24-25.

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### Annex 1: Sources to European Map of Ownership to groundwater

The sources are mainly based on land reports to international organizations like OECD, academic articles and/or primary legislation.

All links in order by 9.4.2018

Country	Ownership to groundwater	Source
Albania	Public ownership  (State property)	UNEP-MAP, UNESCO-IHP (2015). Final report on Mediterranean coastal aquifers and groundwater including the coastal aquifer supplement to the TDA-MED and the sub-regional action plans. Paris: Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem (MedPartnership). (page 16).  <a href="http://unesdoc.unesco.org/images/0023/002353/235306e.pdf">http://unesdoc.unesco.org/images/0023/002353/235306e.pdf</a>

Austria	Private property	Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Austria (page 1) <a href="https://www.oecd.org/austria/Water-Resources-Allocation-Austria.pdf">https://www.oecd.org/austria/Water-Resources-Allocation-Austria.pdf</a>
Belarus	Public property	REPUBLIC OF BELARUS MUNICIPAL WATER SECTOR REVIEW June 2013 (The World Bank) (page 22) <a href="http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/12/12/000461832_20131212155153/Rendered/PDF/832850WPOENGLI0Box0382083B00PUBLIC0.pdf">http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/12/12/000461832_20131212155153/Rendered/PDF/832850WPOENGLI0Box0382083B00PUBLIC0.pdf</a>
Belgium	Private property	“The Evolution of the National Water Regime in Belgium” by Frédéric Varone and David Aubin (page 7) <a href="http://www.euwareness.nl/results/Belgie-cs-kaft.pdf">http://www.euwareness.nl/results/Belgie-cs-kaft.pdf</a>
Bosnia-Herzegovina	Res communis (common good)	Management of coastal aquifers and groundwater. Legal, institutional and policy aspects of coastal aquifer management. (Unesco) (page 23) <a href="http://unesdoc.unesco.org/images/0023/002352/235229e.pdf">http://unesdoc.unesco.org/images/0023/002352/235229e.pdf</a>  Article 3, Paragraph (1) of the Water Law, “Official Gazette of FBiH”, No. 70/06.
Bulgaria	Public property	Bulgarian Water Act Article 11.3 - <a href="http://faolex.fao.org/docs/pdf/bul33607.pdf">http://faolex.fao.org/docs/pdf/bul33607.pdf</a>  Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfe)) <a href="http://environmentportal.in/files/report_january_2009.pdf">http://environmentportal.in/files/report_january_2009.pdf</a>
Croatia	Res communis (common good)	Management of coastal aquifers and groundwater. Legal, institutional and policy aspects of coastal aquifer management. (Unesco) (page 25) <a href="http://unesdoc.unesco.org/images/0023/002352/235229e.pdf">http://unesdoc.unesco.org/images/0023/002352/235229e.pdf</a>
Czech Republic	Res nullius	Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Czech Republic <a href="http://www.oecd.org/czech/Water-Resources-Allocation-Czech-Republic.pdf">http://www.oecd.org/czech/Water-Resources-Allocation-Czech-Republic.pdf</a>  Water act article 3 <a href="http://eagri.cz/public/web/file/10629/The_Water_Act.pdf">http://eagri.cz/public/web/file/10629/The_Water_Act.pdf</a>
Denmark	Res communis/ Res nullius	Res nullius: Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfe))(p. 24) <a href="http://ec.europa.eu/environment/forests/pdf/grounwater_report.pdf">http://ec.europa.eu/environment/forests/pdf/grounwater_report.pdf</a>  Res communis: Peter Pagh, Omsætning og regulering af fast ejendom (2009) p. 18.

Estonia	Public property	<p>Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i>. Country profile Estonia <a href="http://www.oecd.org/environment/resources/Water-Resources-Allocation-Estonia.pdf">http://www.oecd.org/environment/resources/Water-Resources-Allocation-Estonia.pdf</a></p> <p>Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE) (p. 25) <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a></p> <p><u>Water Act § 5 (1)</u></p>
Finland	Private property	<p>Water act 2011 chapter 2 section 1 <a href="http://www.finlex.fi/en/laki/kaannokset/2011/en20110587.pdf">http://www.finlex.fi/en/laki/kaannokset/2011/en20110587.pdf</a></p>
France	Private property according to the civil code but declared common heritage of the nation in the environmental code)	<p>Groundwater in the Southern Member States of the European Union: an assessment of current knowledge and future prospects. Country report for France (p.35-36) <a href="http://www.easac.eu/fileadmin/PDF_s/reports_statements/France_Groundwater_country_report.pdf">http://www.easac.eu/fileadmin/PDF_s/reports_statements/France_Groundwater_country_report.pdf</a></p> <p>Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i>. Country profile France <a href="http://www.oecd.org/france/Water-Resources-Allocation-France.pdf">http://www.oecd.org/france/Water-Resources-Allocation-France.pdf</a></p> <p>Larrue, I. Sangaré and C., «The Evolution of the Water Regime in France», I: The Evolution of national water regimes in Europe : transitions in water rights and water policies, Kuks, Ingrid Kissling-Näf and Stefan (red.), 2004 s.</p>
Germany	Public property	<p>The Groundwater case 58 BVerfGE 300(1981) German Federal Constitutional Court</p> <p>Alexander, G. S. (2003). Property as a fundamental constitutional right? The German example. <i>Cornell Law Review</i>, 88(3), 733-778.</p>
Greece	Public property	<p>Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE)) (p.23) <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a></p>
Hungary	Public property	<p>Bándi, G. (2016). Property and Environmental Protection in Hungary <u>Environmental and property protection in Europe</u>. G. Winter. Groningen, Europa Law Publishing. <b>12</b>: 186-198.</p> <p>Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Hungary <a href="http://www.oecd.org/hungary/Water-Resources-Allocation-Hungary.pdf">http://www.oecd.org/hungary/Water-Resources-Allocation-Hungary.pdf</a></p>
Iceland	Private property	<p>Article 3 of Act on the Survey and Utilization of Ground Resource No 57/1998 <a href="https://www.stjornarradid.is/media/atvinnuvegaraduneyti-media/media/Acrobat/Log_57_1998_ENS_020107.pdf">https://www.stjornarradid.is/media/atvinnuvegaraduneyti-media/media/Acrobat/Log_57_1998_ENS_020107.pdf</a></p>
Ireland	Private property	<p>Legal Issues on Groundwater and Sustainability in Ireland By Yvonne Scannel (p.10-11) <a href="http://www.igi.ie/assets/files/Groundwater%20and%20Sustainable%20Development/YvonneScannell_LegalIssues.pdf">http://www.igi.ie/assets/files/Groundwater%20and%20Sustainable%20Development/YvonneScannell_LegalIssues.pdf</a></p>

		Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE)) (p.24) <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a>
Italy	Public property	Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE)) (p.24) <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a>
Lithuania	Public property	Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE)) (p.24) <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a>
Latvia	Private property	Julija Dzigulska: Subsurface Property Rights in Latvia: Public Interest over Private Rights? RGSL Research Paper No. 14 on page 32-33 <a href="http://www.rgsl.edu.lv/uploads/files/Dzigulska_Julija_6_final.pdf">http://www.rgsl.edu.lv/uploads/files/Dzigulska_Julija_6_final.pdf</a>  Law On Subterranean Depths section 3(1)
Luxembourg	Res nullius	Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Luxembourg <a href="http://www.oecd.org/luxembourg/Water-Resources-Allocation-Luxembourg.pdf">http://www.oecd.org/luxembourg/Water-Resources-Allocation-Luxembourg.pdf</a>  Civil Code article 640
Malta	Private property	Simone Berg (2004) “Review and critical assessment of the legal framework for groundwater in Malta” (p. 14-15) <a href="http://mra.org.mt/wp-content/uploads/2012/08/8.Ownership-or-other-Legal-Status-of-Groundwater.pdf">http://mra.org.mt/wp-content/uploads/2012/08/8.Ownership-or-other-Legal-Status-of-Groundwater.pdf</a>
Macedonia	Public property	Water and Sanitation Country Profile Republic of Macedonia (UN Department of Economic and Social Affairs) (p.4) <a href="http://www.un.org/esa/agenda21/natlinfo/countr/macedonia/Water&amp;SanitationMacedonia04f.pdf">http://www.un.org/esa/agenda21/natlinfo/countr/macedonia/Water&amp;SanitationMacedonia04f.pdf</a>  Water Strategy for the Republic of Macedonia(2011) (p.27) <a href="http://www.moep.gov.mk/wp-content/uploads/2014/12/MACEDONIAN-WATER-STRATEGY-FINAL-DRAFT-VERSION_10092011_EN.pdf">http://www.moep.gov.mk/wp-content/uploads/2014/12/MACEDONIAN-WATER-STRATEGY-FINAL-DRAFT-VERSION_10092011_EN.pdf</a>
Montenegro	Public property	UNESCO-IHP: Management of Coastal Aquifer and Groundwater. The legal and institutional framework for coastal aquifers. (p. 30) <a href="http://unesdoc.unesco.org/images/0023/002352/235229e.pdf">http://unesdoc.unesco.org/images/0023/002352/235229e.pdf</a>
Netherlands	Res nullius	Kuks, S. (2004). The Evolution of the National Water Regime in the Netherlands. <u>The Evolution of national water regimes in Europe : transitions in water rights and water policies</u> . I. Kissling-Näf and S. Kuks. Dordrecht, Kluwer Academic. <b>vol. 40:</b> 87-142.  <a href="http://www.euwareness.nl/results/Ned-cs-kaft.pdf">http://www.euwareness.nl/results/Ned-cs-kaft.pdf</a>
Norway	Private property	Article 44 in Act No 82 of 24 November 2000 relating to river systems and groundwater(Water resources Act) <a href="http://app.uio.no/ub/ujur/oversatte-lover/data/lov-20001124-082-eng.pdf">http://app.uio.no/ub/ujur/oversatte-lover/data/lov-20001124-082-eng.pdf</a>

Poland	Public property	Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE) (p.24) <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a>
Portugal	Partly public, partly private depending on size of groundwater body	Aragão, A. (2016). Property and Environmental Protection in Portugal <u>Environmental and property protection in Europe</u> . G. Winter. Groningen, Europa Law Publishing. <b>12</b> : 262-280.  Law 54/2005 of the 15th November, on ownership of water article 7 and 8  Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Portugal <a href="http://www.oecd.org/portugal/Water-Resources-Allocation-Portugal.pdf">http://www.oecd.org/portugal/Water-Resources-Allocation-Portugal.pdf</a>
Romania	Public property	Final report study on the Economic value of groundwater and biodiversity in European forest (The IUCN Regional Office for Europe (IUCN ROfE)) (p.24)  <a href="https://cmsdata.iucn.org/downloads/report_january_2009.pdf">https://cmsdata.iucn.org/downloads/report_january_2009.pdf</a>
Russia	Public property	Water code of the Russian federation Article 8 <a href="http://www.cabri-volga.org/DOC/PolicyRoundtable/WaterCodeOfRF-UnofficialEnglishTranslation.pdf">http://www.cabri-volga.org/DOC/PolicyRoundtable/WaterCodeOfRF-UnofficialEnglishTranslation.pdf</a>  Economic instruments for water resources management in the Russian federation (OECD) (p.27) <a href="https://www.oecd.org/env/outreach/EIs%20for%20WRM%20in%20Russia_English_Final%20web.pdf">https://www.oecd.org/env/outreach/EIs%20for%20WRM%20in%20Russia_English_Final%20web.pdf</a>
Serbia	Public property	Law on Mining and Geology Explorations Article 4 <a href="http://www.mre.gov.rs/doc/geologija-rudarstvo/Law%20on%20Mining%20and%20Geological%20Explorations.pdf">http://www.mre.gov.rs/doc/geologija-rudarstvo/Law%20on%20Mining%20and%20Geological%20Explorations.pdf</a>
Slovak Republic	Public property	Policies to Manage Agricultural Groundwater Use SLOVAK REPUBLIC (OECD) <a href="https://www.oecd.org/tad/sustainable-agriculture/groundwater-country-note-SVK-2015%20final.pdf">https://www.oecd.org/tad/sustainable-agriculture/groundwater-country-note-SVK-2015%20final.pdf</a>
Slovenia	Public property	Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> . Country profile Slovenia (P.2) <a href="http://www.oecd.org/slovenia/Water-Resources-Allocation-Slovenia.pdf">http://www.oecd.org/slovenia/Water-Resources-Allocation-Slovenia.pdf</a>
Spain	Public property (public hydraulic domain)	Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Spain <a href="http://www.oecd.org/spain/Water-Resources-Allocation-Spain.pdf">http://www.oecd.org/spain/Water-Resources-Allocation-Spain.pdf</a>  Meritxell Costejà, N. F., Anna Rigol, Joan Subirats. (2004). The Evolution of the Water Regime in Spain. In I. Kissling-Näf & S. Kuks (Eds.), <i>The Evolution of national water regimes in Europe : transitions in water rights and water policies</i> (Vol. vol. 40). Dordrecht: Kluwer Academic.
Sweden	Private property	Act 1998:812 on water chapter 2 Article 2 <a href="http://www.notisum.se/rnp/sls/lag/19980812.HTM">http://www.notisum.se/rnp/sls/lag/19980812.HTM</a>

Switzerl and	Groundwater of importance is public	<p>Swiss Civil Code Article Article 704 and 664 (2)</p> <p>Corine Mauch, E. R. (2004). The Evolution of the National Water Regimes in Switzerland. <u>The Evolution of national water regimes in Europe : transitions in water rights and water policies</u>. I. Kissling-Näf and S. Kuks. Dordrecht, Kluwer Academic. <b>vol. 40.</b> (p. 302)</p> <p>Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile Switzerland <a href="http://www.oecd.org/switzerland/Water-Resources-Allocation-Switzerland.pdf">http://www.oecd.org/switzerland/Water-Resources-Allocation-Switzerland.pdf</a></p>
Turkey	Public property	<p>Policies to Manage Agricultural Groundwater Use (OECD) TURKEY (p. 2)</p> <p><a href="https://www.oecd.org/tad/sustainable-agriculture/groundwater-country-note-TUR-2015%20final.pdf">https://www.oecd.org/tad/sustainable-agriculture/groundwater-country-note-TUR-2015%20final.pdf</a></p>
UK	Private right to withdraw/  private property	<p>A.N. Charalambous (2011)." Groundwater and the law" Quarterly Journal of Engineering Geology and Hydrogeology, 44, 147-158, 16 May 2011, <a href="https://doi.org/10.1144/1470-9236/09-052">https://doi.org/10.1144/1470-9236/09-052</a></p> <p>Water Resources Allocation <i>Sharing Risks and Opportunities (OECD)</i> Country profile UK <a href="http://www.oecd.org/unitedkingdom/Water-Resources-Allocation-United-Kingdom.pdf">http://www.oecd.org/unitedkingdom/Water-Resources-Allocation-United-Kingdom.pdf</a></p> <p>Burchi, S. and M. Nanni (2003). "How groundwater ownership and rights influence groundwater intensive use management." Intensive use of groundwater: Challenges and opportunities: 227-240.</p>
Ukraine	Public property	<p>USAID COUNTRY PROFILE PROPERTY RIGHTS AND RESOURCE GOVERNANCE UKRAINE (p.22)</p> <p><a href="https://www.land-links.org/wpcontent/uploads/2016/10/USAID_Land_Tenure_Ukraine_Profile-1.pdf">https://www.land-links.org/wpcontent/uploads/2016/10/USAID_Land_Tenure_Ukraine_Profile-1.pdf</a></p>