

ARTICLES

NATURAL TRANSPLANTS

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Policymakers are constantly faced with the complex task of managing novel challenges. At times, these challenges result from new technologies: Consider fights over allocating air rights for drones or decisions about how to share scarce vaccines in a pandemic. Other times the resources are old, but the challenges are new, such as how to fairly allocate water in times of unprecedented drought or previously undesirable rare earth minerals that are in demand for modern manufacturing and energy production. Often, instead of carefully tailoring a regime to the new resource, decisionmakers simply rely on mechanisms they are familiar with. When jurisdictions borrow from each other, scholars call this a “legal transplant”—as when one state copies another state’s innovations or when the federal government learns from the “laboratories of democracy.” This Article unveils a new dimension of legal transplants: transplants across subject areas. By transplants across subject areas, this article refers to instances when a jurisdiction looks for doctrines in other legal areas, often within its own legal system, when regulating a new resource or addressing a new challenge.

This Article makes three key contributions. First, it identifies a new type of transplant—between subject matters within a jurisdiction. Second, it analyzes the reasons for internal, cross-subject legal transplants and the criteria for selecting which subject areas to copy from. Third, the Article brings the legal transplants literature to bear, specifically, on natural resource law. It explores two cases, groundwater and wind energy, where policymakers and courts have borrowed from other resource schemes, often ignoring the scientific and social differences between these natural resources. Other areas of law, such as the incorporation of contract doctrines in landlord-tenant relations, are also described to show the explanatory power of the natural transplant framework. This conceptual framework is then applied to new mineral developments in space and the deep sea. Cross-subject

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transplants may be more prevalent than previously appreciated, and understanding them will pave the way to analyze the regulation of new developments in natural resources, infrastructure, and beyond.

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INTRODUCTION

Monumental infrastructure and energy shifts are currently underway. In March 2021, for instance, President Biden announced the start of a new era with regards to offshore wind energy,¹ which is unprecedented in the United States. As a result, decisionmakers at the federal level will now need to decide how to divide and govern the

¹ Press Release, The White House, FACT SHEET: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs (Mar. 29, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs> [<https://perma.cc/WY33-R69G>].

winds blowing over U.S. waters.² Other large-scale plans include overhauling the electric grid, investing in electric vehicles, expanding hydropower, and much more.³ All these grand new infrastructure and energy projects will require policymakers to reassess the use of our resources in light of modern challenges.

How will decisionmakers tackle the challenge of governing or reassessing the use of resources? To answer, we look at current and historical examples of resource governance. We use two novel case studies that offer in-depth analysis of two key resources: groundwater and wind energy. As we will see, an interesting pattern emerges: Often, rather than carefully tailoring regimes to fit the resource at hand or crafting rules from scratch, decisionmakers simply copy an existing regime.

The key question, then, is *why*? Why is it that copying exists, and moreover persists, even when the imported regime is sometimes ill-suited for the task at hand? This Article offers a new conceptual framework for answering this question by bringing together currently separate strands of literature: the scholarship on resource economics and the scholarship on “legal transplants.”

Legal transplants, in brief, are usually understood as a transfer of a legal regime or rule from one jurisdiction to another.⁴ The literature generally recognizes two types of transplants. The first is between similarly situated jurisdictions. This is known as “horizontal” transplanting.⁵ An illustrative example is borrowing between states within the United States. For instance, several states are considering copying

² Wind energy was part of the Build Back Better Act. The bill did not pass the Senate, but the Biden-Harris Administration is seeking to push forward offshore wind. Press Release, The White House, FACT SHEET: Biden-Harris Administration Races to Deploy Clean Energy that Creates Jobs and Lowers Costs (Jan. 12, 2022), <https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/12/fact-sheet-biden-harris-administration-races-to-deploy-clean-energy-that-creates-jobs-and-lowers-costs> [<https://perma.cc/74EU-7KR4>] (detailing, among other things, the Department of the Interior’s record-breaking offshore wind lease sale).

³ See generally Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021).

⁴ Jonathan B. Wiener, *Something Borrowed for Something Blue: Legal Transplants and the Evolution of Global Environmental Law*, 27 *ECOLOGY L.Q.* 1295, 1298 (2001) (defining legal transplants).

⁵ See *id.* at 1303 (describing customary international law as horizontal borrowing across states). Note the use of the term “horizontal” here is different from the way it is used in Yael R. Lifshitz, *The Geometry of Property*, 71 *U. TORONTO L.J.* 480 (2021) (employing the term to refer to the spatial domain over which a property regime exerts control) [hereinafter Lifshitz, *The Geometry of Property*].

California's legislation on salaries for college athletes.⁶ The second dimension along which transplanting occurs is between jurisdictions that are either "above" or "below" each other. This is known as a "vertical" transplant.⁷ For example, a vertical transplant occurs when states borrow from federal law or when international law borrows from domestic law.⁸

This Article underscores another type of transplant: transplants within the same jurisdiction but across subject matters. This third option, the "cross-subject transplant," has thus far been understudied and is the primary focus of this Article. Cross-subject transplants may be both more prevalent—and more problematic—than the types of transplants scholars usually explore. Using examples from natural resource law, this Article highlights the transfers of legal rules and doctrines that occur within a jurisdiction, while also offering a conceptual framework to understand why these transfers occur and why a particular subject matter is copied.

To illustrate how the three transplant dimensions might operate, consider the following example. Imagine a new resource is discovered or becomes newly valuable in light of big infrastructure projects or shifts in energy policy. Decisionmakers now need to determine how to manage the resource, to whom it should be allocated, and how to solve conflicts related to its exploration. Think again of wind energy, which is currently a particular growth area in the United States. Winds, of course, are not new to the Earth. But more recently, they have been deployed at scale to produce electricity.⁹ Faced with the growing use of wind power, state and local policymakers must now decide how they should manage this resource. Their first alternative, along the lines of a vertical transplant, would be to borrow from the regimes at the federal level and apply a rule akin to the Clean Air Act.

⁶ Greta Anderson, *The Push for Player Pay Goes National*, INSIDE HIGHER ED. (Oct. 4, 2019), <https://www.insidehighered.com/news/2019/10/04/us-congressman-propose-college-athlete-payment-bill> [<https://perma.cc/9GJ8-YDCP>].

⁷ Wiener, *supra* note 4, at 1297, 1303–04.

⁸ See *id.* at 1303–04 (offering the United States and European Union as examples of vertical legal borrowing from their own member states); see also Toby S. Goldbach, *Legal Norms' Distinctiveness in Legal Transplants and Global Legal Pluralism* 15–18 (Allard Sch. of L. at Univ. of B.C., Working Paper, 2013), <https://doi.org/10.2139/ssrn.2306782> [<https://perma.cc/3VJT-7N5N>] (discussing the United States-style litigation approach as the standard for international commercial arbitration).

⁹ See U.S. DEP'T OF ENERGY, *WIND VISION: A NEW ERA FOR WIND POWER IN THE UNITED STATES* 3–5 (2015) ("[F]rom 2000 to 2013, installed capacity increased at a rate of nearly 30% per year.") [hereinafter DOE, *WIND VISION*]. The current cumulative total installed wind capacity in the United States is 121,955 megawatts. U.S. DEP'T OF ENERGY, *LAND-BASED WIND MARKET REPORT 3* (2021), https://www.energy.gov/sites/default/files/2021-08/Land-Based%20Wind%20Market%20Report%202021%20Edition_Full%20Report_FINAL.pdf [<https://perma.cc/4T82-94H4>].

The second alternative, following a horizontal transplant, would be to copy a rule used by another state. The third alternative, which is the focus of this Article, is to apply a rule from within the same jurisdiction that previously applied to a *different resource*. As the case study below shows, this third alternative best describes what courts and agencies did when faced with the challenge of conceptualizing wind rights: They copied the regimes applicable to water or to oil and gas.¹⁰

The literature on legal transplants has largely ignored cross-subject borrowing.¹¹ The analysis of vertical and horizontal transplants, on which the current literature focuses, helps us understand why jurisdictions prefer to borrow an already existing regime instead of coming up with new rules or doctrines. However, the reasons offered in the literature do not fully account for internal, cross-subject transplants where jurisdictions decide to transfer their own rules between different areas of law.

This Article thus aims to expand the legal transplant umbrella by laying out the conceptual framework for this third route and illustrating its operation in the context of natural resources. While the case studies belong to natural resources, the cross-subject transplants we highlight here extend beyond the domain of natural resources. They are a common phenomenon in different areas of law. When facing a new legal question, judges, regulators, or even private parties turn to other areas of law they are familiar with. They turn to what feels natural and familiar to them, based on a kind of heuristic of availability. This borrowing from what is familiar translates into borrowing across subject matters. We call this kind of cross-subject borrowing “natural transplants.”

Importantly, cross-subject transplants occur within all policymaking institutions. Agencies that need to adopt a new set of rules, for example, could borrow existing rules from a different resource. That is precisely what the Bureau of Land Management did when it needed to put together rules for leasing offshore wind: It used the blueprint that existed in the context of offshore oil and gas.¹² Regulators have similarly used surface mining rules to regulate waste,¹³ and

¹⁰ See *infra* Section III.B (discussing the way courts dealt with the challenge of crafting wind energy law).

¹¹ But see David Marcus, *Trans-Substantivity and the Processes of American Law*, 2013 BYU L. REV. 1191, 1191 (2013) (discussing natural legal transplants in civil procedure matters and defining cross-subject as “doctrine that, in form and manner of application, does not vary from one substantive context to the next”).

¹² See *infra* Section III.B (discussing the construction of wind law).

¹³ See *infra* Section II.C.3 (discussing waste management).

the Clean Air Act, which was originally intended for “conventional” pollutants, has been used to regulate greenhouse gases.¹⁴

Transplanting can occur in the courts as well. A recent case in the Ninth Circuit considered whether dinosaur bones could and should be treated like subsurface minerals (i.e., oil and gas) or rather like limestone in order to determine whether the bones belonged to the surface owner.¹⁵ Oil, gas, and dinosaur fossils are all derived from organic sources and preserved underground for millions of years, but the court considered that fossils are not always valuable, while oil and gas are.¹⁶ Texas follows oil and gas law whenever new questions arise,¹⁷ but Montana, which produces about one percent of the oil Texas produces, deviated from the oil and gas model.¹⁸ The court considered fossils to be closer to limestone, instead.¹⁹ Limestone belongs to the surface owner because, according to the Montana court, it is close to the surface and, like dinosaur fossils, can be found by scraping the soil.²⁰ Here, again, the court’s move can best be characterized as a cross-subject transplant. Importantly, the court is not just reasoning by analogy; the natural transplant framework we highlight here goes further. Using an analogy neither tells us which example is going to be adopted, nor by whom, nor why regimes are selected. Analogy also does not explain the practices of internal borrowing beyond the judiciary. The transplant framework offered here, in contrast, offers a much richer conceptual analysis of these factors.

What motivates the adoption of natural transplants? Internal, cross-subject transplants are motivated by several nonexclusive reasons. First, an existing regime may accurately reflect the preferences of a particular jurisdiction over a particular area of law, and thus copying it would ensure those same preferences are satisfied in another area. For example, some jurisdictions may be wary of commodifica-

¹⁴ See *infra* Section II.C.3 (discussing the Clean Air Act).

¹⁵ *Murray v. BEJ Mins., LLC*, 962 F.3d 485, 486 (9th Cir. 2020); see also Jeremy P. Jacobs, *Mineral Fight Goes Mesozoic: Who Owns Dinosaur Bones?*, E&E NEWS (July 8, 2019, 12:11 PM), <https://www.eenews.net/stories/1060685731> [<https://perma.cc/TR5K-4DAG>] (discussing the holding and implications of the Ninth Circuit’s decision in *Murray*).

¹⁶ See *Murray*, 962 F.3d at 486 (applying the Montana Supreme Court’s conclusions regarding what constitutes a “mineral” for the purpose of a mineral reservation under state law in *Murray v. BEJ Mins., LLC*, 464 P.3d 80, 91 (Mont. 2020)).

¹⁷ See *infra* Section III.A (discussing groundwater).

¹⁸ Oil and gas are allocated to the owner of the mineral estate. While the owner of the surface estate has some soil depth to plant a tree and usually has rights to use groundwater beneath the property, they do not have the rights to minerals and oil. Adopting an oil and gas model may not have given the dinosaur bones to the surface estate owner.

¹⁹ See *Murray*, 464 P.3d at 92 (finding dinosaur fossils analogous to limestone); *Murray*, 962 F.3d at 486 (applying the Montana court’s conclusion).

²⁰ *Murray*, 464 P.3d at 92.

tion of certain goods and be reluctant to accept regimes that rely on private property rights and market transactions. Limits on transferability of agricultural land may be borrowed, for instance, when trying to ensure speculation does not happen in water rights. Second, the new regime might happen to be the most efficient for the new problem. In natural resources, two resources may be scientifically similar and, as a result, applying the same rules to both can produce desired results. In other words, relying on an existing regime does not preclude a transplant across areas from being a positive innovation, as examples beyond the legal system suggest.²¹ Third, copying the rules from another resource may be cost-efficient because coming up with a new rule is expensive at the outset, and the transitional costs of adapting to a new rule are high.²² An internal transplant ensures that the legal community is already familiar with the rules and doctrines to be applied to a novel issue. The legal community may prefer turning to a resource regime that is salient, as it is one with which they are more familiar and thus is natural to them. This practice illustrates the heuristic of availability.²³ This heuristic operates as a sort of cognitive shortcut to help decisionmakers and legal actors. They also cement, over time, the use of particular transplants over others.

Yet, while there are generally many advantages to transplants, and particularly natural transplants, just like any other foundational tradeoffs in law—say, rules versus standards or boilerplate versus non-standardized contracts—transplants inevitably involve compromises. The primary risk is transplanting a regime that is inapt for the particular problem at hand. Even if the adoption costs are lower at the outset, it could be the case that the performance of the transplanted regime over time would be suboptimal. This could be because the

²¹ See, e.g., STEVEN JOHNSON, *WHERE GOOD IDEAS COME FROM: THE NATURAL HISTORY OF INNOVATION* 25–26 (2010) (explaining how an early incubator for babies was copied from the incubators used in the Paris Zoo for chickens).

²² Transition costs, broadly understood, may include the costs incurred by all parties involved who are required to design, draft, and test a new rule or adapt to a new regime; the costs of building new practices and know-how; the costs of political transition; the costs of new institutional-capacity building; the increased financial risk of untested rules; error costs; opportunity costs; and more. The scope and extent of transition costs could vary from case to case.

²³ See Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases* (offering further detail on the availability heuristic), in *JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES* 14 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982). We use the term heuristic of availability liberally to refer to legal professionals' inclination to resort to the rules of salient jurisdictions. The availability heuristic refers to risk perception. As Cass R. Sunstein states, “[i]f a particular incident is cognitively ‘available’—both vivid and salient—then people will have a heightened fear of the risk in question.” Cass R. Sunstein, *Precautions Against What? The Availability Heuristic and Cross-Cultural Risk Perception*, 57 ALA. L. REV. 75, 77 (2005).

transplanted regime is ill fitted to the new setting or resource. As an example, courts in Texas have ignored the scientific differences between oil and water and applied doctrines from oil and gas to groundwater,²⁴ despite the potential for detrimental results.²⁵

The same tradeoffs that are embedded in the context of natural transplants also extend beyond natural resources. They could very well apply to new regulatory challenges in family law, health law, labor law, or the regulation of constantly evolving new technologies. For instance, when state legislatures lagged in regulating the controversial topic of surrogacy, courts applied adoption regulations.²⁶ In another example, part of the landlord-tenant revolution included treating leases (which are proprietary) more like contracts, thus importing contract law doctrines to the regulation of real property.²⁷ Similarly, regulations for corporations were the basis for the regulation of other forms of business associations.²⁸

This Article makes three key contributions to the literature on legal transplants. First, the Article expands the legal transplants literature by offering a conceptual framework for understanding borrowing across three dimensions. The framework for unpacking internal legal transplants explains why they are adopted, which institutions adopt them, and which subject areas are likely to be the exporting ones. Second, it focuses in particular on the most understudied type of transplant—the borrowing that occurs across natural resources or areas of law within a given jurisdiction. In that sense, the Article also brings together two strands of literature: the literature on legal transplants and the literature on the mechanisms by which legal rules evolve or develop internally. Importantly, while the examples used in this Article focus on natural resource law, internal, cross-subject transplants can be found in many other domains.²⁹ The conceptual framework will shed light on existing and future transplants, such as the regime for space minerals.³⁰ Third, this Article brings the legal transplants literature to bear, specifically, on natural resource law. While

²⁴ *Coyote Lake Ranch, LLC v. City of Lubbock*, 498 S.W.3d 53, 63–64 (Tex. 2016); *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 831–32 (Tex. 2012).

²⁵ See, e.g., Judon Fambrough, *Mixing Oil and Water Law*, TEX. REAL EST. RSCH. CTR. (Sept. 21, 2016), <https://www.recenter.tamu.edu/articles/tierra-grande/Mixing-Oil-and-Water-Law> [<https://perma.cc/87X5-GN4A>].

²⁶ See *infra* notes 241–42 and accompanying text.

²⁷ See *infra* notes 237–40 and accompanying text.

²⁸ See *infra* notes 243–49 and accompanying text.

²⁹ For an analysis of internal borrowing within property law, see Yael R. Lifshitz, *Property Beyond Land*, pt. II (2022) (unpublished manuscript) (on file with authors) [hereinafter Lifshitz, *Property Beyond Land*] (discussing the borrowing between land law, a particular branch of property law, and other domains of property law).

³⁰ See *infra* Section IV.B.1 (discussing space minerals).

natural resource law has been studied in other contexts, the idea of legal transplants within natural resources has received little scholarly attention.

The Article proceeds as follows. Part I reviews current strands in the literature on legal transplants and sets forth how this Article broadens the scope of the legal transplant idea. Part II lays out the concept of a natural transplant, which focuses on cross-subject borrowing within a jurisdiction. It offers an analytical framework for understanding why transfers occur, which regimes are borrowed, and which legal actors are involved in these internal, cross-subject transplants. Part III then illustrates how borrowing occurs across areas of law within a given jurisdiction. It does so by drawing on two historical case studies, focusing on two key resources: groundwater, a crucial source of drinking water, and wind, key to our transition to renewable energy. Part IV shows the explanatory and predictive power of the framework. It does so by applying the framework to both past developments in other areas of the law, underscoring that natural transplants are pervasive, and to future regulations in cutting-edge natural resources areas, such as deep-sea and space minerals.

I

THE LEGAL TRANSPLANT FRAMEWORK

In order to understand natural legal transplants, it is necessary to first explore the general transplant framework. Natural legal transplants, which are the focus of this Article, are distinct from those analyzed by the transplant literature because they are intrajurisdictional and cross-subject. Nonetheless, there are commonalities with other theorized types of transplants that help frame natural legal transplants, explaining both why jurisdictions borrow a doctrine from an existing resource for a new resource and which doctrines they borrow.

A. Understanding Legal Transplants

The concept of legal transplants has captured the imagination of scholars and policymakers alike. The idea is typically understood as the movement of a particular legal rule, or a system of laws, either from one country to another or from one people to another.³¹ Much of the discourse regarding legal transplants has focused on the dynamics between developed and developing countries and the more

³¹ ALAN WATSON, *LEGAL TRANSPLANTS: AN APPROACH TO COMPARATIVE LAW* 21 (2d ed. 1993) (defining legal transplants as “the moving of a rule or a system of law from one country to another, or from one people to another”).

or less voluntary legal borrowing that occurs in this regard.³² But transplants also occur between neighboring jurisdictions with a similar level of development. This is the case, for example, with regards to the international spread of environmental impact assessments.³³ U.S. states, likewise, frequently copy each other.³⁴ Beyond the adoption of statutes sponsored by the Uniform Law Commission, some states are trendsetters such that other jurisdictions may copy their regulations on a particular area.

Copying between jurisdictions is often explained on utilitarian grounds. From the point of view of the “receiving” state, copying may be a way to increase efficiency.³⁵ First, and probably most prominently, this could be a result of efficiency gains in the adoption process itself. The basic idea is that copying is essentially cheaper than crafting something anew. Of course, the adopting jurisdiction will still face some adaptation costs. These could include the direct costs of acquiring information about the rules and implementing them, the rent-seeking costs by those who resist change and those who do not, the indirect costs related to the new element imported not being coherent with the rest of the system, and the costs arising from lack of innovation since systems without local variations are less likely to innovate and adjust dynamically.³⁶

The copied rule might also happen to be the best suited for the problem. Even without copying the rule, it could be the case that regulators, after considering all the factors and getting public input, could end up with a rule that happens to be just like the copied one. Lastly, sometimes simply being in unison with neighboring states increases efficiency. This may be the case if having a coherent set of rules across jurisdictions will make it easier for various actors to navigate both

³² See, e.g., Glen Mola Pumuye, *Legal Transplants: A Conflict of Statutory Law and Customary Law in Papua New Guinea*, 4 IALS STUDENT L. REV. 31, 32–33 (2017) (discussing Papua New Guinea’s borrowing of legislation from Australia).

³³ Natasha Affolder, *Contagious Environmental Lawmaking*, 31 J. ENV’T L. 187, 190 (2019).

³⁴ Some scholars propose that state rules may also be followed at the federal level. See Alexandra B. Klass, *Eminent Domain Law as Climate Policy*, 2020 WIS. L. REV. 49, 83 (suggesting state action “can serve as a template for Congress if, in future years, it wishes to enact federal climate policy”).

³⁵ See Wiener, *supra* note 4, at 1354 (explaining that whether borrowing is efficient depends on the receiving state’s criteria for adopting new law).

³⁶ Nuno Garoupa & Anthony Ogus, *A Strategic Interpretation of Legal Transplants*, 35 J. LEGAL STUD. 339, 345–46 (2006).

jurisdictions' regulations, which, for example, might enhance trade or investment.³⁷

A transplant may also have functional advantages from the “originating” state’s point of view. For example, if a state sets a particularly demanding environmental regulation which is later copied by other states,³⁸ the originating state faces less risk of companies fleeing to other areas with less stringent regulations. If many states have the same stringent regulations, companies also face fewer costs adapting to different regimes.³⁹ Furthermore, states may want to have homogeneous rules with their neighboring jurisdictions for other reasons. One reason is to avoid environmental externalities. If a state’s neighbors adopt environmental regulations, cross-border externalities may be reduced, and having the same regime puts everyone on equal footing. Another reason may be that jurisdictions want to have rules aligned with the other jurisdictions that belong to their legal culture because it ensures interoperability.⁴⁰ It also makes it less likely that a higher regulatory power—such as the federal government in the United States or the European Union in European nations—will intervene to homogenize the regulation of a subject.⁴¹

1. Which One? Transplant Types

Legal transplants are an umbrella concept that can be defined across various dimensions, including by reference to the reasons motivating the transplant, or which regime is copied.⁴² Scholars have identified several types of reasons why a particular jurisdiction would adopt a transplant, which correspond with the motivations (or per-

³⁷ For an account of the reasons why states adopt regulations that are similar, or even identical, to the regulations adopted by large numbers of other states, see William Magnuson, *The Race to the Middle*, 95 NOTRE DAME L. REV. 1183 (2020).

³⁸ This copying would not be as easy if laws and regulations were protected, as Stephen Clowney suggests. Nonetheless, protection may help jurisdictions plan carefully for the adoption of the new regulation, because innovating is costly. Stephen Clowney, *Property in Law: Government Rights in Legal Innovations*, 72 OHIO ST. L.J. 1, 4 (2011) (“The drafting and implementation of an untested legal scheme—like the invention of a new commercial product—may consume substantial resources and entail considerable financial risks for the innovating government.”).

³⁹ See Magnuson, *supra* note 37, at 1205 (discussing how corporations benefit from familiarity among different legal regimes).

⁴⁰ See *id.* at 1208–12 (discussing interoperability).

⁴¹ See *id.* at 1212–15 (discussing federal intervention).

⁴² Transplants are broadly aimed at improving the current legal system or converging with other legal systems. See Jonathan M. Miller, *A Typology of Legal Transplants: Using Sociology, Legal History and Argentine Examples to Explain the Transplant Process*, 51 AM. J. COMPAR. L. 839 (2003) (on the aims of transplants); Affolder, *supra* note 33, at 203 (on transplants as convergence). However, of course, transplants are far from homogeneous, as the discussion here shows.

ceived motivations) to undertake a transplant. The leading typology in this regard was developed by Jonathan Miller, who categorized transplants by drawing on examples of transplants between developed and developing countries.⁴³ The first category is cost-saving transplants. This captures the idea of a jurisdiction wanting to save time and money by not developing their own solution to a problem.⁴⁴ Environmental law transplants, in particular, could respond to this model since some jurisdictions may not have the funds to invest in the research studies necessary to regulate certain pollutants.⁴⁵ The second type is the externally dictated transplant, which implies that some external power has imposed a full new legal regime or some regulation.⁴⁶ This category covers anything from a full overhaul of the legal system after a military conquest to the influence of the International Monetary Fund or the World Bank.⁴⁷ These transplants, in particular, have long been criticized. Critics argue that using the language of transfers and convergence of legal systems, when talking about the adoption of rules and doctrines from developed countries by developing countries, masks the politics behind the transplant.⁴⁸ In particular, using such language can lead some to believe, so goes the argument, that former colonies see Western regulatory examples as the only valuable ones.⁴⁹ In reality, however, the choice of former colonies is often constrained, such that their adoption of Western regulatory examples is not necessarily due to their perceived value but due to their increased availability.⁵⁰ As for the efficacy of such transplants, scholars have claimed that imposed transplants are often unsuccessful.⁵¹

⁴³ Miller, *supra* note 42; see also Silvia Ferreri & Larry A. DiMatteo, *Terminology Matters: Dangers of Superficial Transplantation*, 37 B.U. INT'L L.J. 35, 54 tbl.1 (2019) (summarizing examples of transplantation categories in developed nations).

⁴⁴ Miller, *supra* note 42, at 845.

⁴⁵ See *id.* at 846 (observing that adopting their own standards can be too expensive for developing nations).

⁴⁶ *Id.* at 847.

⁴⁷ *Id.*

⁴⁸ See *id.* at 847–48 (describing how developing countries have adopted intellectual property standards or human rights legislation under the threat of trade sanctions from the United States).

⁴⁹ See Affolder, *supra* note 33, at 204 (“Postcolonial tendencies to consider forms of Western law as the only worthy sources of inspiration and replication persist, often unnoticed.”).

⁵⁰ See *id.* (“Today’s ‘idealistic exporters’ of law may employ ‘unconscious attitudes’ of universalism that avoid looking behind the ‘good ideas’, and thus unwittingly privilege certain ideals over others.”).

⁵¹ See, e.g., Matteo Solinas, *The Nature of Legal Transplants – Inspirations from Postcolonial Scholarship*, 22 NZACL Y.B. 179, 211–13 (2016) (discussing the uneven staying power of the Napoleonic Code in early nineteenth-century Europe).

The third type is the entrepreneurial transplant, which focuses on the mechanism that prompted the transplant. In the entrepreneurial transplant, the trigger is a group of people, often experts, pushing for the adoption.⁵² It can be nongovernmental organizations working on a particular area, companies aiming at homogenizing the regulatory frameworks they operate under, or locals educated in the country where the transplanted rule originated.⁵³

Finally, the fourth type is the legitimacy-generating transplant, which focuses on the prestige of the originating legal system or rule.⁵⁴ Even without the colony-metropolis relationship, there is the possibility of certain countries being thought leaders because of their international power position.⁵⁵ For example, the United States Environmental Protection Agency's asbestos regulations have been adopted in approximately forty countries, even if their environmental protection regulations are otherwise less robust.⁵⁶

Finally, some jurisdictions transplant rules from other jurisdictions just to ensure uniformity and interoperability across jurisdic-

⁵² Miller, *supra* note 42, at 849–50.

⁵³ See *id.* at 850 (discussing NGOs and locals educated abroad); Magnuson, *supra* note 37, at 1208 (discussing companies' interests in familiarity across legal regimes).

⁵⁴ See EVERETT M. ROGERS, *DIFFUSION OF INNOVATIONS* 62–63 (5th ed. 2003) (discussing how educators waited to adopt the modern math curriculum until the “most influential” opinion leaders in education advertised their support for it). The scholars of legal transplants have criticized prestige. On the one hand, the prestige rationale could obscure the real reason for a transplant: efficiency. See Ugo Mattei, *Efficiency in Legal Transplants: An Essay in Comparative Law and Economics*, 14 *INT'L REV. L. & ECON.* 3, 8 (1994) (arguing that a movement towards efficiency explains the general convergence of modern legal systems and that there seems to be a synergy between efficiency and prestige rationales). On the other hand, it has also been pointed out that prestige is not objective; it is influenced by ideology and power relationships. See Michele Graziadei, *Legal Transplants and the Frontiers of Legal Knowledge*, 10 *THEORETICAL INQUIRIES L.* 723, 739 (2009) (arguing that prestige is “inscribed in a set of beliefs about the world, about status and achievement” and must be considered in the “broader domain of the analysis of ideology”). Ferreri and DiMatteo refine the taxonomy and suggest that there are seven subtypes of transplants that can be classified in three larger groups: transplantation, borrowing, and influence. Ferreri & DiMatteo, *supra* note 43, at 52–54. These subtypes are: (i) transplantation of a legal tradition; (ii) transplantation of a national law; (iii) transplantation of an area of law; (iv) double transplantation when “[a] country transplants a specific area of law and then uses that transplantation in the making of a broader law”; (v) borrowing of a particular rule or doctrine; (vi) influence from a country's law perceived as advanced; and (vii) superficial transplantation when only terminology is borrowed. *Id.* at 54 tbl.1.

⁵⁵ See Garoupa & Ogus, *supra* note 36, at 347 (discussing how “different legal regimes and practices may be more or less costly to adopt, depending on their influence,” noting that influence is “measured by higher switching costs for the more influential country and lower switching costs for the less influential country,” and stating that a well-known regime may be generally cheaper for countries to switch to than a brand new one).

⁵⁶ Tseming Yang & Robert V. Percival, *The Emergence of Global Environmental Law*, 36 *ECOLOGY L.Q.* 615, 621–22 & n.26 (2009).

tions.⁵⁷ This type of transplant can also occur through a bottom-up process, where private actors abide by the rules of a certain jurisdiction everywhere they operate. The so-called “Brussels Effect” serves as an example: International firms that operate in the European Union find it more efficient to produce all their products following the European standards, even if they are more stringent, and so the European Union has unilaterally globalized certain regulations.⁵⁸

This typology mainly focuses on the reasons why a certain regime is picked. In reality, of course, the types can be mixed and matched. Yet, the scholarship on transplants is not limited to studying the particular reasons for adoption. It also extends to *where* the transplant is coming from.

As far as the origin of the transplant, the literature generally recognizes two types of transplants. The first type is known as a “horizontal” transplant, which occurs between similarly situated jurisdictions.⁵⁹ An illustrative example here is borrowing between states within the United States. For instance, in 2007, Maryland became the twelfth state to implement California’s vehicle emissions standards.⁶⁰ The second type of transplant is sometimes known as a “vertical” transplant, which occurs between jurisdictions at different “echelons” of law, such as national and international law.⁶¹ An illustrative example in this strand of scholarship is work by Jonathan Wiener, who traces how the Kyoto Protocol borrowed the emissions trading mechanism from national regulations.⁶² Similarly, in a federal

⁵⁷ See Magnuson, *supra* note 37 (arguing that informational benefits, demand by constituents for familiar regulations, network effects, and a reduced risk of federal intervention all drive U.S. states to adopt regulations that are similar to those adopted by a large number of other states). Examples of cases where states have adopted regulations that are not particularly the best, but just the most prevalent, include the implementation of secured transaction regulations that aligned with the Uniform Commercial Code and the regulation of limited liability companies. *Id.* at 1222–25.

⁵⁸ For a theoretical and empirical account of the Brussels Effect, see ANU BRADFORD, *THE BRUSSELS EFFECT: HOW THE EUROPEAN UNION RULES THE WORLD*, at xiv–xv (2020).

⁵⁹ See Wiener, *supra* note 4, at 1297 (discussing transplants from one national legal system to another).

⁶⁰ *States Adopting California’s Clean Cars Standards*, MD. DEP’T OF THE ENV’T, <https://mde.maryland.gov/programs/air/mobilesources/pages/states.aspx> [<https://perma.cc/MGC8-DLQJ>]. Another example is transplants across countries. For example, California water markets were the inspiration for those in Spain. See Vanessa Casado Pérez, *Missing Water Markets: A Cautionary Tale of Governmental Failure*, 23 N.Y.U. ENV’T L.J. 157, 163 (2015) (discussing how California’s experience with water markets inspired their introduction in Spain, which faced similar climatological challenges and had similar geographic characteristics).

⁶¹ See Wiener, *supra* note 4, at 1297, 1303 (describing legal borrowing between national and international law and between, for example, the United States and individual states).

⁶² *Id.* at 1309–10.

system, the federal level of government may borrow from one of the subfederal units. For example, provinces in Canada adopted carbon taxes in advance of the Canadian federal government.⁶³ Taken together, the categorization of transplants in the literature is largely based either on the reasons for adopting a transplant or on the origin jurisdiction of the transplant. Yet none of these categories cover the cross-subject, i.e. “natural,” transplants which this Article underscores.

2. *Who and How? The Process and Conditions for Success*

It is also important to understand the process by which a certain transplant is adopted. Scholars have studied the conditions necessary for transplants to achieve the goals that prompted the selection of a particular regulation and be generally accepted by the receiving community.⁶⁴ The success of a transplant will depend largely on the criteria and time frame chosen to evaluate its success. Generally, as more time passes, it becomes more likely that the transplant will fit the society where it is adopted—both because the regulation may adapt to suit the context in which it is adopted and because the jurisdiction may adapt to conform with the regulation.⁶⁵

Importantly, a key piece in the success of the transplant seems to be the people behind the transplant.⁶⁶ Those behind the transplant

⁶³ See Maxine Joselow, *National Carbon Tax Upheld by Canada’s Supreme Court*, SCI. AM. (Mar. 29, 2021), <https://www.scientificamerican.com/article/national-carbon-tax-upheld-by-canadas-supreme-court> [<https://perma.cc/BA36-BWWY>] (noting that the Canadian Parliament passed the Greenhouse Gas Pollution Pricing Act in 2018, which “applied [a carbon tax] to four provinces that had not already enacted prices on pollution”).

⁶⁴ Everett Rogers examines five attributes, which are related to the intrinsic technical characteristics of a legal innovation and the socioeconomic context in which it is adopted, that generally predict an innovation’s success. The factors are: (i) relative advantage over other alternative regulations (including the status quo); (ii) compatibility with the adopter’s preconditions, which relates to the institutions of the jurisdiction that adopts the rule; (iii) simplicity of the regulation, which makes it easy to understand and use; (iv) trialability, which allows for experimentation, evaluation, and improvement; and (v) observability of the transplant’s benefits. ROGERS, *supra* note 54, at 247–53, 258, 269, 286–88.

⁶⁵ George Rodrigo Bandeira Galindo understands transplants as taking into account both space and time. According to Bandeira Galindo, a transplant implies that the country to which the rule is transplanted wants to achieve some result in the future. George Rodrigo Bandeira Galindo, *Legal Transplants Between Time and Space* (“[A] legal transplant can be viewed as a collection of *experiences* that happened in one legal system and are *expected* to be realized in the future in a different legal system.”), in ENTANGLEMENTS IN LEGAL HISTORY: CONCEPTUAL APPROACHES 129, 133 (Thomas Duve ed., 2014).

⁶⁶ See Affolder, *supra* note 33, at 208–10 (arguing that scholars can better understand the transportation of legal norms by focusing on the influence of individual legal actors); Graziadei, *supra* note 54, at 725 (advocating for looking not only at “macro” explanations

may be academics trained in a foreign country, public servants convinced of the good qualities of the foreign rule, or special interests who may be favored by the rule. Those favoring the transplants and contributing to the harmonization of the new rule with the existing legal system have been called “transferists.”⁶⁷ However, the risk of a transplant championed by a particular group (often, an intellectual or economic elite) is that it may not filter through to the broader population.⁶⁸ This focus on the human aspect of legal transplants, in particular the communities that facilitate such transplants, aligns nicely with our focus on the heuristics of availability within the legal community, as discussed below.

Finally, the literature on legal transplants has made clear that transplants are not just a “one-size-fits-all” technocratic mechanism.⁶⁹ Interjurisdictional transplants have to rise above and adapt to differences in culture,⁷⁰ political and judicial systems,⁷¹ distributions of power,⁷² geography, religion, political economy, and norms.⁷³ The complexity of this process is even greater when a developed country’s

of why transplants occur but also at the “micro” level of the individual actions that influence how transplants are implemented).

⁶⁷ María Paula Reyes Gaitán, *The Challenges of Legal Transplants in a Globalized Context: A Case Study on “Working” Examples* (Oct. 2014) (LL.M. dissertation, University of Warwick) (manuscript at 16), <https://ssrn.com/abstract=2530811> [<https://perma.cc/YEU2-N872>]; see also Basil C. Bitas, *Comparative Theory, Judges and Legal Transplants: A Practical Lesson from Singapore and Its Relevance to Transnational Convergence*, 26 SING. ACAD. L.J. 50, 52–54 (2014) (reviewing existing academic work by members of the “transferist school” and scholars with other theoretical orientations).

⁶⁸ See Jan Torpman & Fredrik Jörgensen, *Legal Effectiveness: Theoretical Developments on Legal Transplants*, 91 ARCHIV FÜR RECHTS- UND SOZIALPHILOSOPHIE [ARSP] [ARCHIVES FOR PHILOSOPHY OF LAW AND SOCIAL PHILOSOPHY] 515, 516 (2005) (arguing that “[c]ountries transplanting modern law have experienced a rising gap between public and professionals . . . [and] law in the books and law in action” and have seen “lower degrees of involvement among the population in political processes creating legal change”).

⁶⁹ See Randall Peerenboom, *Toward a Methodology for Successful Legal Transplants*, 1 CHINESE J. COMPAR. L. 4, 5–7 (2013) (discussing how existing research on legal transplants has focused on common best practices, rather than differentiating between countries based on their unique challenges).

⁷⁰ See Oscar G. Chase, *Legal Processes and National Culture*, 5 CARDOZO J. INT’L & COMPAR. L. 1, 1–2 (1997) (arguing that cultural differences “present formidable barriers that should not be ignored” in evaluating proposed legal transplants).

⁷¹ See Mattei, *supra* note 54, at 17 (“[A] potentially efficient doctrine may be deprived of any impact if it is introduced in an incompatible machinery of justice.”).

⁷² See O. Kahn-Freund, *On Uses and Misuses of Comparative Law*, 37 MOD. L. REV. 1, 12–13 (1974) (arguing that variations in the power structures between one country and another can prevent or frustrate the transfer of legal institutions between them).

⁷³ See Wiener, *supra* note 4, at 1357 (“Skeptics of transnational borrowing . . . argue that it must overcome significant differences in national culture, geography, wealth, religion, political system, economic system, distribution of power, interest group pressures and norms.”).

regimes are applied to developing countries without tweaking them to suit the likely cultural and institutional differences. A transplant will be most successful when applied to a jurisdiction with extremely similar characteristics to the jurisdiction of origin unless the transplant is adapted to the particularities of the new jurisdiction. It is unlikely that a purely direct import would result in a successful transplant. A transplant without any attention to the particularities of a jurisdiction is likely to be rejected, in the short or in the long term. Legal transplants evolve in the same way that a transplanted organ does in the human body: They adapt to the new jurisdiction and the new jurisdiction may adapt to them.⁷⁴ However, it is important to note that in many cases, transplants are implemented to jumpstart wider processes of social change.⁷⁵ Increasingly, transplants happen between systems that already have a lot in common,⁷⁶ thus requiring less adaptation. In general, transplants have become very common occurrences in the development of the law.⁷⁷

B. *Weaving Together the Natural Resource Governance Frameworks and Legal Transplants*

Scholarship on natural resources, in the last few decades, has dealt with issues of first impression largely under the Demsetzian framework. In his seminal work, Harold Demsetz used an example of North American rights in fur, and their evolution, to argue that property rights will emerge in a particular resource when the benefits from creating and enforcing rights begin to outweigh the costs associated with such regimes.⁷⁸ A Demsetzian analysis is thus particularly concerned with the question of *when* a property rights regime in a particular resource will develop (and when not).

⁷⁴ See WATSON, *supra* note 31, at 27 (“A successful legal transplant – like that of a human organ – will grow in its new body, and become part of that body Subsequent development in the host system should not be confused with rejection.”). For a comment on Watson’s rejection of mirror theories of law (theories that law is the mirror of the context external to the law), see William Ewald, *Comparative Jurisprudence (II): The Logic of Legal Transplants*, 43 AM. J. COMPAR. L. 489 (1995).

⁷⁵ See David Nelken, *Comparatists and Transferability*, in COMPARATIVE LEGAL STUDIES: TRADITIONS AND TRANSITIONS 437, 455 (Pierre Legrand & Roderick Munday eds., 2003) (“In transnational legal transfers, however, it is *typical* for law to be asked to jump-start the wider process of social change and leap-frog over long-standing social and cultural obstacles.”).

⁷⁶ Graziadei, *supra* note 54, at 727.

⁷⁷ *Id.* at 733.

⁷⁸ Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. (PAPERS & PROC.) 347, 350–51 (1967) (broadly maintaining that property rights evolve when the benefits of establishing such rights exceed the costs associated with the property regime).

A rich body of scholarship has sprung up in the wake of Demsetz's analysis.⁷⁹ Some scholars relate Demsetz's theory to the more general notion of efficiency, claiming that "[t]he Demsetz thesis can be seen as an anticipation of the idea that the common law evolves toward efficient rules."⁸⁰ Other scholars maintain that Demsetz's account can be linked to the views of earlier scholars such as Thomas Hobbes and John Locke.⁸¹

Much of the scholarship following in Demsetz's footsteps can be seen through the lens of transaction costs. The literature often focuses on the different types of transaction costs and highlights the significance of these costs in encouraging or impeding the creation of property and, by extension, other types of regimes as well. One particularly prominent cost that has been repeatedly emphasized in the literature relates to the price of defining and enforcing particular regimes.⁸²

⁷⁹ See, e.g., Terry L. Anderson & Peter J. Hill, *Cowboys and Contracts*, 31 J. LEGAL STUD. S489 (2002) (applying Demsetz's theory to property rights in unowned or unpriced attributes of a resource and arguing that entrepreneurs contract to define and enforce their rights to such attributes); Stuart Banner, *Transitions Between Property Regimes*, 31 J. LEGAL STUD. S359 (2002) (applying the Demsetzian theory to land); Gary D. Libecap & James L. Smith, *The Economic Evolution of Petroleum Property Rights in the United States*, 31 J. LEGAL STUD. S589, S590 (2002) (applying the Demsetzian theory to oil and natural gas); David B. Schorr, *Appropriation as Agrarianism: Distributive Justice in the Creation of Property Rights*, 32 ECOLOGY L.Q. 3 (2005) (discussing the Demsetzian analysis with regards to water); Katrina Miriam Wyman, *From Fur to Fish: Reconsidering the Evolution of Private Property*, 80 N.Y.U. L. REV. 117, 135–36 (2005) (applying and expanding upon Demsetz's theory in a case study of rights in coastal fisheries).

⁸⁰ Thomas W. Merrill, *The Demsetz Thesis and the Evolution of Property Rights*, 31 J. LEGAL STUD. S331, S331 (2002). For a similar argument that the "emergence of property rights thus tends toward a use of resources that maximizes social value," see Thomas W. Merrill & Henry E. Smith, *Making Coasean Property More Coasean*, 54 J.L. & ECON. (SPECIAL ISSUE) S77, S79 (2011).

⁸¹ See, e.g., James E. Krier, *Evolutionary Theory and the Origin of Property Rights*, 95 CORNELL L. REV. 139, 149–50 (2009) (discussing the similarities and differences between Demsetz's account and Hobbes's and Locke's views). For another analysis of the gaps in Demsetz's evolutionary theory, see Carol M. Rose, *Property as Storytelling: Perspectives from Game Theory, Narrative Theory, Feminist Theory*, 2 YALE J.L. & HUMAN. 37 (1990).

⁸² See, e.g., Henry E. Smith, *Exclusion Versus Governance: Two Strategies for Delineating Property Rights*, 31 J. LEGAL STUD. S453, S462–63 (2002) (discussing how the marginal costs of definition and enforcement of property should equal their marginal benefits under Demsetz's theory); Terry L. Anderson & P.J. Hill, *The Evolution of Property Rights: A Study of the American West*, 18 J.L. & ECON. 163, 165 (1975) (applying a similar economic model to property rights definition and enforcement activities). See generally Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, 110 YALE L.J. 1, 8 (2000) (arguing that a standardized set of property rights reduces the "measurement costs" related to defining and enforcing those rights); Henry E. Smith, *The Language of Property: Form, Context, and Audience*, 55 STAN. L. REV. 1105, 1108–10 (2003) (arguing that formalistic property devices can minimize the "[p]rocessing costs" to third parties of recognizing and respecting property rights).

The main critique of the Demsetzian framework focuses on the extent to which changing costs can truly account for shifts in property regimes (or resistances to shifts for that matter). Prominent critics, such as Katrina Wyman, argue that transaction costs alone cannot fully explain the development of property rights but rather that political choices often better explain the evolution of property.⁸³

Circling back to the choices in resource governance, and particularly when a new resource comes about or new uses require reassessing, a Demsetzian framework (and other frameworks that followed in its wake) focuses primarily on the question of *when* a resource regime will emerge. But, importantly for our purposes, the framework does not speak directly to the question of *whether* a regime would be copied from one context to another, nor *which* regime would be chosen for copying. These questions remain open. We aim to fill this gap by weaving together the natural resource literature and the legal transplants literature.⁸⁴

II

NATURAL TRANSPLANTS

This Article seeks to broaden the framework of horizontal legal transplants in two directions. First, it shows that legal borrowing may happen *within* a jurisdiction, not just between jurisdictions. Second, it shows that legal transplants do not need to happen within a single substantive area. While many transplants may entail transferring a rule or doctrine within the same substantive area, there are also cases where a legal doctrine is transferred to another area of law. This Article uses examples from natural resources to elucidate the concept of cross-subject, intrajurisdictional transplants, but these kinds of transplants are not limited to natural resources. In particular, we are looking at issues of first impression where doctrines from another resource have been applied—be they either newly discovered, newly

⁸³ Wyman, *supra* note 79, at 136; *see also* David A. Dana & Hannah J. Wiseman, *Fracking as a Test of the Demsetz Property Rights Thesis*, 71 HASTINGS L.J. 845, 893–97 (2020) (showing, in accordance with Wyman’s claim, that regulatory capture, legislative and judicial politics, and legal tradition, rather than purely transaction costs, explain the lack of regulatory action in the context of fracking).

⁸⁴ One could argue, on a high level of generality, that a Demsetzian framework does provide answers to the question of whether a regime will be copied—the answer, so goes the argument, lies in the analysis of the relevant costs. According to this argument, a Demsetzian framework would predict that a particular regime would be copied when the benefits of doing so outweigh the costs. This assumption, regarding benefits outweighing the costs, is largely shared by the legal transplants literature as well. So at a high level of generality, the Demsetzian framework is in line with the legal transplants literature. But again, this high level of generality does not give us much by way of predicting *which* regime will be selected, and how.

relevant natural resources in need of regulation or new questions about existing resources that became contentious at one point.

The case studies underscore a third, as of yet understudied, type of transplant—one that occurs within the same jurisdiction between types of resources or subject matters. Beyond its descriptive capacity, the transplant framework is helpful in its explanatory power. It highlights *why* this kind of borrowing occurs, *what* is borrowed, and *who* is primarily engaged in borrowing.

A. *Why Do We Borrow?*

Why do we borrow? Policymakers have more than one option for how to govern a particular resource. In that sense, regimes can be seen as “competing” with each other. So why choose an internal, cross-substance transplant as opposed to designing a completely new regime or copying from another jurisdiction? A first explanation relates to particular preferences pertaining to natural resources. Natural resource governance is an area where sovereignty concerns tend to be prominent,⁸⁵ and jurisdictions may aim at discouraging foreign investment by making the entry into a new legal system costly. Regulating a new resource in a way that is similar to an existing resource provides those already operating in the jurisdiction with an advantage over those who might seek to enter from without. The existing actors benefit from existing knowledge and know-how, as compared to external investors. This kind of policy preference encapsulates a form of natural resources parochialism, often also referred to as natural resources protectionism.⁸⁶ Jurisdictions may also want a regime that

⁸⁵ For example, foreign investors are not allowed to invest in minerals in federal lands, and the Mineral Leasing Act only allows foreign investors to do so by owning stock in a United States corporation. Mineral Leasing Act of 1920, Pub. L. No. 66-146, § 1, ch. 85, 41 Stat. 437, 437–38 (codified as amended at 30 U.S.C. § 181) (denying citizens of another country ownership over any lease under the Act when the “laws, customs or regulations” of the other country “deny similar or like privileges to citizens or corporations of this country” but permitting the disposition of leases to corporations organized under the laws of the United States); see also U.S. GOV'T ACCOUNTABILITY OFF., GAO-08-320, FOREIGN INVESTMENT: LAWS AND POLICIES REGULATING FOREIGN INVESTMENT IN 10 COUNTRIES (2008), <https://www.gao.gov/products/gao-08-320> [<https://perma.cc/MYN4-W7P9>] (reviewing how major foreign investors in the United States, among other countries, regulate foreign investment in their own countries).

⁸⁶ For an illustration of the tensions between protectionism and sustainability in regulating the use of Great Lakes water, see Christine A. Klein, *The Law of the Lakes: From Protectionism to Sustainability*, 2006 MICH. ST. L. REV. 1259, 1260, 1278. For a discussion of the differences between protectionism and protecting public access to water resources, see Vanessa Casado Pérez, *Whose Water? Corporatization of a Common Good*, in ENVIRONMENTAL LAW, DISRUPTED 79, 92 (Keith Hirokawa & Jessica Owley eds., 2021). Another example of protectionism relates to the proposed Canadian Great Recycling and Northern Development (GRAND) Canal, which would have dammed James Bay to collect

reflects the jurisdiction's preferences for natural resource development, which may be different from their neighbors' preferences.⁸⁷ For example, a jurisdiction may prefer allowing market mechanisms to allocate natural resources. In such a jurisdiction, copying a private property rights trading scheme used for one resource and applying it to another may be a good solution. Instead, if the jurisdiction prefers to channel exploration and development of resources via governmental licenses, and not property rights, they could already have licensing systems in place. Extending the existing licensing mechanisms to "new" resources could help, for instance, by reducing agency costs and capitalizing on existing institutional capacity and know-how.

The second possible explanation for transplanting focuses on efficiency gains. A regime borrowed from a different resource may be best suited for the new natural resource in question, given the similarities between resources. For example, minerals in space could be deemed similar to any other mineral on Earth, and, accordingly, we could apply similar rules to the two minerals. To be sure, there are no two resources that are the same, and whatever characteristic is deemed salient is subject to a certain degree of subjectivity. Whether or not these efficiency gains materialize is, of course, an empirical and highly case-specific matter.

Relatedly, there could be efficiency gains related to the transition costs involved in adopting a new regime.⁸⁸ Transition costs, as our discussion of the evolution of regimes in natural resources will show,⁸⁹ can be a significant factor in determining whether, or when, change

water wasted in the Quebec River and pump it south to the Great Lakes and Mississippi River. J. Owen Saunders, *Trade Agreements and Environmental Sovereignty: Case Studies from Canada*, 35 SANTA CLARA L. REV. 1171, 1181 (1995). This project prompted the parties to the North American Free Trade Agreement (NAFTA) to make clear through joint statements that the agreement did not generate any right to the water resources of the parties. *Id.* at 1182–83. The North American Water and Power Alliance (NAWPA or NAWAPA) is another project that implied taking Canadian water into the United States, and the Army Corps of Engineers envisioned channelling water from Alaska and the Canadian Northwest through the Rocky Mountain trench to replenish the Colorado and the Mississippi systems. *Id.* at 1181. This behavior also exists at a smaller scale. *See id.* at 1184 (discussing Ontario's protectionist Water Transfer Control Act of 1989).

⁸⁷ *See, e.g.,* U.S. GOV'T ACCOUNTABILITY OFF., *supra* note 85, at 3 (summarizing countries' differing approaches to regulating foreign investment, including policies concerning investment in the energy sector and natural resources).

⁸⁸ As mentioned, the term "transition costs" could—broadly—encompass a wide range of costs, including the costs of designing, drafting, testing, and implementing a new regime; the costs of adapting to a new regime, including building new practices and know-how; building new institutional capacity; increased financing costs, opportunity costs; and more. Just as with the other types of efficiency-related trade-offs, the extent and scope of these costs is an empirical, and highly case-specific matter.

⁸⁹ *See infra* Section II.B.

happens. For example, copying a regime, instead of designing a new one, saves costs because there is less need for preliminary studies. Copying an existing regime reduces the costs for all those involved (whether private parties, courts, or administrators) who would otherwise need to learn and adapt to a new regime and build new institutional capacity, practices, and know-how. Borrowing may also save time when a new regime needs to be in place quickly, either because the judiciary needs to decide on a case before it or because an executive branch agency is influenced by current legislation and finds it quicker to resort to the toolkit available.

When the borrowing is internal, albeit cross-subject, there are further savings. The legal community of that jurisdiction is already familiar with the existing regime, and, therefore, they face fewer upfront costs of learning the operation of the new rules or doctrines.⁹⁰ This is particularly true when the transplant occurs between two natural resources, as lawyers practicing in the area of natural resources may work across several resources.⁹¹

Natural transplants also have potential to be more readily accepted. A transplant “succeeds” when it is not rejected. Transplants of natural resources doctrines are likely to be accepted both because of their intrajurisdictional nature and because of the characteristics of natural resources law. First, intrajurisdictional transplants avoid many of the pitfalls of interjurisdictional transplants. As stated, the main challenges for transfers of legal doctrines between jurisdictions are the political, economic, and social differences.⁹² Interjurisdictional legal transplants need to both adapt to the context in the new jurisdiction and, often, be a motor of change. Intrajurisdictional transplants should not need to adapt to different circumstances, although there is the possibility that the communities exploiting and affected by a particular natural resource may be different. Furthermore, as explained above, there is a community who will likely be constant across resources: the legal community specializing in natural resources. Second, natural resources law is an area where transplants could be accepted given the tight control that government agencies have over most natural resources and because the level of private intermediation

⁹⁰ See Garoupa & Ogus, *supra* note 36, at 347 (“[A] regime that is well known and used may be cheaper to switch to than a brand-new regime.”).

⁹¹ See *infra* notes 113–17 and accompanying text. This is a difference between vertical and horizontal transplants. In vertical transplants between national and international law, international lawyers are borrowing from that which they may not be familiar. See Wiener, *supra* note 4, at 1349–50 (describing how entrepreneurial “change agents,” such as NGOs or academics, not just lawyers, often play a crucial role in executing transplants between national and international law).

⁹² See *supra* notes 69–77 and accompanying text.

is relatively low.⁹³ However, “success” is difficult to measure. Every rule evolves once introduced into a system. Even an ill-fitted one may remain in the system, and both the rule and the responses to it may adapt.

B. *What Do We Borrow?: Heuristic of Availability*

We identify two factors that contribute to the determination of which resource law a jurisdiction may borrow from: similarities between the resources, saliency, or a combination of both. A salient resource, in this context, is one that is most common in a particular jurisdiction or one which is economically prominent in the jurisdiction.⁹⁴ In Texas, for example, oil is probably the most intuitively salient resource. Thus, if a new resource were to be allocated in Texas (especially if that new resource happened to share a few characteristics with oil), rules regarding oil are the ones likely to be transferred. When a new resource or a new legal challenge emerges, lawyers, courts, and policymakers intuitively rely on what they know best and apply it to the new problem. Saliency could also be seen as an illustration of the heuristic of availability.⁹⁵ It could also be seen as a form of path dependence.⁹⁶ Literature on path dependence shows that as

⁹³ See Garoupa & Ogus, *supra* note 36, at 355–57, 356 tbl.4 (discussing how “harmonization” of legal regimes is likely to take place in administrative and regulatory law, where private intermediation is low).

⁹⁴ See Henry E. Smith, *The Elements of Possession* (discussing how resource use and considerations of value and efficiency can make features “prominent and attention grabbing” and therefore salient), in *LAW AND ECONOMICS OF POSSESSION* 65, 66, 84, 93 (Yun-Chien Chang ed., 2015). The idea of “saliency” is also reinforced by Robert Sugden and his work on focal points, which are points of salience that offer solutions to cooperation games. ROBERT SUGDEN, *THE ECONOMICS OF RIGHTS, CO-OPERATION AND WELFARE* 49–51 (2d ed. 2005); see also Lifshitz, *Property Beyond Land*, *supra* note 29 (manuscript at 4–5) (discussing the connection between the idea of salience and focal point solutions in the case of land).

⁹⁵ See *supra* note 23.

⁹⁶ Path dependence refers, broadly, to the idea that history matters: Choices made in the past constrain our set of choices in the present. See, e.g., Oona A. Hathaway, *Path Dependence in the Law: The Course and Pattern of Legal Change in a Common Law System*, 86 *IOWA L. REV.* 601, 604 (2001) (stating that path dependence “entails . . . a causal relationship between stages in a temporal sequence, with each stage strongly influencing the direction of the following stage”); Lewis A. Kornhauser, *Modeling Collegial Courts I: Path-Dependence*, 12 *INT’L REV. L. & ECON.* 169, 180–81 (1992) (discussing how a strong principle of stare decisis contributes to making judicial decisions path dependent and also predictable and fair); Richard R. Nelson, *Recent Evolutionary Theorizing About Economic Change*, 33 *J. ECON. LITERATURE* 48, 50–51 (1995) (“[T]he process of evolution is strongly path dependent and there is no unique selection equilibrium. Any ‘optimizing’ characteristics of what exists therefore must be understood as local and myopic”); Karrigan S. Börk, *An Evolutionary Theory of Administrative Law*, 72 *SMU L. REV.* 81, 86 (2019) (arguing that the development of administrative law mimics a path-dependent biological evolution and examining the implementation of the Endangered Species Act as

areas of the law evolve, they remain constrained by existing regulations and institutions, making it difficult to start with a clean slate.⁹⁷ In some cases, the legal actor may not have any other choice. The Environmental Protection Agency facing congressional inaction needed to use the Clean Air Act framework after *Massachusetts v. EPA* was decided.⁹⁸

Path dependencies could lead to a particular resource being more salient than others. Regarding natural legal transplants, it is often the case that those who practice in, adjudicate, or regulate one resource may also work on a new resource requiring a new solution,⁹⁹ and, as such, they may turn to what is familiar to them, which illustrates the heuristic of availability.¹⁰⁰

Consider again the example of Texas: As mentioned, in Texas, the dominant industry is oil and gas, and, accordingly, oil and gas law is a particularly prevalent source of transplant.¹⁰¹ Saliency in this context is also a result of the training and experience of the legal community. As noted above, natural resource lawyers often work across multiple areas and are likely to have more experience in the most common or most valuable resource in the community.¹⁰²

a case study); Amy L. Stein, *Breaking Energy Path Dependencies*, 82 BROOK. L. REV. 559, 559–60 (2017) (using path-dependency theory to explain how energy law perpetuates the use of fossil-fuel resources and identify mechanisms for promoting clean energy development).

⁹⁷ See Mark J. Roe, *Chaos and Evolution in Law and Economics*, 109 HARV. L. REV. 641, 642–43 (1996) (analyzing path dependence and how it overlaps with other paradigms of the evolutionary theory of law). Roe also questions the law and economics claim that the regulations that survive are efficient and claims that lasting regulations can be related to path dependence or may have been efficient for the conditions at time of enactment but not at present time. *Id.* at 641–44; see Donald T. Hornstein, *Complexity Theory, Adaptation, and Administrative Law*, 54 DUKE L.J. 913, 921 (2005) (reviewing theories that examine how inefficient regulations arise because of selection, self-assembly, and emergence); J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 GEO. L.J. 757, 806–09 (2003) (discussing the problem of “conflicting constraints” imposed by regulations, where changing a single legal rule can lead to unanticipated consequences on the overall effectiveness of the legal system); Gail Charnley & E. Donald Elliott, *Risk Versus Precaution: Environmental Law and Public Health Protection*, 32 ENV'T L. REP. 10363, 10365 (2002) (“Environmental health regulation is path-dependent: actions taken now affect the nature of actions taken later. Governments may not be able to ‘roll back’ citizen protections in the face of charges from environmental advocates even if the original actions turn out to have been unnecessary or ineffective.”).

⁹⁸ See *infra* notes 118–27 and accompanying text.

⁹⁹ See *infra* notes 111–15 and accompanying text.

¹⁰⁰ See Sunstein, *supra* note 23, at 87–88 (explaining how people assess the magnitude of risks by turning to what examples come to mind, which are influenced by familiarity, culture, and social context).

¹⁰¹ See *infra* Section III.A (discussing Texas courts’ use of oil law to adjudicate groundwater disputes).

¹⁰² See *supra* note 91 (discussing the expertise of international actors besides lawyers).

The behavior of the legal community in this context, however, is not limited to the experience of private attorneys. It can also be observed in government actors. If one lawyer was working in coal mining in a state's environmental agency and is transferred to the waste program, this lawyer may well import regulatory frameworks from surface mining into waste when asked to prepare a new regulation.¹⁰³

C. *Who Borrows?*

An important factor in the choice of who effectuates a transplant is the forum in which transplanting occurs. Transplanting within the legislature or an agency may be even more prominent than if it happens in the courthouse, where the procedure would be adversarial. When a problem with a new resource is litigated in court, one party may argue that the resource is more like another resource governed by a doctrine favoring the interests of the said party, while the other side will argue similarly in favor of the doctrine which governs a different resource. In the legislature or executive branches, we expect the deliberation procedure to engage with a broader set of stakeholders and draw from a larger pool of regulatory ideas.¹⁰⁴ In the absence of regulatory capture,¹⁰⁵ a legislature or the executive branch is expected to produce regulations applicable across all cases, with a long-term view. In contrast, judges and attorneys are constrained by the facts of the case before them and may lack the capacity to systematically study a subject area. For example, if a court is tasked with developing a new doctrine over a recently discovered natural resource, the information costs¹⁰⁶ judges face may prevent them from considering all the long-term effects and the application of the rule to situations that differ from the case at hand. The next Section will start by looking at judicial proceedings to highlight the similarities and differences between the natural transplants framework and legal analogy. It will then review examples of transplants in the other branches.

¹⁰³ See *infra* Section II.C.3 (discussing waste management).

¹⁰⁴ For a comment on the input received during notice-and-comment rulemaking by agencies and the potential changes in the proposed regulation as a result of stakeholder input, see *Public Notice and Comment Rulemaking (United States)*, ORG. FOR ECON. COOP. & DEV., <https://www.oecd.org/gov/regulatory-policy/USA-Public-Notice-and-Comment.pdf> [https://perma.cc/HWY8-VKNM].

¹⁰⁵ See Wiener, *supra* note 4, at 1359 (arguing that capture may cause inefficient regulations when legislatures adopt legal rules from other jurisdictions).

¹⁰⁶ See *id.* (“Judicial adoption of legal rules may be inefficient because judges have high information costs . . .”).

1. *The Judicial Branch: Analogy and Transplants*

One may wonder whether the borrowing highlighted here is really just a manifestation of the common law practice of reasoning by analogy.¹⁰⁷ It is not. We resist this simplification for three main reasons.

First, in the courtroom, analogy may be the vehicle by which transplanting happens, but it does not capture the full breadth and depth of the broader phenomenon of transplanting.¹⁰⁸ While the term analogy means, roughly, that an idea from one context is used in another, this definition in itself has very limited explanatory power. It does not tell us, for example, which regime will be chosen, by whom, or why. The transplant framework offered here, in contrast, offers a much richer conceptual analysis of these factors. We aim to begin filling the explanatory gap (albeit, for now, only in the specific context of natural resources) by referring to the idea of saliency and the heuristic of availability.

Second, and relatedly, the idea of analogy misses an important message of the transplant literature: Sometimes borrowing works well, and sometimes it does not. Analogical reasoning does not speak directly to whether the borrowing is justified, successful, or useful. The concept of transplanting is also much broader than an analogy. The former indicates a broader adoption of systems and rules, whereas the latter is limited to similarities between particular cases.¹⁰⁹

¹⁰⁷ See Brian N. Larson, *Law's Enterprise: Argumentation Schemes & Legal Analogy*, 87 U. CIN. L. REV. 663, 679–80 (2019) (describing how reasoning by legal analogy involves identifying relevant similarities between instant and prior cases based on rules or general principles).

¹⁰⁸ For a recent articulation of the process of analogical reasoning in the court system, see Cass R. Sunstein, *Analogical Reasoning 1* (Harv. Kennedy Sch., Working Paper No. 21-39, 2021), <https://ssrn.com/abstract=3938546> [<https://perma.cc/QPC3-76DP>].

¹⁰⁹ When reasoning by analogy, we pull upon similarities of existing case law or statutory interpretations and apply them to a specific fact pattern. EDWARD H. LEVI, *AN INTRODUCTION TO LEGAL REASONING* 1–2 (1949). When it comes to case law, we typically see a particular phrase generalized through reasoning by analogy. *Id.* at 8. Legal concepts end up applying to a wide range of cases because a multitude of similarities have been identified. Thus, this constant analogizing and expansion can result in the “breakdown” of rules. *Id.* at 9. Breakdown occurs when the application of the rule has become so broad through the use of analogy that the original, specific doctrine no longer exists. *Id.* Levi here suggests that the rule is no longer the same across subject matters even if they nominally use the same concept. The application of the rule of capture to water, see *infra* Section III.A; foxes, see *Pierson v. Post*, 3 Cai. 175, 177–80 (N.Y. Sup. Ct. 1805) (finding that hunter who killed and removed a wild fox established a property right in it); whales, see ROBERT C. ELLICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* 191–206 (1991) (discussing how whaling norms led to several property rules that were variations of the rule of capture); or baseballs, see *Popov v. Hayashi*, No. 400545, 2002 WL 31833731, at *2, *8–9 (Cal. Super. Ct. Dec. 18, 2002) (finding that both litigants established equal possessory interests in a baseball during a scrum to catch it and ordering the parties

Third, and no less importantly, the term analogy is primarily court-focused, whereas the practice of natural transplanting is not limited to courts. It occurs across institutions and includes legislators, agencies, and private individuals, as the next Sections show.

2. *Natural Transplanting in the Legislature*

Prior appropriation is the regime that governs the allocation of water use rights in the Western United States. It is a doctrine born in the customs of mining camps.¹¹⁰ “First in time, first in right” was the doctrine applied to minerals, so when mining camps had to decide how to allocate water, the same principle applied. Courts acknowledged and accepted this doctrine for the first time in *Irwin v. Phillips*.¹¹¹ Later, most state legislatures moved to adopt prior appropriation.¹¹²

3. *Transplanting Within the Executive Branch*

Agencies usually work across different areas, and administrators may hold different job positions, in different subject matters, over time. As such, they may be biased towards the resource they have more experience with. Consider the following example, which is based on an interview we conducted: An administrator worked in the Pennsylvania Department of Environmental Resources for more than

to equally divide the proceeds from the baseball’s sale), may well illustrate this point. That said, the cases reviewed in this paper have not caused a breakdown of the rules, such as, the ownership in place. Analogy is, thus, a mechanism through which natural transplants happen.

¹¹⁰ The system of prior appropriation was first articulated in *Irwin v. Phillips*, when the California Supreme Court acknowledged, “[t]he miner who selects a piece of ground to work, must take it as he finds it, subject to prior rights.” 5 Cal. 140, 147 (1855). Accordingly, miners who selected riparian land previously subjected to water diversion could not prevent others from diverting the water in the future. *Id.* To the contrary, miners who selected riparian land where water had never been diverted could prevent others from diverting the water in the future. *Id.* In contrast, in the Eastern United States, water was allocated based on the English doctrine of riparianism, which was well-suited for the humid areas of the first colonies, but much less so for the West where average rainfall was much lower and use of water beyond riparian lands was a necessity. See BARTON H. THOMPSON, JR., JOHN D. LESHY, ROBERT H. ABRAMS & SANDRA B. ZELLMER, *LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS* 194–95 (6th ed. 2018) (describing how Western states slowly transitioned from the “traditional common-law riparian system” to “specific statutory scheme[s] for allocating its surface water”).

¹¹¹ See THOMPSON, JR. ET AL., *supra* note 110, at 195 n.30; see also Denise D. Fort, *Prior Appropriation*, WATER ENCYCLOPEDIA, <http://www.waterencyclopedia.com/Po-Re/Prior-Appropriation.html> [<https://perma.cc/99NR-MTVM>].

¹¹² THOMPSON, JR. ET AL., *supra* note 110, at 195–98 (noting that while “early legislatures . . . typically adopted either variants of the riparian doctrine or more general equitable allocation schemes,” by the start of the 1860s, and especially by the 1870s, courts and legislatures increasingly saw the attractions of the appropriation system).

a decade, first in the Bureau of Regulatory Council and then in the Bureau of Waste Management. In the first position, he worked on surface mining; in the second, in waste management.¹¹³ When tasked to deal with municipal and industrial non-hazardous waste, he borrowed ideas from surface mining and introduced them in the waste regulations.¹¹⁴ For example, the notice and participation requirements or the separation between permit and operating requirements were borrowed. Surface mining and waste have issues in common; for example, both require moving soil.¹¹⁵ However, his knowledge of surface mining regulations clearly played a role in his decision to transplant elements of the mining regime to waste regulations.¹¹⁶ Nonetheless, this was not a copy-and-paste situation; rather, content-specific subject matter was introduced. At times, the language of surface mining regulation, in issues like notice, could be used; in other matters, surface mining regulations provided the organizational framework that then was filled with content specific to waste. The result was a very clear waste regulation.¹¹⁷

Sometimes a natural transplant is the most viable option for administrators faced with legislative inaction. For example, when the Environmental Protection Agency had to regulate greenhouse gas emissions, the only toolkit available was the one offered by the Clean Air Act.¹¹⁸ This statute did not originally envision the regulation of carbon dioxide or methane. Instead, the Clean Air Act was passed to regulate conventional pollutants, even if the statute's words are ambiguous.¹¹⁹ The Environmental Protection Agency could not use

¹¹³ Video Conference Interview with John Dernbach, Professor, Widener Univ. Commonwealth L. Sch. (May 2021).

¹¹⁴ *Id.*

¹¹⁵ *See, e.g.*, 25 PA. CODE §§ 86.134(4), 271.3(c), 299.160(a) (2021).

¹¹⁶ Video Conference Interview with John Dernbach, *supra* note 113.

¹¹⁷ *Id.*

¹¹⁸ *See Massachusetts v. EPA*, 549 U.S. 497, 512–13, 532 (2007) (holding that the Clean Air Act requires the EPA to regulate greenhouse gas emissions even though drafters of the statute might not have anticipated it would be used for that purpose).

¹¹⁹ *See* 42 U.S.C. § 7401 (stating that one purpose of the statute was to generally “promote the public health and welfare” in response to urban and industrial developments, as well as increased use of cars). The Clean Air Act was enacted to deal with the rampant air pollution the United States suffered in the mid-twentieth century. *See* JAMES SALZMAN & BARTON H. THOMPSON, ENVIRONMENTAL LAW AND POLICY 111–13 (4th ed. 2014) (suggesting that Congress initially intended for the Clean Air Act to regulate pollutants that pose health risks, such as smog, nitrogen oxides, volatile organic compounds, and other hazardous air contaminants, many of which were released into the air from urban centers). Greenhouse gases were not part of the initial pollutants the Clean Air Act was enacted to regulate. While the EPA had denied that the Clean Air Act covered greenhouse gases, the Supreme Court allowed their regulation under the Clean Air Act in *Massachusetts v. EPA*, in what has been described as a “watershed moment.” Mark C. Bond, *Can and Should Greenhouse Gases Be Regulated as Hazardous Air Pollutants Under*

tools such as a carbon tax or cap-and-trade,¹²⁰ the gold standard for greenhouse gases, due to congressional inaction. Instead, the Agency had to use the Clean Air Act,¹²¹ despite the fact that it did not originally conceive of greenhouse gases as pollutants.

There are numerous differences between greenhouse gases and conventional pollutants, which poses a challenge for the EPA because the tools available under the Clean Air Act were not optimized to deal with greenhouse gases.¹²² While the EPA had to use the same regulatory apparatus to deal with greenhouse gases, modifications were necessary. Conventional pollutants, for one, are local, while carbon dioxide is global. Another difference is the level of emissions for each of these pollutants. In 2011, for example, the EPA promulgated the Light-Duty Vehicle Rule regulating fuel efficiency and greenhouse gas standards for mobile sources.¹²³ By regulating greenhouse gases as pollutants, the regulation of stationary sources under the Clean Air Act was triggered.¹²⁴ The Clean Air Act required “major” stationary sources to be regulated.¹²⁵ However, the caliber of “major” was measured based on conventional pollutants and thus applied to facilities emitting 100 or 250 tons per year, much lower than the amount of greenhouse gases normally emitted.¹²⁶ The EPA had to adapt and tailor the requirements for stationary sources to greenhouse gases to 100,000 tons per year.¹²⁷

Clean Air Act Sec. 112?, 28 ENV'T CLAIMS J. 18, 19 (2016). The words in a statute are given by the legislature and carry a heavy weight. See LEVI, *supra* note 109, at 54 (noting how statutory silence on certain issues is sometimes interpreted as an intentional move by a legislature). However, there are many reasons why a legislature might purposefully leave a statute ambiguous, such as high pressure to pass the bill or inability to foresee every case in which the statute will need to be applied. Such ambiguity is why the intent behind the statute is of equal importance as the words. Reasoning by analogy can expand the legislature's intent and apply a statute to a specific fact pattern.

¹²⁰ The House of Representatives approved the American Clean Energy and Security Act of 2009, which would have established an economy-wide cap-and-trade system, but the Senate did not. Jody Freeman & David B. Spence, *Old Statutes, New Problems*, 163 U. PA. L. REV. 1, 20–21 (2014).

¹²¹ *Id.*

¹²² Bond, *supra* note 119, at 28–30 (discussing various shortcomings of the Clean Air Act as a tool for regulating greenhouse gases).

¹²³ Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514, 31,516 (June 3, 2010).

¹²⁴ *Id.*

¹²⁵ *Id.* at 31,520.

¹²⁶ *Id.* at 31,516.

¹²⁷ *Id.*; see also *Clean Air Act Permitting for Greenhouse Gases*, U.S. ENV'T PROT. AGENCY, <https://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases> [<https://perma.cc/9YVT-5HJB>].

Federal agencies have to cope with similar challenges in the face of congressional inaction when regulating emerging energy markets¹²⁸ and many non-environmental matters.¹²⁹ Misfits continue to appear as Congress is unable to amend obsolete statutes,¹³⁰ and the need to respond to new areas that require regulation is satisfied thanks to transplants, as discussed below.

4. *Private Parties' Transplants*

Oil and gas leasing brokered by landmen has a long history in the United States.¹³¹ “Leasing” in this context refers to the practice of acquiring rights to access the resource (oil and gas) through a particular plot of land and to harvest the resource. As the case study below on wind shows, when the wind energy industry started to develop, more recently, it similarly needed to access and exploit resources (in this case, wind) on private lands. It thus relied on the same familiar leasing mechanism from oil and gas. Both underground oil and above-ground wind belong by default to the landowner.¹³² Both resources need to be pooled, so private parties need to agree to contracts with developers. Hence, it is natural that oil and gas leases have served as a model.¹³³ Contracting for land-access and wind rights is largely based on oil and gas contracting practices. Thus, much like courts and administrative agencies, private parties also employ internal transplanting techniques in their contractual relationships.¹³⁴

¹²⁸ See Freeman & Spence, *supra* note 120, at 43 (describing how the Federal Energy Regulatory Commission has regulated emerging energy markets against the backdrop of the Federal Power Act).

¹²⁹ See *id.* at 5–6 (discussing generally how agencies often have to adapt to changing realities in the face of congressional inaction and older statutes).

¹³⁰ See *id.* at 18 (enumerating examples of statutes in need of “makeovers”).

¹³¹ Gary Libecap’s work on contracting among landowners toward control of oil and gas reserves serves as an illustrative example of this strand of literature. GARY D. LIBECAP, *CONTRACTING FOR PROPERTY RIGHTS* 97–98 (1989) (explaining how private agreements help avoid common pool losses from competitive oil extraction).

¹³² See Lifshitz, *The Geometry of Property*, *supra* note 5, at 502 (stating that management decisions on wind resources are made according to real-property divisions).

¹³³ See, e.g., David G. Runnels & Bonnie Rubey McMurtry, *How Wind, Oil and Gas Leases Differ*, *TEX. LAWYER* (Mar. 18, 2013), https://www.kslaw.com/attachments/000/004/750/original/3-18-13_Runnels.pdf [<https://perma.cc/5UHD-BLV4>] (finding that many landowners today seek to sever their wind rights from their surface rights and thereby sell them off, similar to how they might sever and sell their rights to underground resources like minerals).

¹³⁴ For a similar argument discussing the shifting of doctrines from one area of contract to another and the process by which such shifting occurs, see Tal Kastner & Ethan J. Leib, *Contract Creep*, 107 *GEO. L.J.* 1277, 1279 (2019) (arguing that although contract law doctrines often develop to deal with certain types of transactions, legal ideas from one transactional context often bleed into others). Under the framework offered here, this kind of doctrinal creep could be conceptualized as an internal-type transplant.

As mentioned above, lawyers often work in a portfolio of somewhat adjacent areas. For example, a lawyer may cover several natural resources in his practice. Borrowing from one of them to deal with a new issue in a different case or client is natural, as we have explained under the heuristic of availability. Private attorneys may bring analogies before courts, but this Section refers to transplants in the private sphere, specifically, transplants in contracts.¹³⁵ Referring to a well-known contract form or clause may offer a focal point and may shorten negotiation time. Moreover, in a contract, both parties must agree to the borrowing of a clause. As such, one may expect such borrowing to be socially beneficial and enhance the positions of both parties. However, there are situations where parties may not be on equal footing, and, as such, the legal transplant may be beneficial only to one party.¹³⁶

D. *The Risks of Natural Transplants*

Legal transplants are not always successful. Two jurisdictions are never identical. The economic, political, and social characteristics of a jurisdiction can influence the operation of the regulation. Accordingly, a successful law in country *A* may fail in country *B*.¹³⁷ As noted above, legal transplants are not so different from organ transplants, where the organ can be rejected in the short or in the long term.¹³⁸ Many critiques of legal transplants are rooted in the transplanting of legal institutions from developed to underdeveloped countries, imposed or not, because the receiving country does not have the same characteristics as the country where the legal institution originated, and the effects may be detrimental for the importer. Natural transplants do not face the same challenges because they are internal to a jurisdiction, so the socioeconomic and political context is constant; at most, there may be differences in the industry players and stake-

¹³⁵ *Id.* (explaining that contract regimes developed to deal with certain types of transactions might have broad applicability to other types of contractual relationships).

¹³⁶ For such an example in the natural resource context, see Brian Steinocher, *Regulate or Be Regulated: Why Professional Landmen Should Be Proactive in Protecting the Integrity of Their Occupations*, 4 TEX. A&M J. PROP. L. 383, 388–92 (2018) (underscoring how landowners who negotiate leases with energy companies are often at an informational disadvantage or inferior bargaining position).

¹³⁷ As an example, Spain adopted Germany's feed-in tariff policy to promote solar power. However, the rates required to promote solar in rainy Germany turned out to be far too high for sunny Spain. The result was gross overspending by the government, which, in turn, eroded public support for the policy. Felix Mormann, *Enhancing the Investor Appeal of Renewable Energy*, 42 ENV'T L. 681, 729 (2012).

¹³⁸ See *Transplant Rejection*, MEDLINEPLUS, <https://medlineplus.gov/ency/article/000815.htm> [<https://perma.cc/4PDY-LPQN>] (stating that organ transplant rejections can occur over a period of weeks, months, or even years).

holders. We can imagine one resource being controlled by a few big international firms, while another is allocated to small businesses in a state.

The material differences in the context of natural transplants that may affect the transplant's success are the natural characteristics of the resource. There are differences between oil, water, and wind, and yet courts and regulators, at least in some cases, treat them the same.¹³⁹ If our transplant decisions ignore the scientific differences between resources, the consequences of importing a legal doctrine or practice can be negative.

As stated in the previous Section, the exploitation of wind rights followed the oil and gas model on private lands. Wind leases were modeled after oil and gas leases. This transplant may have impaired the development of wind rights. As will be explained below, extracting energy from the wind (for the purpose of producing electricity) has significant impacts on neighboring users. A neighbor located downwind of a turbine will receive a depleted wind-stream. This could cause conflicts among neighbors over the use of the airstream, and such conflicts have indeed arisen in a few instances.¹⁴⁰ The effects of wind energy extraction, however, are not limited to neighborly conflicts, but rather extend to the broader environment. The introduction of wind energy to an area has been shown to cause changes in temperatures¹⁴¹ as well as levels of precipitation¹⁴² and even changes in climate.¹⁴³ Altering the wind can also affect local ambient pollution

¹³⁹ See *infra* Section III.A.

¹⁴⁰ See *infra* Section III.B for a full discussion of the instances in which conflicts over the use of wind resources arose, and other practices that signal concern over the potential conflicts that can result from the wind wakes.

¹⁴¹ See Liming Zhou, Yuhong Tian, Somnath Baidya Roy, Chris Thorncroft, Lance F. Bosart & Yuanlong Hu, *Impacts of Wind Farms on Land Surface Temperature*, 2 NATURE CLIMATE CHANGE 539, 539 (2012) (finding a warming trend near wind farms); Somnath Baidya Roy & Justin J. Traiteur, *Impacts of Wind Farms on Surface Air Temperatures*, 107 PROC. NAT'L ACAD. SCI. 17899, 17899 (2010) (showing a warming effect at night and a cooling effect during the day near wind farms); David Biello, *How Wind Turbines Affect Your (Very) Local Weather*, SCI. AM. (Oct. 4, 2010), <https://www.scientificamerican.com/article.cfm?id=how-wind-turbines-affect-temperature> [<https://perma.cc/DG9Z-BS5Y>] (describing the impact that wind farms can have on regional or local temperatures).

¹⁴² See B.H. Fiedler & M.S. Bukovsky, *The Effect of a Giant Wind Farm on Precipitation in a Regional Climate Model*, 6 ENV'T RSCH. LETTERS 1, 3 (2011) (finding a "statistically significant 1.0% enhancement of precipitation in a multi-state area surrounding . . . the wind farm").

¹⁴³ See Daniel B. Kirk-Davidoff & David W. Keith, *On the Climate Impact of Surface Roughness Anomalies*, 65 J. ATMOSPHERIC SCI. 2215 (2008) (describing the various ways that modifications to the earth's surface features can effect wind currents and, in turn, impact the climate); D.B. Barrie & D.B. Kirk-Davidoff, *Weather Response to a Large Wind Turbine Array*, 10 ATMOSPHERIC CHEM. PHYSICS 769 (2010) (discussing the effects of wind farms on climate); L.M. Miller, F. Gans & A. Kleidon, *Estimating Maximum Global Land*

levels¹⁴⁴ and seed pollination¹⁴⁵ and has been suggested to influence radar systems.¹⁴⁶ Importantly for our purposes, applying oil and gas leasing practices in the emerging wind context has only exacerbated the problem, as the leases do not tend to account for these area-wide impacts.¹⁴⁷ In addition, the severance practices¹⁴⁸ which are typical of oil and gas proved to be unsuccessful in the context of wind.¹⁴⁹ This phenomenon is not exclusive to private parties. It can occur whenever a court, a legislature, or an agency imports a regulation from a different resource if those institutions ignore the differences between resources.

But there is also cause for optimism. Sometimes regulators are able to incorporate a regulatory framework from another resource but infuse it with the particularities of the resource it is being applied to. This is what happened in Pennsylvania when municipal waste regulations imported the framework from surface mining but adapted it.¹⁵⁰

Surface Wind Power Extractability and Associated Climatic Consequences, EARTH SYS. DYNAMICS, Feb.–June 2011, at 1 (“Inevitably, this [huge scale] removal of wind power from the Earth system must result in climatic impacts.”); Mark Z. Jacobson, Cristina L. Archer & Willett Kempton, *Taming Hurricanes with Arrays of Offshore Wind Turbines*, 4 NATURE CLIMATE CHANGE 195 (2014) (finding that offshore wind turbines can mitigate hurricane damage to coastal cities and states).

¹⁴⁴ See, e.g., Jonathan Remy Nash & Richard L. Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 ECOLOGY L.Q. 569, 601 (2001) [hereinafter Nash & Revesz, *Markets and Geography*] (“Winds that carry chemicals great distances and mix atmospheric components can significantly augment the rate of ozone production.”).

¹⁴⁵ See JAMES D. MAUSETH, BOTANY: AN INTRODUCTION TO PLANT BIOLOGY 208–11 (2008) (noting that wind aids plants in dispersal and reproduction).

¹⁴⁶ See Felix A. Losco & Thomas F. Collick, *When Wind, Wind Turbines, and Radar Mix—A Case Study*, 68 A.F. L. REV. 235 (2012) (evaluating how wind turbines can interfere with the functioning of air radar systems).

¹⁴⁷ See Yael R. Lifshitz, *Rethinking Original Ownership*, 66 U. TORONTO L.J. 513, 545–47 (2016) [hereinafter Lifshitz, *Rethinking Original Ownership*] (finding that landowners assert an exclusive position over the wind when it blows over their land, decide themselves if and how wind gets harvested, and do not necessarily account for the other widespread ramifications that these leases have on others).

¹⁴⁸ “Severance” in this context refers to the splitting of the mineral estate from the surface estate. In most U.S. states oil and gas are severable from the land title, meaning that the owner of the land does not necessarily own the right to the oil and gas under it. See JOSEPH P. TOMAIN & RICHARD D. CUDAHY, ENERGY LAW IN A NUTSHELL 224 (2d ed., Thomson Reuters 2011).

¹⁴⁹ See Runnels & McMurtry, *supra* note 133 (highlighting that many states have come to recognize that in the context of wind leases, the surface owner must generally be more involved with the lessee than they would in the context of, for example, a mineral lease, since in the wind context it is harder for the lessee to conduct their business entirely independent from the landowner).

¹⁵⁰ Video Conference Interview with John Dernbach, *supra* note 113.

In fact, copying is often the source of innovation.¹⁵¹ For instance, Johannes Gutenberg introduced moveable type printing by building on traditional presses at the time and woodblock printing.¹⁵² Similarly, adopting regulations from other resources can save upfront costs while still allowing for adaptation.

III

HISTORICAL EXAMPLES OF NATURAL TRANSPLANTS

The application of oil and gas law doctrines to groundwater in Texas and the regulation of rights in wind energy illustrate the nature of internal, cross-subject legal transplants, based on saliency and heuristics of availability.

Cross-subject borrowing can occur between jurisdictions, although the case studies will focus on intrajurisdictional transplants: water law borrowing from oil and gas, and water law or mineral law influencing wind and solar energy regulations. Taken together, these examples illustrate how a jurisdiction could, in a sense, copy itself.

A. *Water and Oil Do Mix in Texas*

(Ground)water and oil do not mix, except in Texas, where the doctrines and rules governing one of these resources are often transplanted to govern the other. Water and oil do share a few commonalities. First, water and oil may be found underground. Second, both are fugitive resources because there is some movement of them underground.¹⁵³ Third, while for a long time oil was perceived as the most important resource for economic prosperity, climate change has changed the outlook. Now, the consensus is to move away from oil. At the same time, water scarcity is more acute than ever, and water has become the new oil, attracting governments and deep-pocket companies to compete for access to the resource.¹⁵⁴ However, the differences

¹⁵¹ See JOHNSON, *supra* note 21 (theorizing that innovation does not necessarily come from developing new technologies and ideas purely from scratch but from modifying old ones or incorporating ideas from other domains into new contexts).

¹⁵² *The Incunable Era: The Gutenberg Press*, OR. STATE UNIV. LIBRS.: SPECIAL COLLECTIONS & ARCHIVES RSCH. CTR., <https://scarc.library.oregonstate.edu/omeka/exhibits/show/mcdonald/incunabula/gutenberg> [<https://perma.cc/H5JU-5SP4>].

¹⁵³ *Westmoreland & Cambria Nat. Gas Co. v. Dewitt*, 130 Pa. 235, 249 (1889) (“Water and oil, and still more strongly gas, may be classed by themselves, if the analogy be not too fanciful, as minerals *ferae naturae*. In common with animals, and unlike other minerals, they have the power and the tendency to escape without the volition of the owner.”).

¹⁵⁴ See, e.g., Julian Brookes, *Why Water Is the New Oil*, ROLLING STONE (July 7, 2011, 11:20 AM), <https://www.rollingstone.com/politics/politics-news/why-water-is-the-new-oil-198747> [<https://perma.cc/642G-D9EU>] (“As oil was in the 20th century – the key resource, a focus of tension, even conflict – so water will be of the 21st, as states, countries, and industries compete over the ever-more-precious resource.”).

are important too, and they suggest that groundwater and oil allocation should perhaps follow different rules. First, oil reservoirs are non-renewable and groundwater can be renewable. But replenishment of groundwater can be affected by overpumping. Overdraft occurs when recharge of groundwater from precipitation is smaller than groundwater withdrawals.¹⁵⁵ Overdraft has numerous negative consequences. It directly causes a depletion of the aquifer, contributing to groundwater contamination and requiring larger groundwater pumping costs and drilling of new or deeper wells.¹⁵⁶ There are also indirect negative effects of groundwater overexploitation such as land subsidence, infrastructure damage, harm to groundwater-dependent ecosystems, and the economic losses from a more unreliable water supply.¹⁵⁷ Second, and relatedly, groundwater systems have to be analyzed both dynamically over time (because there are lagged effects) and across a vast territory since the aquifers are connected to other resources.¹⁵⁸

The Texas Supreme Court, starting in *Stephens County v. Mid-Kansas Oil & Gas Co.*, has applied the rule of capture from groundwater to oil, with references to the similarities between groundwater and oil.¹⁵⁹ Also interesting for the purposes of this Article's analysis are the relatively recent transfers from oil and gas law to groundwater law regarding ownership in place of the resource and the accommodation doctrine.

In *Edwards Aquifer Authority v. Day*, the Texas Supreme Court adopted the rule of ownership-in-place for groundwater, following the oil and gas model in Texas.¹⁶⁰ In the *Day* case, the court made a com-

¹⁵⁵ William M. Alley, Thomas E. Reilly & O. Lehn Franke, *Sustainability of Groundwater Resources*, USGS, <https://pubs.usgs.gov/circ/circ1186/html/intro.html> [<https://perma.cc/BNX8-JJTA>].

¹⁵⁶ Tara Moran, Janny Choy & Carolina Sanchez, *The Hidden Costs of Groundwater Overdraft*, WATER IN THE W., <https://waterinthewest.stanford.edu/groundwater/overdraft/> [<https://perma.cc/6KPC-G2U4>].

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ 254 S.W. 290, 292 (Tex. 1923) (noting how oil and gas located in the ground, like water, can flow between spaces or crevices, thereby raising questions about whether one only acquires ownership over the resource once it is extracted and brought to the surface). The potential for tragedy that the rule of capture brings for the exploitation of natural resources has been well documented. See Gary D. Libecap & Steven Wiggins, *Contractual Responses to the Common Pool: Prorating of Crude Oil Production*, 74 AM. ECON. REV. 87, 88–89 (1984) (describing problems associated with the rule of capture, such as incentivizing over-drilling of oil); Anderson & Hill, *supra* note 79, at 492 (explaining that the rule of capture can lead to unequal distribution of resources and rent-collection when particularly skilled entrepreneurs race to obtain the resource, thereby boxing-out others).

¹⁶⁰ 369 S.W.3d 814, 831–32 (Tex. 2012). Texas, New Mexico, Colorado, and Kansas apply this approach closer to the *ad coelum* principle. JOHN S. LOWE, OIL AND GAS LAW IN A NUTSHELL 33–34 (6th ed. 2014). Other oil producing states, like California, Oklahoma, Louisiana, and Wyoming follow the non-ownership theory where the owner of the land has

parison between groundwater and oil because both are fugacious resources.¹⁶¹ According to the court, the differences between the two are the product of regulation and even that seemed to be converging.¹⁶² While the Edwards Aquifer Authority argued that the lack of correlative rights in groundwater implied that it could not be subject to ownership in place, the court considered that the authority granted to the Edwards Aquifer Authority by the legislature precisely established the equivalent of correlative rights in groundwater because the agency's purpose was to ensure that each landowner gets a fair share of groundwater.¹⁶³

The Texas Supreme Court recognized the differences between the two resources and the ultimate goals of their regulation but ultimately adopted the same rule for both.¹⁶⁴ Oil is a nonrenewable commodity used primarily for energy production.¹⁶⁵ In contrast, groundwater is renewable, and while it may be sold as a commodity, it has multiple uses from irrigation to recreation.¹⁶⁶ Accordingly, “[g]roundwater regulation must take into account not only historical usage but future needs, including the relative importance of various uses, as well as concerns unrelated to use, such as environmental impacts and subsidence.”¹⁶⁷ However, the differences between water and oil were not relevant, according to the court. Instead, the court declared that the two resources “are governed by the same fundamental principle: each represents a shared resource that *must* be conserved under the Constitution.”¹⁶⁸

The court went further and declared both groundwater and oil are essential, albeit for different reasons: water for life and oil for modern production.¹⁶⁹ The court focused on the commodity nature of both resources¹⁷⁰ as well as the high price of oil today and the foreseeable high price of water in the future.¹⁷¹ It went on to conclude that

a “profit a prendre” right (meaning a right go to a piece of land and extract a product or resource from it) for the oil and gas beneath the surface estate but only acquires full ownership once they extract it. *Id.*

¹⁶¹ *Day*, 369 S.W.3d at 829.

¹⁶² *Id.* at 830.

¹⁶³ *Id.*

¹⁶⁴ *Id.* at 831 (holding that despite various differences between groundwater and oil, the fundamental approach to regulating the two resources is the same).

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

¹⁶⁸ *Id.*

¹⁶⁹ *Id.* at 831 (“Drinking water is essential for life, but fuel for heat and power, at least in this society, is also indispensable.”).

¹⁷⁰ *Id.*

¹⁷¹ *Id.*

groundwater, like oil and gas, is owned by the landowner in place and subject to the rule of capture, following the oil case *Texas Co. v. Daugherty*.¹⁷² The basis for this transplant rests on shaky grounds. The court ignored the role of climate change in its future prices prediction: While water will be more scarce and thus more valuable, climate change mitigation may make oil inexpensive by suppressing demand. Furthermore, the commodification of water is a controversial issue that some legislatures are trying to avoid.¹⁷³

Four years later, the Texas Supreme Court continued its comparison between water and oil and gas by extending the accommodation doctrine from oil and gas to groundwater.¹⁷⁴ In *Coyote Lake Ranch, LLC v. City of Lubbock*,¹⁷⁵ the groundwater state and the surface state were separated, very much like in groundwater ranching.¹⁷⁶ The city of Lubbock had bought the groundwater rights from the owners of Coyote Lake Ranch in the midst of a drought in 1953.¹⁷⁷ The issue at stake was the use of the surface area by the city. The deed provided that the city has “the rights to use all that part of [the Ranch] necessary or incidental to the taking[,] production, treating[,] transmission[,] and delivery of . . . water.”¹⁷⁸ But the Texas Supreme Court considered that the accommodation doctrine should be applied to groundwater. The accommodation doctrine was established for oil and gas in 1971 to regulate the conflicts between the surface estate and the severed oil estate. The Texas Supreme Court cited oil and gas decisions to state the tenets of the accommodation doctrine:

[T]he surface owner must prove that (1) the groundwater owner’s use of the surface completely precludes or substantially impairs the existing use, (2) the surface owner has no available, reasonable alternative to continue the existing use, and (3) given the particular circumstances, the groundwater owner has available reasonable, customary, and industry-accepted methods to access and produce

¹⁷² *Id.* at 831–32 (quoting *Elliff v. Texon Drilling Co.*, 146 Tex. 575, 580 (1948)); *see also id.* at 828 (noting that *Stephens County* established that ownership in place of oil and gas was not incompatible with the rule of capture).

¹⁷³ *See generally* S.B. B, 73d Gen. Assemb., 2d Reg. Sess. (Colo. 2022), https://leg.colorado.gov/sites/default/files/images/committees/2017/22-0179_bill_b.pdf [<https://perma.cc/AW5Q-PABC>].

¹⁷⁴ The accommodation doctrine for oil and gas was first established in *Getty Oil Co. v. Jones*, 470 S.W.2d 618, 623 (Tex. 1971).

¹⁷⁵ 498 S.W.3d 53 (Tex. 2016).

¹⁷⁶ *See* Vanessa Casado Pérez, *Liquid Business*, 47 FLA. ST. U. L. REV. 201, 226 (2020) (describing groundwater ranching).

¹⁷⁷ *Coyote Lake Ranch*, 498 S.W.3d at 55–56.

¹⁷⁸ *Id.* at 56.

the water and allow continuation of the surface owner's existing use.¹⁷⁹

The court analyzed the similarities and differences between groundwater and oil and gas. Both “exist in subterranean reservoirs in which they are fugacious” and are subject to the rule of capture.¹⁸⁰ Both severed estates, groundwater and mineral, have the right to use the surface.¹⁸¹ These similarities prompted the Texas Supreme Court to transfer the oil and gas doctrine of ownership in place to water.¹⁸² The court considered that there was no reason not to do the same here, suggesting a certain path dependency.¹⁸³ The court also stated that “[c]ommon law rules governing mineral and groundwater estates are not merely similar; they are drawn from each other or from the same source.”¹⁸⁴ Even though the court recognized some differences between the resources, mainly that water is a renewable and life-sustaining resource and oil is nonrenewable and used for energy and manufacturing, it was “reluctant to search for a new approach to resolving disputes over a severed estate’s implied right to reasonable use of the surface when a proven rule [wa]s at hand.”¹⁸⁵ Commentators disagree with the court’s view and consider the natural and legal differences between groundwater and oil to be dispositive,¹⁸⁶ suggesting that common law should give way to newer groundwater management rules today given the better scientific understanding of groundwater.¹⁸⁷

The city wanted the court to apply a reasonable standard but, according to the court, the municipality did not explain how such a standard would differ from the accommodation doctrine.¹⁸⁸ The city

¹⁷⁹ *Id.* at 64–65 (citing *Merriman v. XTO Energy, Inc.*, 407 S.W.3d 244, 249 (Tex. 2013)).

¹⁸⁰ *Id.* at 63.

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ The city of Lubbock considered the application of the accommodation doctrine “momentous.” *Id.* at 64.

¹⁸⁴ *Id.*

¹⁸⁵ *Id.*

¹⁸⁶ See, e.g., Elizabeth A. Reichenberger, *Another Attempt to Mix Oil, Gas, and Water: An Analysis of the Texas Supreme Court’s Decision to Apply the Accommodation Doctrine to Groundwater* [*Coyote Lake Ranch, LLC v. City of Lubbock*, 498 S.W.3d 53 (Tex. 2016)], 57 WASHBURN L.J. 367, 387–88 (2018) (commenting on the fact that property rules for oil and water are different because oil is subject to a single regime during its cycle while water has separate regimes for surface and groundwater, even though these two are connected).

¹⁸⁷ See *id.* at 387 (discussing potential new rules). For a discussion of groundwater exceptionalism and the disconnect between science and law, see generally Christine A. Klein, *Groundwater Exceptionalism: The Disconnect Between Law and Science*, 71 EMORY L.J. 487 (2022).

¹⁸⁸ *Coyote Lake Ranch*, 498 S.W.3d at 64.

in this case centered its arguments on the interpretation of the deed. However, given that the court believed the deed did not cover the conflict between surface and groundwater estate uses, competing ways to resolve the dispute could have been put forward. In particular, the city could have argued that while the mineral estate and the surface estate are dominant and subservient respectively, the groundwater and surface estate are equal, as is the case in federal lands, where unnecessary and undue degradation of the surface is not allowed.¹⁸⁹ While other states may not have specifically addressed the conflict between a surface owner and a groundwater owner, they do have a different approach to deal with the relationship between the surface and the mineral estates. In contrast to Texas's accommodation doctrine, these states follow a multidimensional approach or a correlative approach, which, instead of focusing on the rights of the mineral estate, focuses on the balance between the uses of the surface and the development of the mineral estate.¹⁹⁰ *Day* and *Coyote Lake Ranch* ensure that, in Texas, the development of groundwater law will piggyback off well-developed oil and gas law in the state with the largest oil and gas production.¹⁹¹

B. Constructing Wind Law

Wind has been harnessed for centuries by seafaring sailors and mill-grinding farmers.¹⁹² But it is only more recently, in the past three decades or so, that wind has been used more readily in the production of electricity.¹⁹³ Wind energy is now the largest form of renewable energy in the United States, producing 100 gigawatts of electricity,

¹⁸⁹ 43 C.F.R. § 1732(b) (2020). Marla Mansfield defines unnecessary or undue degradation as “surface disturbance greater than what would normally result when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of similar character.” Marla E. Mansfield, *On the Cusp of Property Rights: Lessons from Public Land Law*, 18 *ECOLOGY L.Q.* 43, 61 (1991). Currently, the Bureau of Land Management interprets unnecessary and undue degradation in a manner similar to the accommodation doctrine as it imposes conditions on the mineral development insofar it does not make the development impractical. *Id.* at 79–80.

¹⁹⁰ See G. Alan Perkins, *Rights and Conflicts Among Surface Owners, Mineral Owners, and Lessees in Arkansas: Comparing Sticks in the Bundle*, 68 *ARK. L. REV.* 381, 390–91 (2015) (describing the Arkansas approach); Bruce M. Kramer, *The Legal Framework for Analyzing Multiple Surface Use Issues*, 44 *ROCKY MTN. MIN. L. FOUND. J.* 273, 273–75 (2007) (describing the “due regard” approach).

¹⁹¹ See Marvin W. Jones & C. Brantley Jones, *The Evolving Legacy of EEA v. Day: Toward an Effective State Water Plan*, 68 *BAYLOR L. REV.* 765, 783 (2016).

¹⁹² See generally *WIND & WATER IN THE MIDDLE AGES: FLUID TECHNOLOGIES FROM ANTIQUITY TO THE RENAISSANCE* (Steven A. Walton ed., 2006).

¹⁹³ See *History of Wind Power*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/energyexplained/wind/history-of-wind-power.php> [<https://perma.cc/VBA4-LK6Y>] (detailing how wind energy use expanded in the wake of the oil shortages in the 1970s).

enough to supply about 32 million homes.¹⁹⁴ Globally, according to the International Renewable Energy Agency, “[p]roduction of wind electricity doubled between 2009 and 2013, and in 2016 wind energy accounted for 16% of the electricity generated by renewables.”¹⁹⁵ Given the favorable economics of wind energy¹⁹⁶ and the potential for wind energy both offshore and onshore,¹⁹⁷ further growth can likely be expected.

Why does it matter how we govern the wind? After all, the argument goes, it is a renewable resource. But in fact, the use of wind by some does diminish or change the uses available to others. Wind is the movement of air upon the surface of the earth. Wind turbines produce electricity by converting that movement—known as kinetic energy—to electric energy. When kinetic energy is pulled out of the airstream (after it hits a turbine), there is less kinetic energy left for others downstream.¹⁹⁸ These wind wakes can last fifty kilometers downwind, potentially resulting in losses of millions of dollars.¹⁹⁹ More broadly, harvesting the wind creates externalities in the broader area, such as changing temperatures, precipitation, pollution levels, climate, seed pollination, and radar operation.²⁰⁰ Given all these impacts, extracting wind requires our attention in determining who can use it and to what extent.

What legal rule governs the use of wind? This question remained largely unaddressed until about two decades ago. The first modern

¹⁹⁴ AWEA: *Wind Energy Now Top Source of Renewable Electricity*, AM. CLEAN POWER (Feb. 27, 2020), <https://cleanpower.org/news/awea-wind-energy-now-top-source-of-renewable-electricity> [<https://perma.cc/2EU2-JXG2>].

¹⁹⁵ *Wind Energy*, INT’L RENEWABLE ENERGY AGENCY, <https://www.irena.org/wind> [<https://perma.cc/T3PF-9SRC>].

¹⁹⁶ See generally POUL-ERIK MORTHORST & SHIMON AWERBUCH, *THE ECONOMICS OF WIND ENERGY: A REPORT BY THE EUROPEAN WIND ENERGY ASSOCIATION* (Soren Krohn ed., 2009), https://www.ewea.org/fileadmin/files/library/publications/reports/Economics_of_Wind_Energy.pdf [<https://perma.cc/HTQ5-BUTV>]; *Analysis: Record-Low Price for UK Offshore Wind Cheaper than Existing Gas Plants by 2023*, CARBON BRIEF (Sept. 20, 2019), <https://www.carbonbrief.org/analysis-record-low-uk-offshore-wind-cheaper-than-existing-gas-plants-by-2023> [<https://perma.cc/LDQ7-LDK5>].

¹⁹⁷ See DOE, *WIND VISION*, *supra* note 9, at 21 (discussing the wind energy potential in the United States and noting that there are over “15,000 GW of technical wind resource potential, both land-based and offshore, that can be harnessed and delivered reliably”).

¹⁹⁸ For but a few examples of studies analyzing wakes, see, for example, R.J. Barthelmie & L.E. Jensen, *Evaluation of Wind Farm Efficiency and Wind Turbine Wakes at the Nysted Offshore Wind Farm*, 13 *WIND ENERGY* 573, 573 (2010); R.J. Barthelmie et al., *Modelling and Measuring Flow and Wind Turbine Wakes in Large Wind Farms Offshore*, 12 *WIND ENERGY* 431, 431 (2009).

¹⁹⁹ J.K. Lundquist, K.K. DuVivier, D. Kaffine & J.M. Tomaszewski, *Costs and Consequences of Wind Turbine Wake Effects Arising from Uncoordinated Wind Energy Development*, 4 *NATURE ENERGY* 26, 26 (2019).

²⁰⁰ See *infra* notes 209–14 and accompanying text.

case to confront the issue was *Contra Costa Water District v. Vaquero Farms, Inc.*,²⁰¹ in California. The case involved a taking of land on which wind power facilities were installed.²⁰² The water district, the condemning authority in this case, severed the wind rights from the land and awarded compensation only for the land itself (excluding the value of the wind).²⁰³ The landowner argued against the severance, claiming that the water district needed to pay compensation for the entire value of the property including the wind rights.²⁰⁴ The court was thus called upon to consider “[w]hen a public entity acquires property through eminent domain, are the windpower rights capable of segregation or are they so affixed to the underlying land that they must be acquired by the condemning authority?”²⁰⁵ The court found that “windpower rights are ‘substantial rights’ capable of being bought and sold in the marketplace,”²⁰⁶ and therefore could be severed from the land.

In doing so, the court held that wind rights were much like rights in other energy-producing minerals, such as oil and gas.²⁰⁷ Agreeing with the Water District, the court specifically noted that the “right to generate electricity from windmills . . . and the right to sell the power so generated, is no different, either in law or common sense, from the right to pump and sell subsurface oil, or subsurface natural gas by means of wells and pumps.”²⁰⁸ Thus, the court recognized a right to the flow of wind separate from the right to the land itself based on wind’s similarity to oil and gas.²⁰⁹

Borrowing from oil and gas law to the context of wind proved to be a quick (and in that sense useful) shortcut. But it also comes at a cost: In oil and gas, it turned out that splitting control over a broad (horizontal) resource, based on parcel ownership, led to problems of

²⁰¹ 68 Cal. Rptr. 2d 272 (1997).

²⁰² *See id.* at 273.

²⁰³ *Id.*

²⁰⁴ *Id.*

²⁰⁵ *Id.* at 276.

²⁰⁶ *Id.* at 277.

²⁰⁷ *Id.* at 278.

²⁰⁸ *Id.*

²⁰⁹ In this case, the result of recognizing wind rights (and their existence separately from the land) was that the landowner was not awarded additional compensation beyond that which was received for the value of the land itself. *Id.* at 273. More broadly, splitting the control over wind based on parcel ownership (which was itself based on mineral rights rules) is problematic given the wind wakes and the area-wide impacts of wind extraction. *See supra* note 198 and accompanying text.

premature extraction and overexploitation.²¹⁰ Having borrowed from oil and gas, wind is now subject to the same potential problems.²¹¹

The question of wind rights, and specifically when and how they materialize, was also addressed by the U.S. District Court for the District of New Mexico in *Romero v. Bernell*.²¹² The respondent, opposing the partitioning of a parcel of land owned by tenants in common, argued that “the property cannot equitably be partitioned because the principal value of the property appears to be for a wind farm development.”²¹³ Partitioning the land, the respondent argued, would diminish the land’s main value.²¹⁴ Instead of drawing on minerals law as the *Contra Costa* court did, the *Romero* court compared wind to wildlife and water as severable property interests.²¹⁵

The *Romero* court thus recognized property in wind, although it held that such rights only materialize when the resource is captured.²¹⁶ In this case, since at the time there were no wind turbines on the land, the court found that the wind interest had not yet materialized and thus ordered the division of the property.²¹⁷

Importantly, the court drew explicitly on New Mexico’s prior appropriation water law mechanisms,²¹⁸ finding “[i]t is long established in New Mexico that individual rights to water can be acquired only by appropriation and application of the water to beneficial use.”²¹⁹ Here again, borrowing from prior appropriation, especially in a state like New Mexico where the legal community is familiar with the prior appropriation regime, could be a useful shortcut for governing a new resource. The risk, however, is that applying a prior appropriation-like rule, which is based on the rule of capture, to the context of wind could lead to problems of premature exploitation.²²⁰

Aside from these two leading cases, there is otherwise very little jurisprudence on wind governance. The few adjudicated cases that

²¹⁰ See Lifshitz, *The Geometry of Property*, *supra* note 5, at 19 & nn.45–46.

²¹¹ See *id.* at 31 & nn.87–94.

²¹² 603 F. Supp. 2d 1333, 1334–36 (D.N.M. 2009).

²¹³ *Id.* at 1334.

²¹⁴ See *id.* (dismissing the respondent’s argument).

²¹⁵ *Id.* at 1335.

²¹⁶ *Id.* (“The right to ‘harvest’ wind energy is . . . an inchoate interest in the land which does not become ‘vested’ until reduced to ‘possession’ by employing it for a useful purpose.” (quoting *Contra Costa Water Dist. v. Vaquero Farms, Inc.*, 68 Cal. Rptr. 2d 272 (1997))).

²¹⁷ *Id.* at 1335–36.

²¹⁸ *Id.* at 1335 (“This analysis is consistent not only with logic but with New Mexico’s legal treatment of the most analogous natural resource, water.”).

²¹⁹ *Id.*

²²⁰ For a discussion of the potential application of prior appropriation to wind, and its potential pitfalls, see Yael R. Lifshitz, *Winds of Change: Drawing on Water Law Doctrines to Establish Wind Law*, 23 N.Y.U. ENV’T L.J. 434, 474–78 (2015).

pertain to wind energy installations are typically concerned with the noise or aesthetics of the turbines, or the wellbeing of the wildlife in the region, but not wind extraction as such.²²¹

The practice of transplanting regimes from one resource to another is not reserved for the courts. On federal lands, the Bureau of Land Management (BLM), which is the largest manager of federal lands,²²² has implemented a process to award lease grants for wind energy production.²²³ Through this process, the BLM administers “rights-of-way” for wind energy production under the authority given to it by Title V of the Federal Land Policy and Management Act (FLPMA).²²⁴ These rights-of-way allow developers to produce energy from the wind blowing over a specific piece of public land and to access the underlying land necessary for mounting turbines, transmis-

²²¹ The question of compensability of wind rights in takings was also addressed by the Kansas Supreme Court in *Zimmerman v. Hudson*, 264 P.3d 989 (Kan. 2011). The court rejected the claims on zoning-related grounds, finding there was “no property for the purpose of a takings claim.” *Id.* at 1005. But residents of areas in proximity to turbine installations have voiced opposition to the projects focusing mainly on the noise, flickers, and aesthetic impacts of turbines. These are NIMBY-like claims in nature and have mostly been brought under the nuisance doctrine claiming that the presence of the turbines interferes with the enjoyment of the land. *See, e.g.,* *Rose v. Chaikin*, 453 A.2d 1378 (N.J. Super. Ct. Ch. Div. 1982); *Rassier v. Houim*, 488 N.W.2d 635 (N.D. 1992); *Burch v. NedPower Mount Storm, LLC*, 647 S.E.2d 879 (W. Va. 2007); *Rankin v. FPL Energy, LLC*, 266 S.W.3d 506 (Tex. App. 2008). Some courts have found that turbine operations indeed constitute an enjoined nuisance. *See, e.g.,* *Rose*, 453 A.2d 1378; *Burch*, 647 S.E.2d 879. Other courts have found in favor of the turbine facilities. *See, e.g.,* *Rassier*, 488 N.W.2d 635; *Rankin*, 266 S.W.3d 506. Suits have also been filed raising concerns over the potential environmental impacts of turbines, focusing mainly on the wellbeing of birds in the region. *See, e.g.,* *Flint Hills Tallgrass Prairie Heritage Found. v. Scottish Power, PLC*, No. 05-1025, 2005 WL 427503, at *4 (D. Kan. Feb. 22, 2005) (holding that the plaintiffs failed to state a cause of action under federal law because they could not establish that the Migratory Birds Treaty Act established a private right of action), *aff'd* 147 Fed. App'x 785 (10th Cir. 2005); *Ctr. for Biological Diversity, Inc. v. FPL Grp.*, 83 Cal. Rptr. 3d 588 (Cal. Ct. App. 2008) (rejecting an environmental group's complaints regarding impacts on birds).

²²² Bureau of Land Mgmt., *Bureau Highlights*, in U.S. DEP'T OF THE INTERIOR, THE INTERIOR BUDGET IN BRIEF: FISCAL YEAR 2021, at BH-7, BH-8 (2020), <https://www.doi.gov/sites/doi.gov/files/uploads/2021-highlights-book.pdf> [<https://perma.cc/LW7U-5Q7G>].

²²³ The Energy Policy Act (EPAct), passed in 2005, encouraged the Secretary of the Interior, who oversees both the BLM and BOEM, to approve a minimum of 10,000 MW of renewable (but non-hydro) energy projects by 2015. *See* Energy Policy Act of 2005, Pub. L. No. 109-58, § 211, 119 Stat. 594, 660.

²²⁴ 43 U.S.C. §§ 1761–1771; *see also* Competitive Processes, Terms, and Conditions for Leasing Public Lands for Solar and Wind Energy Development and Technical Changes and Corrections, 81 Fed. Reg. 92,122, 92,124 (Dec. 19, 2016) (to be codified at 43 C.F.R. pts. 2800, 2880) [hereinafter BLM, Final Wind Rule] (discussing the BLM's authority to regulate; explaining that “Title V of FLPMA . . . authorizes the BLM to issue rights-of-way on the public lands for electric generation systems, including solar and wind energy generation systems”).

sion lines, and other service areas.²²⁵ As of 2018, the BLM has approved thirty-five wind projects on public lands, with a cumulative capacity of 3,284 megawatts, enough to power almost two million American homes.²²⁶

For our purposes, it is important to note that several of the key features of the BLM wind framework echo the frameworks adopted for leasing oil and gas on public lands. For example, the BLM uses a “multi-component” fee which is made up of an “acreage rent” (correlating to the land area used by the wind project) and a “MW capacity fee” (which relates to the amount of electricity generated by the wind project).²²⁷ While the similarity to oil and gas developments are not cited as the sole reason for adopting the fee structure, the similarity was specifically mentioned and explained by the BLM when announcing the rule. The structure of a multi-component fee, notes the BLM, “mirror[s] the multi-component payments received from activities like oil and gas development where both rent and royalties are charged.”²²⁸ This mirroring, emphasizes the BLM, “ensur[es] consistency across users.”²²⁹

More broadly, beyond the explicit references to borrowing by the courts and agencies, spontaneous borrowing also occurs in the practices of individual developers and landowners. While the law is silent on the governance of wind, the underlying assumption on which the market operates is that wind belongs to the landowners. The majority of wind energy development in the United States takes place on private lands.²³⁰ The practice of wind energy is such that when a developer is looking to set up a wind farm, they need to contract with the landowners to obtain access to the winds blowing over the lands. The agreements under which these access permissions occur are known as “wind leases.”²³¹ These wind leases are basically agreements under which the landowners agree to lease out “their” winds, much like the oil and gas leases that facilitate access to oil and gas on their lands. A

²²⁵ BLM, Final Wind Rule, *supra* note 224, at 92,122.

²²⁶ *BLM Fact Sheet: Renewable Energy: Wind*, BUREAU OF LAND MGMT., <https://www.blm.gov/sites/blm.gov/files/Wind%20Fact%20Sheet.pdf> [<https://perma.cc/QC3Y-BXQ5>]. The approved BLM projects are in Arizona, California, Idaho, Nevada, Oregon, Utah, and Wyoming. *Id.* There are also twenty-three pending applications. *BLM Fact Sheet: Renewable Energy: Wind*, BUREAU OF LAND MGMT., https://www.blm.gov/sites/blm.gov/files/documents/files/fact_Wind.pdf [<https://perma.cc/VBN2-N35X>].

²²⁷ See BLM, Final Wind Rule, *supra* note 224, at 92,123, 92,134 (defining these terms).

²²⁸ *Id.* at 92,134.

²²⁹ *Id.*

²³⁰ See Lifshitz, *Rethinking Original Ownership*, *supra* note 147, at 543 & n.122; Lifshitz, *The Geometry of Property*, *supra* note 5, at 502.

²³¹ Lifshitz, *Rethinking Original Ownership*, *supra* note 147, at 543; Lifshitz, *The Geometry of Property*, *supra* note 5, at 502.

few states explicitly embrace the practice of wind leasing.²³² Others, however, are silent on the matter. Nonetheless, the practice of wind leasing persists and continues to underly both new and existing wind energy development.²³³

The practice of wind leasing is rooted in the preexisting tradition of oil and gas leasing, where the resource—whether it be below or above the ground—is initially allocated to the landowner, who can then agree to lease it out (or refrain from doing so). The reliance on oil and gas leasing in the context of wind has been mentioned specifically by practitioners in the field.²³⁴ The same practice also echoes the centuries-old, property-based concept of *ad coelum*, which views all resources (below and above the land) as attached to it.²³⁵ The key point here is that using the property rules applicable to land as a fallback, or a blueprint, is a type of transplant in itself.²³⁶ It illustrates, again, how the use of a familiar and salient blueprint is used to govern a new resource.

IV

BEYOND WATER AND WIND

A. Existing Natural Transplants in Other Areas

While the examples in this paper focused on natural resources and transplants across these resources, the same idea of natural transplants applies to many other areas too. The term “natural” in this context refers to the fact that it seems intuitive or instinctual for judges, regulators, or other legal actors to turn to what is familiar. The descriptions below of this phenomenon in landlord-tenant, family, and corporate law illustrate how the framework applies outside the context of natural resources.

In the 1960s and 1970s a revolution in landlord-tenant law occurred, substantially strengthening the rights of tenants.²³⁷ One of the key factors that contributed to the strengthening of tenants’ rights

²³² Lifshitz, *Rethinking Original Ownership*, *supra* note 147, at 543–44 (offering examples).

²³³ *Id.*

²³⁴ See, e.g., Runnels & McMurtry, *supra* note 133 (stating that “[d]ue to the well-developed state of oil and gas leasing in Texas, landowners and their counsel often look to familiar oil and gas leasing concepts when negotiating wind leases” and further noting that “[w]hile mineral and wind leases have some similarities, efforts by landowners and their counsel to apply mineral-leasing concepts to the wind lease are creating challenges”).

²³⁵ Lifshitz, *The Geometry of Property*, *supra* note 5, at 502.

²³⁶ For a similar argument, see Lifshitz, *Property Beyond Land*, *supra* note 29.

²³⁷ See Edward H. Rabin, *The Revolution in Residential Landlord-Tenant Law: Causes and Consequences*, 69 CORNELL L. REV. 517, 520–21, 540 (1984) (outlining the history and development of certain U.S. landlord-tenant laws).

was the rise in tenants' ability to withhold rent if the landlord failed to keep the flat in decent condition or fulfill other lease-based obligations. This was done by borrowing a particular principle from contract law into landlord-tenant law, which was a departure from the status quo during the revolution.²³⁸ Before this time, a tenant's covenant to pay rent was independent from any other covenant in the lease. But in *Javins*, the D.C. Circuit decided to apply the contract law principle of dependent covenants in the modern residential lease context.²³⁹ As a result, a breach by the landlord of a statutory or contractual duty constituted grounds for the tenant to stop paying rent.²⁴⁰

Transplanting also comes up in adjudicating the controversial issue of surrogacy. Courts often consider surrogacy cases without legislative guidance. Faced with the need to decide cases in front of them, different state courts applied adoption rules to cases of partial or complete surrogacy.²⁴¹ Even legislators have followed the same path of naturally transplanting adoption regulation to surrogacy situations.²⁴²

Another example comes from the realm of business associations. States have repurposed concepts from corporate law to other types of business entities. The most prominent example in recent years has been the adoption of LLC statutes.²⁴³ These statutes often include ideas of fiduciary duties, management rules, and veil piercing²⁴⁴ that were originally developed in corporate law. In some cases, they make

²³⁸ See *Javins v. First Nat'l Realty Corp.*, 428 F.2d 1071, 1074–80 (D.C. Cir. 1970).

²³⁹ See *id.* at 1082–83.

²⁴⁰ See Rabin, *supra* note 237, at 522–23.

²⁴¹ See, e.g., *R.R. v. M.H.*, 689 N.E.2d 790, 796 (Mass. 1998) (noting that the “normal expectation in the case of a surrogacy agreement seems to be that the father’s wife will adopt the child with the consent of the mother (and the father)”). For a general report on surrogacy across the globe and how researchers, legislators, and judges have applied adoption regulations to the surrogacy phenomenon, see ALEX FINKELSTEIN, SARAH MAC DOUGALL, ANGELA KINTOMINAS & ANYA OLSEN, COLUMBIA L. SCH. SEXUALITY & GENDER L. CLINIC, *SURROGACY LAW AND POLICY IN THE U.S.: A NATIONAL CONVERSATION INFORMED BY GLOBAL LAWMAKING* (2016), https://web.law.columbia.edu/sites/default/files/microsites/gender-sexuality/files/columbia_sexuality_and_gender_law_clinic_-_surrogacy_law_and_policy_report_-_june_2016.pdf [<https://perma.cc/TNN4-FBLP>]. For an account of how courts in Tennessee and Oregon have used adoption-like rules to deal with surrogacy cases given the lack of legislation, see *id.* at 10–12.

²⁴² See, e.g., IOWA ADMIN. CODE r. 641-99.15 (2013) (specifying certain situations in which adoption laws apply when establishing new birth certificates following a birth involving a surrogate arrangement).

²⁴³ See Geoffrey Christopher Rapp, *Preserving LLC Veil Piercing: A Response to Bainbridge*, 31 J. CORP. L. 1063, 1063 (2006) (describing the “emergence” of the LLC as “[c]orporate law’s most dramatic revolution of the last quarter-century”); Douglas K. Moll, *Minority Oppression & the Limited Liability Company: Learning (or Not) from Close Corporation History*, 40 WAKE FOREST L. REV. 883, 925–27 (2005) (discussing the emergence of LLC statutes).

²⁴⁴ See generally J. WILLIAM CALLISON & MAUREEN A. SULLICAN, *LIMITED LIABILITY COMPANIES: A STATE-BY-STATE GUIDE TO LAW AND PRACTICE* § 5:3 (2021 ed.)

sense; in others, less so. According to some scholars, veil piercing was arbitrarily applied simply because it was available to judges when LLC cases arose and not because it was intended to apply to LLCs.²⁴⁵ The factors required for veil piercing include fraud, inadequate capitalization, failure to observe corporate formalities, and operation of the corporation as an alter ego for the shareholders.²⁴⁶ While these factors are applicable to corporations, they do not all fit the nature of LLCs. For example, state legislatures have been explicit in not wanting to subject LLCs to excessive formalisms, so relying on a lack of formalities to pierce the veil would go against this intent.²⁴⁷ Indeed, applying veil piercing to LLCs discourages capital formation in small businesses.²⁴⁸

Finally, the fugitive disentitlement doctrine emerged in the criminal context with respect to the dismissal of appeals by defendants who had escaped from physical custody.²⁴⁹ The doctrine has since been applied to civil asset forfeiture. While the Supreme Court in *Degen v. United States* refused to do so, citing the dangers of applying such a severe sanction in the civil context when courts had other appropriate docket management mechanisms,²⁵⁰ Congress responded by passing the Civil Asset Forfeiture Reform Act of 2000 (CAFRA).²⁵¹ CAFRA codified the fugitive disentitlement doctrine in civil forfeiture actions.²⁵² The fugitive disentitlement doctrine is also applied in immigration contexts. Tania Valdez has criticized this appli-

(describing various state laws); Eric Fox, *Piercing the Veil of Limited Liability Companies*, 62 GEO. WASH. L. REV. 1143, 1169 (1994) (discussing veil piercing in the LLC context).

²⁴⁵ See Stephen M. Bainbridge, *Abolishing LLC Veil Piercing*, 2005 U. ILL. L. REV. 77, 82 (2005) (discussing how “the availability of corporate law doctrines as ready made body of law close at hand” has led courts to permit veil piercing in the LLC context, with many courts “simply assum[ing] the corporate law standard applies”).

²⁴⁶ Fox, *supra* note 244; see also *Castleberry v. Branscum*, 721 S.W.2d 270 (Tex. 1986); Peter B. Oh, *Veil-Piercing*, 89 TEX. L. REV. 81, 103–04 (2010).

²⁴⁷ See Bainbridge, *supra* note 245, at 104–05 (2005) (discussing early adoption of limited liability as a means to encourage entrepreneurship); cf. Rapp, *supra* note 243, at 1093 n.178 (noting that some courts overlook the formalities factor in the LLC context).

²⁴⁸ See Bainbridge, *supra* note 245, at 102 (noting that the veil doctrine “encourage[s] . . . [small businesses] to spend time and effort on organizational formalities that simply do not address the real problem of negative externalities”).

²⁴⁹ See Tania N. Valdez, *Eliminating the Fugitive Disentitlement Doctrine in Immigration Matters*, 97 NOTRE DAME L. REV. 963 (2022) (discussing the emergence of the doctrine); U.S. Dep’t of Just., *The Fugitive Disentitlement Doctrine*, IMMIGR. LITIG. BULL., Mar. 2013, at 1 (“[The fugitive disentitlement doctrine] reflects the inherent authority of the federal courts of appeals to place conditions on the exercise of their appellate jurisdiction. In one sense, the doctrine is a tool of case management, justifying the dismissal of certain cases from a court docket.”).

²⁵⁰ 517 U.S. 820, 821, 827–29 (1996).

²⁵¹ 28 U.S.C. § 2466.

²⁵² *Id.*

cation because it disregards the differences between criminal and immigration cases.²⁵³

B. *Implications for Current Debates: The Next Frontier in Natural Resources*

Armed with a richer understanding of the operation of natural legal transplants—that is, cross-subject, intrajurisdictional transplants—this Section aims to analyze current developments in the regulation of new resources and their potential evolution to show how natural transplants may operate in these new regimes.

1. *Outer Space Minerals*

“Space mining” is said to be the new Gold Rush.²⁵⁴ The regime governing the extraction of extraterrestrial resources has, in many ways, transplanted our familiar property law systems from Earth into outer space. As one scholar recently noted, “we copy-pasted our property law system.”²⁵⁵

Congress enacted the Spurring Private Aerospace Competitiveness and Entrepreneurship (SPACE) Act in 2015. The SPACE Act allows U.S. citizens to engage in the commercial exploration and exploitation of “space resources.”²⁵⁶ The Act expressly lists water as one of the resources it covers.²⁵⁷ As Rhett Larson has recently pointed out, the regime governing the extraction and use of extraterrestrial water under the SPACE Act is akin to prior appropriation, as it adopts a “first-in-time, first-in-right” approach.²⁵⁸ The United States is not the only country to apply the familiar “first-in-time, first-in-right” rule to space exploration. Japan and Luxembourg, for example, both passed similar legislative provisions.²⁵⁹

²⁵³ Valdez, *supra* note 249.

²⁵⁴ Ezzy Pearson, *Space Mining: The New Goldrush*, BBC SCI. FOCUS MAG. (Dec. 11, 2018), <https://www.sciencefocus.com/space/space-mining-the-new-goldrush> [<https://perma.cc/3AWM-QBPZ>].

²⁵⁵ Eva Vermeulen, *Property’s Transformative Nature: Space Mining, Airbnb, and Apartheid*, TRANSFORMATIVE PRIV. L. BLOG (Nov. 2, 2020), <https://transformativeprivatelaw.com/transformative-property-law> [<https://perma.cc/ERB9-66X6>].

²⁵⁶ U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015).

²⁵⁷ *Id.*

²⁵⁸ Rhett B. Larson, *Extraterrestrial Water Law 4* (Jan. 25, 2022) (unpublished manuscript) (on file with authors).

²⁵⁹ *Id.* (citing Mark J. Sundahl & Jeffrey A. Murphy, *Set the Controls for the Heart of the Moon: Is Existing Law Sufficient to Enable Resource Extraction on the Moon?*, 48 GA. J. INT’L & COMPAR. L. 683, 684 (2020)).

In 2020, President Donald Trump issued an executive order which eventually led to the creation of the Artemis Accords.²⁶⁰ The accords were ultimately signed by the United States and seven other countries (Australia, Canada, Italy, Japan, Luxembourg, the United Arab Emirates, and the United Kingdom).²⁶¹ The Artemis Accords took a similar approach to appropriating resources in space—that is, adopting a first-in-time kind of rule—and, according to some scholars, even went further by rejecting the idea of outer space as a “global commons.”²⁶²

Before the current wave of space-related regulation, the Outer Space Treaty governed space exploration. Rhett Larson argues that these two regimes—the SPACE Act/Artemis Accords and the Outer Space Treaty—represent the two main regimes governing the use of surface-water law in the United States.²⁶³ Whereas the SPACE Act roughly correlates with prior appropriation, the Outer Space Treaty is more akin to riparianism.²⁶⁴ Future unilateral regulation may reinforce the saliency hypothesis put forward in this piece if countries follow the regulatory model of their most bountiful resource.

2. *Deep Seabed Minerals on the New Frontier*

The prospect of deep-sea mining has attracted interest since the 1960s. Deep-sea mining refers to the exploration and development of polymetallic nodules on the ocean floor and active or extinct hydrothermal vents containing minerals.²⁶⁵ Deep-sea mineral quantities surpass those found on Earth’s surface and are important for renewable energy technologies needed to fight climate change.²⁶⁶

²⁶⁰ Larson, *supra* note 258 (manuscript at 9); *see also* *The Artemis Accords: Principles for a Safe, Peaceful, and Prosperous Future*, NASA, <https://www.nasa.gov/specials/artemis-accords/index.html> [<https://perma.cc/5B7X-UX64>] (summarizing the Artemis Accords); Aaron Boley & Michael Byers, *U.S. Policy Puts the Safe Development of Space at Risk*, 370 *SCI.* 174, 174 (2020) (critiquing U.S. policy approaches to space development).

²⁶¹ *See* Larson, *supra* note 258 (manuscript at 10); *NASA, International Partners Advance Cooperation with First Signings of Artemis Accords*, NASA (Oct. 13, 2020), <https://www.nasa.gov/press-release/nasa-international-partners-advance-cooperation-with-first-signings-of-artemis-accords> [<https://perma.cc/Y9YJ-J2S8>].

²⁶² Larson, *supra* note 258 (manuscript at 9); Boley & Byers, *supra* note 260, at 174.

²⁶³ Larson, *supra* note 258.

²⁶⁴ *Id.* (manuscript at 11).

²⁶⁵ *See* Kathryn A. Miller, Kirsten F. Thompson, Paul Johnston & David Santillo, *An Overview of Seabed Mining Including the Current State of Development, Environmental Impacts, and Knowledge Gaps*, *FRONTIERS MARINE SCI.*, Jan. 2018, at 4.

²⁶⁶ Daniel Ackerman, *Deep-Sea Mining: How to Balance Need for Metals with Ecological Impacts*, *SCI. AM.* (Aug. 31, 2020), <https://www.scientificamerican.com/article/deep-sea-mining-how-to-balance-need-for-metals-with-ecological-impacts1> [<https://perma.cc/WY24-BD5X>].

These minerals reside in the high seas, beyond the territorial jurisdiction of states. The 1982 United Nations Convention on the Law of the Sea (UNCLOS) established the International Seabed Authority, based in Kingston, Jamaica, to manage these resources for the benefit of mankind.²⁶⁷ The International Seabed Authority was operative in 1996 after the 1994 Agreement Relating to the Implementation of Part XI of UNCLOS.²⁶⁸

The regulation of these bountiful resources has always been controversial. There were numerous discussions about the best regime even before UNCLOS was signed.²⁶⁹ The International Seabed Authority and the principles regulating the exploration and exploitation of the seabed minerals is one of the reasons why the United States has not ratified UNCLOS, despite recognizing parts of it as customary international law.²⁷⁰ A new agreement in 1994 did address some of the United States's concerns over the Authority and the wealth redistribution scheme.²⁷¹ Regardless, the United States remains an observer country in the International Seabed Authority.²⁷²

While the interest in deep-sea minerals has not waned, the technology for its exploration was historically too expensive, and the regulatory environment too uncertain,²⁷³ for their exploitation to take off. Only recently has exploration perked up,²⁷⁴ both because satisfying renewable energy demand requires copper, nickel, and other seabed minerals and because the International Seabed Authority finalized the Mining Code in 2020, alleviating at least some concerns over regulatory uncertainty.²⁷⁵

²⁶⁷ U.N. Convention on the Law of the Sea, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397, Arts. 156–57 (entered into force Nov. 16, 1994).

²⁶⁸ See *About ISA*, INT'L SEABED AUTH., <https://www.isa.org.jm/index.php/es/node/19199> [<https://perma.cc/J92Y-T6LC>] (providing a historical overview of the ISA).

²⁶⁹ See Memorandum from the L. Offs. of Northcutt Ely on Potential Regimes for Deep Sea Mining 36C-2 (1977) (listing and discussing potential alternative regimes).

²⁷⁰ PHILIP JONES, MAX McGRATH-HORN, MATT MERIGHI, STEPHEN MURRAY, CULLAN RILEY, BOGDAN ROTAR, KRITTIKA SINGH, MEAGHAN TOBIN, TIMOTHY URBAN, JACK WHITACRE & STEVEN YOUNG, *LAW OF THE SEA: A POLICY PRIMER* 4–10 (John Burgess, Lucia Foulkes, Philip Jones, Matt Merighi, Stephen Murray & Jack Whitacre eds., 2017) <https://sites.tufts.edu/lawofthesea/chapter-one> [<https://perma.cc/JN93-YTNQ>].

²⁷¹ See Eric A. Posner & Alan O. Sykes, *Economic Foundations of the Law of the Sea*, 104 AM. J. INT'L L. 569, 587 (2010) (discussing how the 1994 agreement weakened agency power over deep seabed exploration).

²⁷² See *Observers*, INT'L SEABED AUTH., <https://isa.org.jm/index.php/observers> [<https://perma.cc/2XDR-9X52>] (listing observing countries).

²⁷³ See Ackerman, *supra* note 266 (discussing the “lack of international rules to govern the nascent [deep-sea mining] industry”).

²⁷⁴ *Id.*

²⁷⁵ *The Mining Code*, INT'L SEABED AUTH., <https://www.isa.org.jm/mining-code> [<https://perma.cc/T74X-J3UK>]; see also Ackerman, *supra* note 266.

The Mining Code has been in the works for almost a decade. Stakeholders have had the opportunity to comment on several iterations. Their comments have often referred to other regulatory regimes.²⁷⁶ For example, regarding the Environmental Management Plan, the model of the OSPAR Guidelines for Monitoring the Environmental Impact of Offshore Oil and Gas Activities was put forward.²⁷⁷ For regulating emergencies, the stakeholders suggested looking at the International Convention on Oil Pollution Preparedness, Response, and Cooperation as well as the EU Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.²⁷⁸ For risk assessment, the proposed model also suggests transferring traditional oil and gas frameworks. Stakeholders and policymakers continue to transfer different aspects of oil and gas law, albeit sometimes with adaptation.²⁷⁹ The notes from the Secretariat of the International Seabed Association in February 2020 refer to oil and gas regulations with regards to inspection matters.²⁸⁰

Oil and gas regulations are salient because of their economic relevance and the common development of deep-sea reserves. Land mining, by contrast, is not acknowledged as a regulatory model. Borrowing from oil and gas in this case thus serves as an illustrative example of natural transplants in action.

CONCLUSION

Understanding the mechanisms by which legal regimes develop is particularly important in our times, with innovative technologies, new resources, and rising health-related and economic challenges constantly coming to the fore. From drones and novel vaccines to hydrofracking, aquaculture, and deep-sea mining, the legislative, executive, and judicial branches constantly encounter new issues in need of regulation.

²⁷⁶ See INT'L SEABED AUTH., DEVELOPING A REGULATORY FRAMEWORK FOR DEEP SEA MINERAL EXPLOITATION IN THE AREA: DRAFT FRAMEWORK, HIGH LEVEL ISSUES AND ACTION PLAN (2015), https://www.isa.org.jm/files/documents/EN/OffDocs/Rev_RegFramework_ActionPlan_14072015.pdf [<https://perma.cc/Z2ZY-46RJ>] (discussing stakeholder comments).

²⁷⁷ *Id.* at 31–32.

²⁷⁸ *Id.* at 33 n.45.

²⁷⁹ *Id.* at 31, 45, 47, 49 (discussing how existing oil and gas frameworks should be used as benchmarks).

²⁸⁰ Note by the Secretariat, Int'l Seabed Auth., Comments on the Draft Regulations on the Exploitation of Mineral Resources in the Area, at 5 (Dec. 6, 2019), https://www.isa.org.jm/files/documents/advance_isba_26_c_comments.pdf [<https://perma.cc/KFW8-A3ZW>].

This Article has shown that when facing new questions, jurisdictions often copy their own doctrines and regulations from a different subject matter. To explain this phenomenon, the Article builds on and expands the literature of legal transplants with two additional dimensions: internal transplants and cross-subject transplants. When these two dimensions combine, natural legal transplants take place. Jurisdictions copy their own doctrines across subject areas for a myriad of reasons, chief among them the cost savings arising from the application of a doctrine that the legal community is already familiar with. In natural resources, the most salient resource in a jurisdiction turns out to be the source of doctrines for other areas, as illustrated by the case studies on Texas groundwater and wind regulation. Saliency is often correlated with the economic relevance of a particular resource. Regulatory innovations following the regulations and doctrines of the most salient resource show the heuristic of availability at work and can result in poorly fitting regulations for the new resource in question. As the Texas groundwater case study demonstrates, doctrines borrowed from different areas of law may not respond to the particularities of the new challenge presented.

While the focus here is on natural resources, natural legal transplants—internal, cross-subject transplants—occur well beyond this legal area. In fact, “natural” in natural legal transplants refers not to the area of the law but to the fact that it seems intuitive or instinctual for judges, regulators, or other legal actors to turn to what is familiar, using a sort of heuristic of availability or path dependency to respond to new challenges. Landlord-tenant law, surrogacy regulation, and the veil piercing doctrine in corporate law illustrate the use of natural legal transplants in other areas of the law. Examples abound and will keep appearing, as deep-sea and space minerals show. Indeed, this Article demonstrates that legal actors will continue to turn to what is familiar and copy rules and doctrines from other legal areas. In doing so, these legal actors should account for the differences between areas and the potential for misfit. Otherwise, natural legal transplants may not only prove to be a fruitless exercise, but a perilous practice.