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The making of rights of nature: nine patterns in a decade of empirical research on social-ecological drivers and actors

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Supplementary material for this article is available [online](#)

Abstract

Rights of Nature (RoN) cases, where nature is granted legal rights, are rapidly gaining traction across the globe. Although there are many individual and comparative case studies, the extent to which emerging RoN cases share specific patterns that can be observed in the processes leading to the adoption of RoN is yet to be understood. To fill this gap, we provide a systematic literature review of the decade of empirical research on the RoN. Building on the Institutional Analysis and Development framework, our review uses an in-depth analysis, with a special focus on eliciting evolving patterns across cases. The analysis demonstrated that the drivers of RoN processes are extraordinarily complex and case-specific, shaping our understanding of RoN itself. The identified nine patterns show that understanding RoN as a ‘revolutionary ecocentric movement’ is too simplistic, and it should rather be understood as a boundary object that connects place-based non-human and human well-being and relations, as well as formal and informal institutional conditions. The review revealed that themes such as justice, property rights, and personal engagement of powerful actors have been key in driving RoN cases worldwide. Likewise, contrary to the conventional perception, concern for the environment is not a common driver of RoN, and Indigenous or local communities cannot be universally and simply described as advocating actors for RoN, while undoubtedly it is often their interests that are most affected by RoN reforms. However, RoN-related rules tend to create space for questioning the purely instrumental and short-term perspectives towards nature and for redirecting the focus to relational and representational thinking. We found that disciplinary silos contributed to the historically veiled image of RoN due to insufficient engagement with interdisciplinary and decolonizing research methods. The revealed patterns can guide scholars, practitioners, and policymakers in rapidly growing cases worldwide to learn from the existing empirical knowledge. Our study is particularly valuable in times when multiple local-to-global and increasingly acute challenges around nature and biodiversity are putting pressure on societies to develop more ‘fundamental’ or ‘transformative’ approaches bridging science, policy, and practice and especially those that can better integrate diverse knowledge systems of Indigenous and local communities.

1. Introduction

It has been increasingly argued that tinkering with the margins is not sufficient to resolve the problems that humanity currently faces (Dixson-Decleve *et al* 2022, IPBES 2024) and finding more just and sustainable

solutions that combat the challenges of the Anthropocene is essential (Kim and Bosselmann 2013, Natarajan and Khoday 2014). Recognizing the ‘rights of nature’ (RoN) is a fundamental change of the human-nature-relations and the idea of a legal subject, that is said to give the promise of challenging the underlying paradigm of human dominance in relation to nature (Neimanis *et al* 2015, Gonzalez 2017, Bleby 2020, GARN 2020). The RoN challenges the anthropocentric perspective of nature as a pure resource for satisfying human needs. It has many potential applications such as bringing humans closer to environmental and intergenerational justice, de-commodifying nature, decolonizing laws, and solving environmental problems (Boyd 2017, Angstadt and Hourdequin 2021, Tănăsescu 2022). However, as the concept of rights originates in European law and is foreign to many Indigenous cultures, it excludes Indigenous relational thinking (Arstein-Kerslake *et al* 2021, Viaene 2022, Petel 2024). Some authors even see RoN as a governance framework that is ‘reinforcing and naturalizing the White privilege embedded in the liberal rights system, that is perpetuating a White right to a clean environment’ (Kohl and Walenta 2023, p. 285).

The idea of recognizing RoN emerged in the 1970s in the philosophical legal theory of Earth Jurisprudence (EJ) as a way to implement the philosophical idea of the human moral responsibility of nature (Leopold 1970, Naess 1984), where non-human entities and non-living systems are viewed as intrinsically or inherently valuable. From this non-anthropocentric perspective, humankind is part of an interconnected Earth community where human well-being is dependent on the well-being of non-human entities, and vice versa (Nash 1989, Berry 1999, Cullinan 2003, 2011). Hence, for EJ scholars, the concept of rights approaches the idea of natural rights, which are understood as the only universally valid principle of order dictated by nature itself (Cullinan 2021). This literal personality of nature, which demands the recognition of its rights, draws arguments parallel to those in the human rights domain (Stutzin 1984).

In parallel, a pragmatic legal approach has evolved that understands RoN as a tool that recognizes ecosystems as subjects with rights, without necessarily relating to its philosophical foundations. It started in 1972 when Stone (1972) argued that natural ecosystems should have rights in the courts of law. Stone put this legal tool pragmatically in line with other non-human and even non-animate entities that already had legal standing, namely corporations and ships (Stone 1972). Because legal standing comes with the creation of a legal personality, an entity that is legally represented becomes a person before the law. He argued that there were no valid *a priori* reasons to use the construct of legal personality for some entities but not for nature. Subsequently, Stone’s initial pragmatic argument provided space for further philosophical and normative arguments that legal standing for nature was intrinsically tied to its moral standing (Stone 1972, 2010). However, in contrast to EJ scholars, Stone did not particularly specialize in or focus on nature’s moral status itself, or the philosophical foundations thereof, but rather used ethical arguments pragmatically in search of conceptual tools to solve a specific perceived problem (Tănăsescu 2022).

The first practical implementation of RoN took place in 2006 with a municipal ordinance adopted in Tamaqua Borough in Pennsylvania, which for the first time in world history recognized nature as a subject with inalienable rights (Youatt 2017, Dancer 2021). Since then, myriad non-human entities have gained a new legal status through laws and court rulings at different administrative levels from municipalities to states or even on an international level, resulting in over 400 adopted or pending RoN cases in 39 countries (Putzer *et al* 2022). In view of the fundamental paradigm shift inherent to the implementation of RoN with regard to human-nature relations and the concept of a legal subject, the enormous increase in RoN cases is remarkable. It is unsurprising that RoN cases have gained increasing academic attention. As the RoN addresses interdisciplinary questions, different disciplines study its potential, implementation, and possible outcomes. Most of the research is in legal studies, but also in other social sciences, such as human geography (Rawson and Mansfield 2018), area studies (Colón-Ríos 2015), development studies (Laastad 2019) and political ecology (Kauffman and Martin 2021). Furthermore, some critical studies of RoN (Nieto Sanabria 2018, Chaturvedi 2019, Macpherson *et al* 2020, Guim and Livermore 2021) have already observed unintended and environmentally disadvantageous outcomes of earlier RoN rules. However, a global and systematic analysis of empirical research on social-ecological drivers and actors is still lacking, and the current data on RoN are largely fragmented and mostly based on single cases (Angstadt and Hourdequin 2021). Gilbert *et al* (2023) argued that since RoN addresses inherently interdisciplinary questions at the intersection of society and the environment, and can potentially lead to far-reaching social-environmental consequences, it requires a matching level of interdisciplinary and transdisciplinary analysis.

To contribute to such an analysis, we undertake a detailed mapping of the existing knowledge about the processes that led to the formalization of RoN, adapting and applying the Institutional Analysis and Development (IAD) framework (Ostrom 2007). The main question we explore is what are the key drivers and actors leading to the formalization of RoN across case studies, as reported in the current empirical evidence. For this, we combined a systematic literature review of a decade of empirical studies (2012–2022) to understand broader trends with an in-depth qualitative study of the first formalized cases in the USA, Ecuador, India, and New Zealand to understand the nuances within well-documented cases. Next, we present the methods by

explaining how the data were collected and analyzed to answer the key research question. We then provide the results of both bibliometric and in-depth content analyses and discuss how our findings extend the existing knowledge. Finally, we provide our concluding remarks by highlighting significance of our review results and gaps for future research.

2. Method

First, we systematically reviewed scientific articles published in peer-reviewed journals, following the methodology for systematic literature reviews by Xiao and Watson (2019) and Page *et al* (2021). Second, we conducted an in-depth analysis of cases in the four selected countries based on the case study research methodology by Yin (2009). We selected cases based on the results of the systematic review that revealed the top four countries in terms of number of studies—Ecuador (25 studies), New Zealand (12), India (10), and the United States (8), which already at the early stages of review indicated variation in the drivers of RoN formalization (biophysical conditions, social-cultural context, policy-institutional environment). For each country, we chose the first formalized RoN case, as these were the most well-documented empirical cases that allowed in-depth analysis. We included the second case in New Zealand because of its substantial interlinkages with the first case.

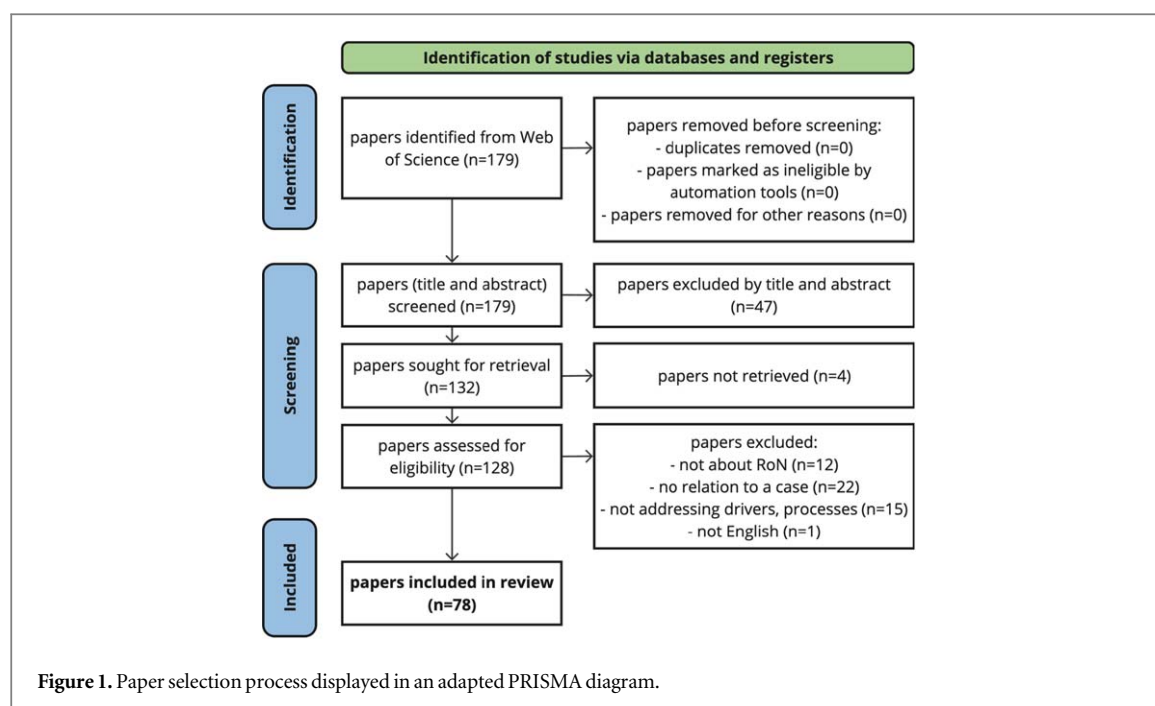
2.1. Data collection and screening

We used the online database 'Web of Science' (WoS) to collect peer-reviewed articles due to its wide usage and authoritative status ensuring that the literature reviewed covers natural sciences, social sciences, and humanities and arts journals relevant for RoN (e.g., law, philosophy, sociology, political sciences, economics, geography, anthropology, development studies, environmental sciences) and meets high standards of impact and academic quality. We used the following search string and ran it twice on the 5th of September 2021 with a total output of 153 articles and on the 2nd of May 2022 with a final output of 179 articles: 'rights of nature' OR 'rights of river*' OR 'earth law' OR 'earth jurisprudence' OR 'wild law' OR 'right* of river*' OR 'ecosystem right*' OR 'right* of nature.' After the second run, we reached the point of theoretical saturation, as the collected articles covered a significant period—a decade (2012–2022)—of empirical research, and the newly coded articles did not add further significant results relative to the effort needed to continue the analysis. The articles were then screened based on their titles and abstracts to ensure they included 'rights of nature' or a closely related term; referred to at least one adopted legal RoN case (we included the cases in India as they were in advanced stages of formalization at the time of research); dealt with drivers and processes related to a RoN case; and were written in English. These criteria excluded articles that were solely conceptual or described cases that had not yet been formalized. The first screening using Covidence software excluded 47 articles. After reviewing the full articles using MAXQDA software for qualitative data analysis, 49 were excluded. In addition to the remaining 75 articles, three 'review articles' were included because they met the inclusion criteria and ensured that major studies at the time were included. The complete selection process is visualized in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram in figure 1.

For the in-depth analysis, in total we selected 50 out of 78 articles that focused on case studies in the four selected countries (some with focus on more than one country). Following Xiao and Watson (2019), we prioritized studies that addressed our research questions directly (code 5) and had higher evidence strength (code 97) (see table S9 in the supplementary data file for the complete list of articles for bibliometric and in-depth analyses).

2.2. Structuring the analysis of RoN formalization process with the IAD framework

We understand the formalization process of RoN as an institutional change (North 1990, Ostrom 1990, Williamson 2000). In this context, institutional change represents a policy process driven by a set of variables. However, existing institutional arrangements or path dependencies influence this set of variables at all times, too. Hence, while drivers affect the actors and action situations (consisting of windows of opportunities and actors with various positions, decision options, information, expectations, interests), the resulting interactions, outcomes, and (re-)evaluation of these by the actors continuously modify the existing conditions and drivers (Ostrom *et al* 1994). To structure the analysis of such complex and interdependent processes, Ostrom (2005) developed the Institutional Analysis and Development (IAD) framework. The IAD framework allows for a systematic and structured analysis of the institutional settings and their changes. It offers a common language for descriptive and diagnostic analyses that is open to different disciplinary perspectives, and can bridge knowledge from theory and practice (Gilbert *et al* 2023). Furthermore, it is open to a non-anthropocentric perspective. Its simple but complete structure, as well as its meta-language, make it suitable for structuring rapidly growing scientific literature from a variety of disciplines. As we are particularly interested in the drivers and actors of RoN formalization, we adapted the key exogenous groups of drivers specified in the general IAD framework to the



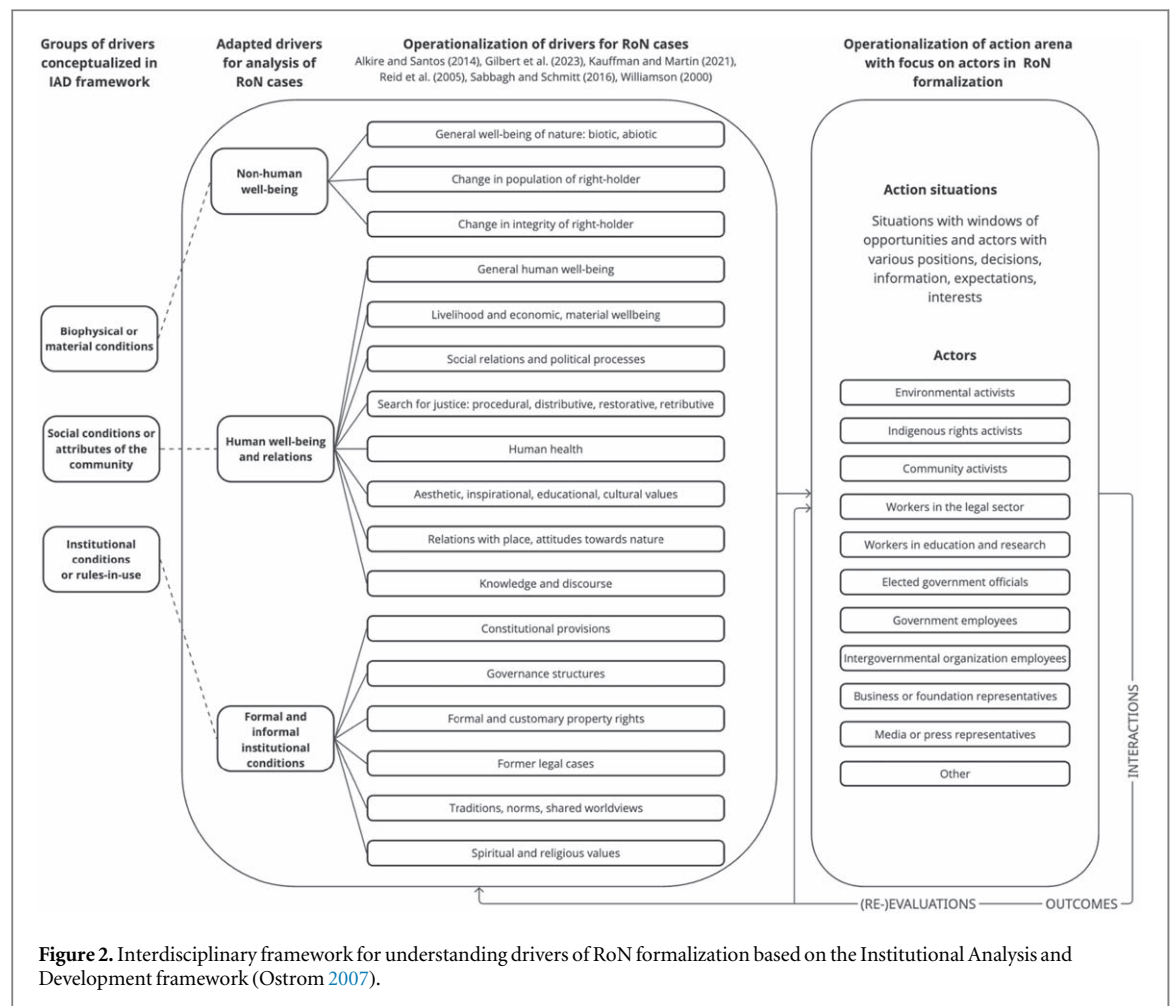
RoN cases. Drivers were subdivided into three general groups in the IAD framework: (1) biophysical/material conditions, (2) social conditions or attributes of the community, and (3) institutional conditions or rules in use. Adjusting these to RoN cases, we grouped them into (i) non-human well-being of nature, (ii) human well-being and relations, and (iii) formal and informal institutional conditions. They formed a structure for coding families (figure 2) (see tables S1–S8 for detailed codes).

The first group of factors is in line with the assumption that overall conditions in the natural world, namely the deterioration of ecosystems, can drive experiments such as RoN. Additionally, we distinguished RoN by the subject of rights, which could theoretically be a single species, an ecosystem such as a river or forest, or nature as a whole. Accordingly, the subject of rights can either be surrounded by or include biotic and abiotic natural world. From the perspective of the natural sciences, this distinction could be useful in understanding the scales at which concern for the non-human well-being of nature drives RoN (Gilbert *et al* 2023). The second group of factors is in line with the assumption that overall conditions in the social world largely explain the emergence of RoN, namely, livelihood concerns, social relations and political processes, benefits of nature for human health, aesthetic, inspirational, and educational values of nature, relations with and attitudes towards nature, knowledge and discourse about nature, and search for justice. Human well-being and relations can hardly be exhaustively listed, yet these groups of factors are listed almost universally across various disciplines and strands of literature (e.g., Alkire and Santos 2014, Reid *et al* 2005, Sabbagh and Schmitt 2016). Finally, the third group of factors is in line with the assumption that the existing institutional setting—broadly understood here as formal and informal rules shaping human interaction (e.g., North 1990, Williamson 2000, Ostrom 2007)—often determines whether new sets of rules, such as RoN, can be devised and what the limitations of these new rules could be.

With regard to the actors, we built on the categorization of actors by Kauffman (2020b) based on their activities but also kept the category open to leave methodological room for further categories that could emerge inductively from the qualitative analysis (after Mayring 2014). As a result, we added the category of media/press. The type of actor was assigned only once per article, even if the authors mentioned the category more than once, to reduce bias owing to the content focus of the authors.

2.3. Development of the coding scheme and data extraction

We extracted information from the articles through qualitative analysis based on a coding scheme consisting of parameters that set the criteria for coding the literature and assessed its quality following Xiao and Watson (2019). We used iterative analysis (Bryman 2012) to develop and refine the coding scheme parameters. This included validation of the general framework of analysis with the participants of an online workshop organized as part of an interdisciplinary scoping project on RoN, as well as the authors' reflections and subsequent integration of lessons from the two transdisciplinary workshops during the project that included RoN practitioners (Gilbert *et al* 2023). The final coding scheme consisted of the following eight code families: (1) basic article information (authors, title, year, main aim, journal, discipline, region of publication), (2) methodological approach, (3) case description, (4) actors, (5) factors related to the non-human well-being of nature, (6) factors



related to human well-being and relations, (7) factors related to formal and informal institutional conditions, and (8) information related to implementation and research (how RoN was represented, what resources RoN received, the extent of RoN independence, evidence strength, any peculiarities and patterns in described drivers and outcomes, the extent of the empowerment). In MAXQDA the articles were coded by segments identifiable within the text that corresponded to these codes. All 101 codes are described in detail in the supplementary data file (tables S1–S8). As several parameters (e.g., code 5—the aims of research, code 7—the research disciplines, and code 21—definitions of RoN) consisted of open questions, we used the open coding method of Inductive Category Development (Mayring 2014).

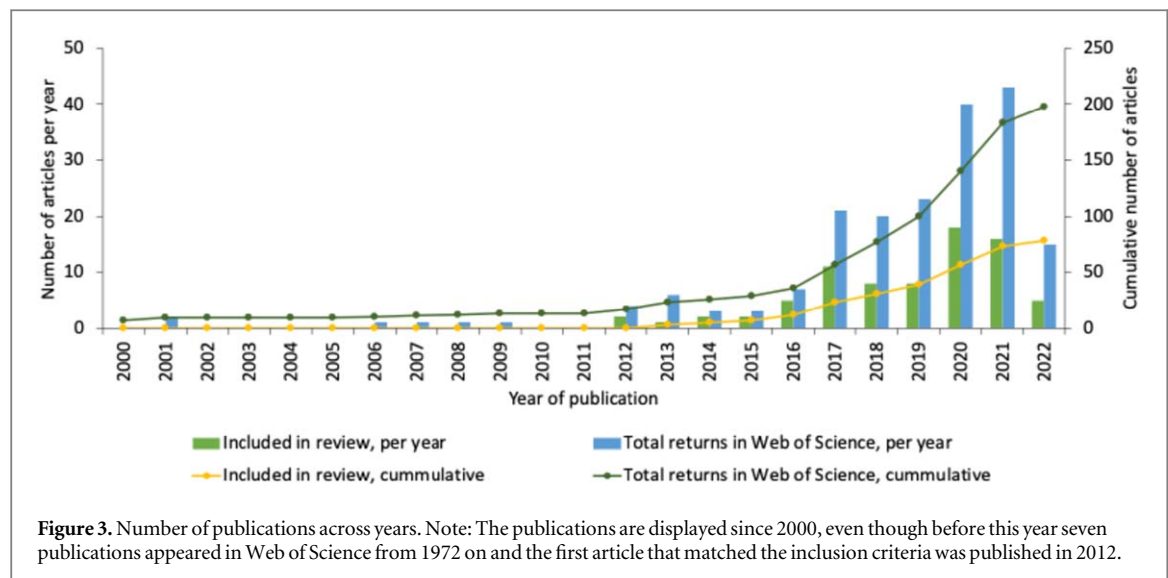
3. Results and discussion

3.1. Key bibliometric trends: right of nature studies are on the rise but remain concentrated across few disciplines and regions with limited epistemological reflexivity

Altogether, the 78 analyzed articles (see the supplementary data file) were published over a period of a decade between January 2012 and May 2022 in 60 different peer-reviewed journals. The total number of articles dealing with RoN, as well as those included in this study, has substantially increased in recent years (figure 3).

In total, 101 authors wrote the analyzed articles, of which 14 authors published more than one article. Most journals have published one or two articles. Transnational Environmental Law stands out as the journal with the most publications. In terms of discipline, the analysis showed large shares for law (38%) and political sciences (19%), whereas interdisciplinary journals remained weakly represented (5%).

By their affiliation, it is striking that 61% of the authors are based in the US (29%), Canada (2%) and European countries (UK - 10%, Netherlands - 8%, Germany - 3%, Belgium - 2%, Norway - 2%, Spain - 2%, Finland - 1%, Ireland - 1%, Italy - 1%, Sweden - 1%, Switzerland - 1%). Furthermore, 19% of the authors have institutional affiliations in Australia (11%) and New Zealand (8%). Latin American affiliations account for 14% (Chile - 4%, Ecuador - 4%, Brazil - 2%, Mexico - 2%, Argentina - 1%, Columbia - 1%, Peru - 1%), while 4% of authors have institutional affiliations in India and 2% in South Africa. In total, 11 countries had detailed case



studies, whereas 37 countries were mentioned briefly. The majority of the RoN cases studied in detail were located in Ecuador (34% of all case studies), New Zealand (14%), the United States (10%), Bolivia (10%), India (9%), and Colombia (8%). The countries studied in detail were also the most often represented in brief mentions. It should be noted that because of the inclusion criteria, the countries studied in detail only consisted of formalized RoN cases (and India that was in its advanced stage), whereas other countries with one mention were Egypt, Kenya, Madagascar, Morocco, Rwanda, Sudan, South Sudan, Tunisia, Hungary, Montenegro, Serbia, Jamaica, Dominican Republic, Turkey, Nigeria, Germany, Benin, Costa Rica, and Pakistan. More than half of the observed case studies have been conducted in Latin America. While most of the reported cases were from only six countries (84% of the countries studied in detail), it is notable that other cases were much less represented in the literature.

The analysis showed that empirical outcome evaluation was the most common objective (36%) (table 1). Notably, 8% of the articles on actors and 17% on the drivers and processes leading to the emergence of RoN were of high value in the qualitative analysis. Although purely conceptual papers were excluded during screening, some conceptual articles had valuable empirical information and were, therefore, included. From all articles, 83% ($n = 65$) were coded as empirical and 17% ($n = 13$) as more conceptual. Almost all articles used qualitative data, 51 used a qualitative case study design, and 20 used a comparative case study design. Six articles were coded as qualitative research, with no distinct research design. One scenario analysis (Jenkins *et al* 2021) used a mixed methods approach.

With regard to the applied research methods, we could not find a single study that reflected on their research in terms of epistemic injustices (Fricker 2007). Although RoN is a clear interdisciplinary and transdisciplinary topic, most articles were conducted within a single discipline. This determines the perspective of the topic and number of factors considered in the analysis. It would be valuable to intensify interdisciplinary analyses that include an analysis of the environmental dimensions of institutional change. In this regard, our review supports that the IAD framework, with its capability to unite the analyses of biophysical conditions, social-cultural context, and institutional environment at the meta level and in a coordinated manner, is a particularly useful approach for RoN analysis. In addition, many studies (e.g., Rühls and Jones 2016, Youatt 2017, Alley 2019, Chaturvedi 2019, Bandopadhyay and Pandey 2020, Bleby 2020, Álvarez-Marín *et al* 2021) that have primarily used academic publications leave little space for reciprocity, respect for self-determination, embracing other ways of knowing, and embodying transformative praxis (Thambinathan and Kinsella 2021). Other studies (e.g., Lalander 2016a, Shiraishi Neto and Martins Lima 2016, Espinosa 2019, Laastad 2019, Valladares and Boelens 2019, Fitz-Henry 2020, 2022, Kauffman 2020a, Coombe and Jefferson 2021, Marras Tate and Rapatahana 2023, Wesche 2021) used semi-structured interviews that were more compatible with decolonizing methodologies but still gave the scientist interpretive dominance. None of the case studies in India engaged directly with actors through interviews or ethnographic research. Despite this, several studies adopted principles of boundary thinking. For example, RiverOfLife *et al* (2021) acknowledged Martuwarra RiverOfLife as an active participant in their scholarly argumentation and granted her the primacy of authorship. Coombe and Jefferson (2021), Fitz-Henry (2022), and Tola (2018) used feminist and decolonial theories to examine the topic. Adamson (2020) used storytelling techniques. However, these examples are exceptions, and almost ironically most RoN studies appear to reproduce hegemonic patterns while exploring a topic related to these structural barriers.

Table 1. Categorization of research topics through content assessment.

Main cate-gory	Category of research focus	Share of articles in %	Articles
Empirical	Actors in RoN cases	8	Adamson (2020), Crews (2019), Fitz-Henry (2018), Jones (2021), Laastad (2019), O'Donnell <i>et al</i> (2020)
	Drivers/ emergence of RoN cases	17	Akchurin (2015), Espinosa (2014, 2015, 2017, 2019), Humphreys (2017), Kauffman (2020a), Kauffman and Martin (2018), Shiraishi Neto and Martins Lima (2016), (Takacs 2021), RiverOfLife <i>et al</i> (2021), Schmidt (2022), Marras Tate and Rapatahana (2023)
	Outcome evaluation of cases in relation to certain goals	36	Alley (2019), Berros (2021), Calzadilla and Kotze (2018), Chaturvedi (2019), Coombes (2020), Fitz-Henry (2012), Hill and Fernandez-Salvador (2017), Kauffman and Martin (2017), Kotze and Calzadilla (2017), Krämer (2020), Lalander (2016a, 2016b), Radcliffe (2012), Nieto Sanabria (2018), Schimmöller (2020), Talbot-Jones and Bennett (2019), Tănăsescu (2015, 2020), Tola (2018), Valladares and Boelens (2017, 2019), Cano Pecharroman (2018), Álvez-Marín <i>et al</i> (2021), Fitz-Henry (2022), Guim and Livermore (2021), Jolly and Menon (2021), Dancer (2021), Coombe and Jefferson (2021), Schapper <i>et al</i> (2022)
	Assessing RoN as a pragmatic tool in specific cases (sustainability/justice)	11	Barrett <i>et al</i> (2020), Fitz-Henry (2020), Macpherson <i>et al</i> (2020), Saavedra (2013), Schoukens (2018), Stilt (2021), Van Norren (2020), Strack (2017)
	Policy evaluation in terms of governance of commons	4	Dupuits <i>et al</i> (2020), Perry <i>et al</i> (2021), Jenkins <i>et al</i> (2021)
More conceptual	Normative reasoning for RoN	4	Babcock (2016), Rühs and Jones (2016), Kofler and Grogan (2021)
	RoN in relation to human-nature relationships	10	Adloff and Hilbrich (2021), Kramm (2020), Latta (2014), Wu (2020), Youatt (2017), Arstein-Kerslake (2021), Page and Pelizzon (2022), Schapper <i>et al</i> (2022)
	RoN in relation to anthropocentrism/ecocentrism	9	Bandopadhyay and Pandey (2020), Bleby (2020), Borrás (2016), Fukurai (2020), Gudynas (2017), Knauf (2018), Roncancio (2017)
	Analysis of RoN characteristics on being a 'movement'	1	Kinkaid (2019)

Further, methodologically we were also interested in the temporal dimension taken in the studies, as this could have affected the prominence of various drivers, processes, and outcomes revealed in their analyses. However, based on the information in the analyzed articles, it was not possible to establish the potential influence of this dimension, as only two papers addressed it and in rather general terms. Both Wesche (2021: 534) and Fitz-Henry (2012: 265) explored the effects 'four years after the ruling.' Other articles mentioned unclear time specifications such as 'in recent years' (Strack 2017: 4) or 'decades' (Akchurin 2015: 937).

3.2. Tendencies across cases

In total 2739 segments were coded, of which 2066 segments were content-related. Of these, 210 segments addressed actors, 215 segments addressed factors of non-human well-being, 580 segments addressed factors of human well-being and relations, 456 segments addressed factors of formal and informal institutional settings, and 563 segments addressed outcomes. On average, each paper had 36 coded segments, whereas the lowest number of coded segments in one article was seven and the highest number was 133.

3.2.1. Restorative justice, traditions, norms and shared worldviews, as well as general non-human well-being mentioned by most as factors facilitating RoN formalization

Our analysis revealed diverse facilitating and hindering factors (figure 4). Each factor included in the analysis was described at least once. In total, factors related to human well-being and relations were coded the most, factors related to formal and informal institutional conditions were the second most, and factors related to the non-human well-being of nature were the last.

The results show that the factors that drive the formalization processes are complex, as all 32 defined factors influence the RoN formalization. This means that an institutional change such as the introduction of RoN is an interplay of various factors that cannot be generalized but varies greatly between the different cases. Factors that

		Articles describing the factor			
		in total	as facilitating	as hindering	as with no impact
Non-human wellbeing of nature	General non-human wellbeing	49	48	0	1
	Population of the subject of rights	18	17	0	1
	Integrity of the subject of rights	13	13	0	0
	Population of biotic environment	3	3	0	0
	Integrity of the biotic environment	5	5	0	0
	Population of abiotic environment	4	4	0	0
	Integrity of the abiotic environment	6	6	0	0
Human wellbeing and relations	General human wellbeing	23	23	0	0
	Income	2	2	0	0
	Natural capital	14	12	2	0
	Food security	9	9	0	0
	Material assets	5	5	0	0
	Employment	5	4	3	0
	(Eco)-tourism	2	2	0	0
	Recreation	3	3	0	0
	Social relations	19	17	2	0
	Political processes	36	34	5	0
	Relations with place	27	27	0	0
	Human health	17	17	0	0
	Aesthetic, inspirational, educational values	7	7	0	0
	Cultural heritage	35	35	0	0
	Attitude toward nature	37	35	2	0
	Scholarly knowledge	35	35	1	0
	Procedural justice	5	5	0	0
	Distributive justice	19	18	2	1
	Restorative justice	59	59	0	0
	Retributive justice	2	2	0	0
	Other human-related factors	42	39	5	1
Formal and informal institutional conditions	Constitutional provisions	16	14	3	0
	Governance structures	35	33	3	0
	Formal property rights	11	8	3	0
	Reference to former legal cases	39	38	0	1
	Traditions, norms, shared worldviews	52	52	4	0
	Spiritual and religious values	40	39	3	3
	Customary property rights	24	24	0	0

Figure 4. Distribution of social-ecological drivers (and barriers) as observed by reviewed articles. Note: The size of the evidence was assessed based on the proportion of articles that described each category. The blue color signifies the trends of factors described by the articles in total, the green as facilitating ones, red as hindering, and yellow as those with no impact.

were highly influential in one case had no influence in others (e.g., the general well-being of non-humans). Thus, the idea of clearly identifying the key drivers that ensure the formalization process cannot be supported by our results. This is in contrast to Kauffman and Martin (2018, 2021), who summarized three main facilitating factors for RoN formalization: functional needs, a new (ecocentric) understanding of the natural world, and practical experiments with law.

Overall, facilitating factors were mentioned much more often than hindering factors, and specific factors with no influence were mentioned the least. The most mentioned factors were restorative justice (75% of all articles), traditions, norms, shared worldviews (67% of all articles), and general well-being of non-humans (62% of all articles). Various factors related to human-related well-being and relations as well as formal and informal institutional settings were mentioned in more than 45% of all articles (such as political processes, cultural

Table 2. Distribution of actors by their activity types.

Actor groups by activity type	Advocating actors Number	Obstructing actors Number	Non-influential actors Number
Environmental activists	26	0	0
Indigenous rights activists	38	0	2
Community activists	20	0	0
Workers in the legal sector	20	0	0
Workers in education/ research	15	1	0
Elected government officials	21	4	1
Government employees	6	4	0
Intergovernmental organization employees	2	0	0
Business or foundation representatives	0	2	0
Media or press representatives	2	0	0
Total	150	11	3

heritage, attitudes towards nature, scholarly knowledge, spiritual and religious values, governance structures, and references to former cases). Examining the hindering factors, political processes, other human-related factors, traditions, norms, shared worldviews, and spiritual and religious values were mentioned most. Economic factors were the least-mentioned factor group. Although factors related to the non-human well-being of nature are often mentioned, they are not differentiated in detail. What also becomes obvious is that many of the analyzed factors are not clearly defined as only facilitating or hindering, but this becomes more evident by interpretation of the context. One exception was restorative justice, which was clear and the most prominent facilitating factor.

3.2.2. *Individuals, community organizations, domestic and international non-governmental organizations are the key RoN advocates, obstructing actors are underreported*

Actors were categorized as advocating, obstructing, or non-influential. Overall, 61 articles (78%) named different actors as advocates, and 20 articles (26%) named obstructing or non-influential actors. Regarding organizational structure, the most frequently mentioned advocating actors were certain individuals, community organizations, domestic non-governmental organizations (NGOs), international NGOs, courts, national governments, and universities or think tanks. Businesses and foundations, the media, and local governments were mentioned least as advocating actors. These actor groups, particularly businesses, foundations, and local governments, were also mentioned as obstructive actors, in addition to certain individuals and national governments. We further categorized the actors according to their type of activity when advocating or obstructing the formalization of the RoN (table 2).

Without the results of the in-depth analysis, which follows in the next section, the most frequently mentioned advocating groups consisted of Indigenous rights activists, environmental activists, community rights activists, elected government officials, people engaged in legal work, and scholars. The most frequently mentioned obstructing actors by activity type are government officials, government employees, and representatives of businesses and foundations.

Our finding about the general variation of actors is in line with the results of the analysis of transnational networks by Kauffman (2020b), who identified a total number of 1189 individuals and organizations that consist of RoN advocates and partners worldwide. While Kauffman's focus is on the transnational governance structure of networks and laws, he highlights a strong interrelatedness that describes RoN as one 'dynamic movement that is growing across the globe' (Kauffman 2020b: 27). In contrast, our analysis allows us to compare the actors' structures between different cases and to focus on the observed case-specific differences within actors. Although our study confirmed the overall importance of the actor groups identified by Kauffman (2020b) for RoN, their relative importance varied from case to case. In Kaufman's analysis (2020b), Indigenous rights activists and government officials played minor roles, at 5% and 3%, respectively. Our studied articles named the Indigenous actors 20% and government officials 13% more often, whereas environmental activists, educators and researchers, businesses, and foundations were named much less. One reason for this could be the different data sources of the analyses and the fact that Kauffman focused mainly on actors working in the network. Even if the reason for the low representation of obstructors might be because no obstructing actors existed, it is more likely that they were not at the researchers' center of attention. Nevertheless, this is a potential area of future research.

Table 3. Summarized comparison of RoN formalization within selected cases.

Categories		United States	Ecuador	New Zealand		India
1 General characteristics	1.1 Legal case	Tamaqua Borough Sewage Sludge Ordinance 2006	2008 Constitution of the Republic of Ecuador, Part 2, chapter 7, Articles 71 – 74	Te Urewera Act 2014	Te Awa Tupua (Whanganui River Claim Settlement) Act 2017	Mohammed Salim v. State of Uttarakhand (Ganga) (2017) Writ Petition (PIL) No. 126 of 2014
	1.2 Rights-bearing entity	Nature as-a-whole	Nature as-a-whole	Specific local ecosystem (Forest)	Specific local ecosystem: Whanganui Riverbed (existing rights to water and land were excluded)	Specific local ecosystem (River)
2 Drivers	2.1 Non-human wellbeing	<i>Supporting</i> • Risk of worsening general wellbeing of environment	<i>Supporting</i> • Rich biodiversity system destroyed by extractivism	<i>Obstructing</i> • Good wellbeing of nature and absence of specific environmental problem		<i>Supporting</i> • Pollution and destruction due to illegal mining
	2.2 Human wellbeing and relations	<i>Supporting</i> • Felt need for environmental and human health protection, reestablish power of community • Personal engagement of powerful actors (Cathy Morelli)	<i>Supporting</i> • Risk of reliance on extractive industries for economic growth • RoN as a symbolic tool for a ‘citizen revolution’, achieving a post-neoliberal development model infused with Indigenous concepts	<i>Supporting</i> • Conflicts over historical and ongoing injustice • Restorative justice (treaty settlement over natural resource management) and recognition of ontology		<i>Supporting</i> • So far failure of environmental governance • Environmental protection, improve legal implementation/enforcement of law
		• Influence of scholar work; Cultural resonance of voters (environment merely seen as the basis for human health)	• Personal engagement of powerful actors (Alberto Acosta)	• Personal engagement of powerful actors (Christopher Finlyson)		• Personal engagement of powerful actors (Judges)
		<i>Obstructing</i> • Fear of unemployment, constitution, governance structures	<i>Obstructing</i> • Fear of unemployment, political processes, • Distributive justice, spiritual value, worldview	<i>Obstructing</i> • Political processes, relation with place, scholarly knowledge, formal property rights		<i>Obstructing</i> • Spiritual, religious value
	2.3 Institutional conditions	Closed political opportunity on national level;		Treaty of Waitangi formalized power dissemblance		Constitutional provision of public interest litigation

Table 3. (Continued.)

Categories		United States	Ecuador	New Zealand		India
3 Actors	3.1 Key advocating actors	Environmental law mainly based on intervention, not enough prevention CELDF, local actors (civil society organization, private actors, local community)	Political instability opened a window of opportunity in drafting of new constitution Convenient communities of actor networks from different institutional levels (state, NGOs, international organization, private actors, media)	New Zealand Crown representatives and Māori representatives (state, Indigenous private actors)		Court
	3.2 Key obstructing actors	No specific actor ('anonymous' threats by lawsuits against the town and individuals)	Correa government, Indigenous communities were rather skeptical	Not mentioned, Indigenous communities were rather skeptical	Not mentioned, Indigenous communities were rather skeptical	Not mentioned
4 Outcomes	4.1 Implementation/ legal standing	Municipal ordinance (sub-ordinate to state or federal law)	Constitutional case	Acts of Parliament (Parliamentary supremacy)		Court ruling
	4.2 Legal status	Legal standing to exist and 'flourish'	'To exist and maintain ecosystem integrity; restored when damaged'	Full legal personhood, exercised on behalf of the entity by human face		Rights and duties of a legal/ living person, but constituted as legal minors
	4.3 Representation	Legal representative: city, municipal citizens Power: can sue demanding fulfillment by and before public authorities	Legal representative: everyone Power: anyone can sue demanding fulfillment by and before public authorities	Legal representative: Te Urewera Specific board members: first 3 years: 8 members (4 Tuhoe-appointed, 4 Crown-appointed) thereafter: 9 members (6 Tuhoe-appointed, 3 Crown-appointed); Powers: managing the ecosystem in a way that ensures the forest's health and well-being operating within the parameters of state legislative processes	Legal representative: Te Pou Tupua Specific members: 2 people forming one station (one iwi member, one from government) Powers: Ownership rights of the river, limited involvement in decisions about river management (only mandated role to administer Te Koro-tete, the fund established to support the river's health and well-being)	Legal representative: Guardians in loco parentis Specific members: the director of Namami Gange, the chief secretary of the state of Uttarakhand, and the advocate general of the state; Powers: legal responsibility to take on some of the functions and responsibilities of a parent

Table 4. Key findings from the in-depth content analysis.

Code family	Pattern
Drivers	1. Environmental protection is not a common driving factor.
	2. Justice, property rights, and personal engagement of powerful actors are common driving factors.
Actors	3. Type of advocating actors depends on the context, with a special focus on the actors' needs and capabilities. This leads to a scale dependency of actors' alliances.
	4. Indigenous actors are not necessarily advocating actors driving RoN. They were partly skeptical which sometimes slowed down the processes leading to RoN adoption, too. Local communities are likewise not actors advocating for RoN.
Implementation	5. Actors perceive RoN not as an Indigenous but as a Western legal tool. This tool is primarily influenced by Western knowledge.
	6. Two models for structuring RoN law occur: the nature's rights model and the legal personhood model.
Outcome	7. The way the new rules are integrated with existing legal-institutional frameworks in the observed cases hinders actors from achieving their aspired goals.
	8. The rules still create new relations between humans and other than humans.
Reporting	9. Hindering factors are less reported and little is known about them.

3.3. Insights from in-depth analysis and patterns in a deeply complex world

At first sight, the formalization processes leading to the adoption of RoN in the four observed countries differed substantially (summarized in table 3, see detailed individual case studies are available in the supplementary data file).

Despite the highly complex and case-specific nature of drivers leading to RoN, as summarized in table 3, our analysis revealed some key patterns that evolve across cases. We synthesize nine such key patterns in table 4 that emerged from the case comparison. Here we organize the discussion of our key findings while referring to both of these tables. These patterns partially confirm and partially contradict previous observations of the RoN.

Pattern 1, that environmental protection is not always a driver and therefore RoN does not automatically emerge from ecocentric ontologies (table 3: row 2.1), and Pattern 4, that neither Indigenous nor local community actors necessarily drive the RoN formalization process (table 3: rows 2.2 and 3.2), highlight the most important findings against the background of previous literature. In contrast to the understanding that RoN is an Indigenous or local community movement for environmental protection (Kahui *et al* 2024), that is, moreover, very homogeneous (Adamson 2020, Espinosa 2017, Knauß 2018, Chaturvedi 2019, Jolly and Menon 2021, Jones 2021, Perry *et al* 2021, Wesche 2021), our results confirm Tănăsescu's (2022: 16) statement that '[r]ights of nature legislation have appeared in different places and in radically different ways.' While businesses and political leaders were mentioned as obstructing actors directly (table 3: Row, Column), one key actor group mentioned as obstructing indirectly were the skeptics whose consent was required to advance the RoN in the formalization process (Henry 2018, Valladares and Boelens 2017, 2019, Kauffman and Martin 2018, Tănăsescu 2020). Particularly noteworthy is that in some cases where Indigenous actors' support was needed for RoN formalization (Ecuador and New Zealand), Indigenous actors were not per se in favor of RoN adoption (Kaufmann 2020a). In Ecuador, once the idea of RoN was on the discussion table, Indigenous representatives remained skeptical, expressing concerns that RoN could conflict with long-standing Indigenous political demands (Tănăsescu 2015, Valladares and Boelens 2017, 2019). This skepticism arose partly from bad experiences with governmental and NGO programs that emphasized conservation over local autonomy (Fitz-Henry 2012, Lalander 2016b) and partly because the priority of making nature the subject of rights was unclear, 'abstract, academic, and even lyrical' (Akchurin 2015: 955). For others, it was self-evident and only a minor part of the cultural identity based on broader claims about 'plurinationality' and collective rights (Espinosa 2015, Laastad 2019). With time they still facilitated the formalization indirectly by opening the discourse for the sake of pursuing legal recognition of their cosmovision (Espinosa 2015, Tănăsescu 2015, Valladares and Boelens 2017, 2019). Their pronounced aims in discussions opened the discourse about other nature-related topics (Akchurin 2015, Espinosa 2015, Kotzé and Calzadilla 2017). Only after losing the discussions on rights to consent did the Indigenous representatives start to support RoN in discussions directly, because for them it was important to restrain the state's power upon natural resources, Indigenous communities, and their traditions (Wu 2020). In New Zealand, there was more agreement around granting rights to the Whanganui River among the Indigenous representatives. However, in the Te Urewera case, where the Indigenous communities were in the fight for return of their lands, there was an overall feeling of frustration and failure about the newly granted RoN. Coombes (2020:1) described it as an 'act of misrecognition' because it 'conflates Indigenous with environmental, development with preservation and human with natural values' (2020: 1). For him, the treaty claims emerged more from land loss than disrespect for biocultural values but granting rights ruled out the return of ancestral land and discursively controlled, hegemonized, and silenced decades of activism that claimed

Indigenous autonomy and repatriation of resources (Coombes 2020). Hence, our findings support Kinkaid's (2019: 559) proposal to understand RoN as a 'boundary object [...] a fuzzy mobile concept or form around which various sets of relations become organized, mobilized and reconfigured through processes of translation [...] connecting translocal assemblages of environmental governance' instead of being 'a global transnational movement or singular institutional form.'

This boundary-object-understanding of RoN matches our observation of the complexity of supporting drivers too, (Pattern 3). The supporting drivers related to the non-human well-being of nature, human well-being and relations, and institutional conditions vary significantly from case to case. The most contrasting variation in non-human drivers can be observed between the Ganges, one of the world's most polluted rivers, and the Te Urewera, which consists of a highly biodiverse and integer ecosystem (table 3: rows 2.1 – 2.3). The Te Urewera case also shows that not only is environmental protection not a common driver, but in fact it could be considered an obstructing factor, where authorities preferred to uphold the existing conservationist governance model in the form of a national park instead of altering the arrangement of rights (Strack 2017, Tănăsescu 2020).

In addition, we see a connection between the actor group sizes and the institutional levels at which the new law was implemented, connected through the existing and needed power structures to implement institutional change, which leads to a scale-dependency of actors' alliances (Pattern 3). Generally, smaller groups are associated with cases in which formal decision making either does not require or does not allow larger social mobilization. For example, in the United States, the main advocating actors were smaller in size - individuals and local actors - because the closed legal structure did not allow the implementation of RoN at higher institutional levels (policy, constitutional, meta-constitutional) (table 3: rows 2.3 and 3.1) (Babcock 2016, Fitz-Henry 2018). By contrast, in Ecuador, a large-scale heterogeneous network of advocating actors from different institutional levels (operational to meta-constitutional) were involved to drive RoN formalization at the constitutional level (table 3: rows 2.3 and 3.1) (Fitz-Henry 2012, Kaufmann and Martin 2017, Lalander 2016b). New Zealand's laws emerged from the interaction of representatives of only two groups (table 3: rows 2.3 and 3.1) (Crews 2019, Marras Tate and Rapatahana 2023). In India, only one main actor - the judges - drove RoN legislation without the need to build alliances (Kinkaid 2019).

Despite the definitional amplitude and regional specificity of the RoN, we still found commonalities in the reporting of factors that have not yet been discussed in-depth in the literature. The call for justice, reorganization of property rights, and personal engagement of powerful actors are commonly reported as drivers in observed cases (Pattern 2). Furthermore, all cases have a commonality in that the personal engagement of certain powerful individuals plays a pivotal role in driving processes regardless of the existence of a window of opportunity. In New Zealand and Ecuador, a window of opportunity was created through new elections, which allowed the personal beliefs of powerful actors, such as Alberto Acosta in Ecuador and Christopher Finlayson in New Zealand, to influence the RoN formalization processes (Kauffman 2020a). The same influence of actors' personal beliefs was key in situations without an open window of opportunity, such as in India, where it was specific judges who enacted RoN, but also in Tamaqua Borough in the US, where the initiator, Cathy Miorelli, already had a chair in the town's council and favorable contacts with the other council members (Kauffman and Martin 2018). However, the heterogeneity of these calls indicates that the RoN framework is used as a narrative for many transformative goals that are partly unclear and contradictory. As Petel (2024) argues, the establishment of the RoN will not be without political battle or social tension. The results of the comparative analysis confirm this point through Pattern 7.

The analysis of implementation clarified that thus far, the construction of the laws restricts the achievement of the actors' motives and goals through structural problems (Pattern 7). In the US, the way the new rules are enacted does not allow them to bind. In Ecuador, second-order executive rules and the training of judges, both needed to make sense of constitutional rules, are missing. In New Zealand, the Acts have formalized solutions that are now difficult to undo, even though not all advocating actors support these specific rules. Although the rules are binding in India, they are ambiguous and contradictory, making them incompatible with the existing legal system. This was also observed by Tănăsescu (2022), who found tensions and contradictions that predated rights in practice. Thus, these critiques make the rules seem ineffective at first sight. However, the discursive power of even seemingly soft RoN should not be disregarded, as new laws also appear to convey new (and at times attractive with their relative novelty) information about alternative pathways that help people coordinate, change incentives, or create new social norms and relations (Guim and Livermore 2021). Therefore, we see structural judicial ineffectiveness as a valuable snapshot for ex-post policy evaluation and adjustments as rules are continuously constructed and revised (Jann and Wegrich 2007, Anderson *et al* 2022).

The pattern that virtually all actors perceive RoN as a Western legal tool (Pattern 5) is highly relevant as it reveals somewhat 'romanticized' scientific representation and practical hybridization process. RoN has been promoted as Indigenous-originated or emergent from decolonial practices (see the explanation above in Pattern 4). However, our results clearly showed that this was not the case. Instead, the concept of RoN in all observed cases was based on the written work of Western scholars, mainly Stone, and Indigenous actors remained

skeptical, even when there were many instances of general support for RoN from these communities (table 3: row 3.2). It is not the RoN that can empower local communities that might simultaneously lead to better ecological outcomes, but the concrete and individual institutional design that can combat power asymmetries and empower certain marginalized groups, whose well-being mainly depends on a certain biophysical environment (Viaene 2022, Petel 2024).

Whether RoN is a successful hybridization of Western and non-Western thinking, a more strategic approach of Indigenous people using Western terminology to be more recognized, or an unfortunate combination that cannot resolve the existing tensions between different worldviews on nature is also an unclear point in the scientific debate. Pattern 8, in which the rules allow to question fundamental assumptions taken for granted in a society, create or imagine a new relationship between humans and other-than-humans, and develop rather novel forms of representation (table 3: rows 4.1 – 4.3), supports the first perspective, but at the same time, will be limited by trends identified in Patterns 4 and 5. Furthermore, if the formalization of RoN is driven by Indigenous or local communities, this does not necessarily mean that it can be associated with a more considerate relationship with nature, as shown in Pattern 1. Socioeconomic conditions also determine whether people favor environmental conservation in its ‘pure’ and Western understanding (e.g., protected areas in New Zealand), even in the case of Indigenous and other local or marginalized communities (Petel 2024).

Pattern 6 differentiates the studied RoN cases into two approaches based on the structure of the right-bearing entity: the approach to grant RoN for nature-as-a-whole, as in the US and Ecuador, and to grant RoN to specific local ecosystems, as in New Zealand and India (table 3: row 1.2). Based on this differentiation, legal status and representation differ. This means that the laws about nature-as-a-whole are characterized by the attributes that anyone can speak for nature but are not obliged to do so, and that the rights are protected reactively when violations are reported. The rights assigned to a particular ecosystem extend legal personhood (e.g., human rights) to ecosystems. This requires the appointment of specific representatives to represent the ecosystem at all times. Within this latter approach, RoN is proactively reflected in decision-making processes. These two approaches resonate with Kauffman and Martin’s (2018) categorization. As noted, the model type has implications for representational arrangements (whether anyone or designated representatives can speak for nature) and whether rights are protected proactively (guardians, stewards, trustees, etc, can represent RoN *ex ante*) or reactively (anyone can claim a violation of RoN *ex post*).

As mentioned above, hindering factors as well as actors are much less reported than facilitating ones (Pattern 9) (table 3: rows 2.1 – 2.2 and 3.2), which could be the result of blind spots in the research, including our own methodological decisions, such as the inclusion criteria and biases. However, we do not see this as the only explanation for total underrepresentation. In any case, in light of the ongoing scientific debate on the transformative power that RoN can or cannot develop, a stronger focus on impediments is required.

4. Concluding remarks

In this article we presented the results of a systematic review, including the in-depth analysis of most well-documented empirical case studies, on the formalization processes of Rights of Nature (RoN) from 2012 to 2022. Given the rapid growth of interest in this topic across academia, policy, and practice (Putzer *et al* 2022), this is an urgently needed stocktake. Furthermore, we engaged extensively with an interdisciplinary body of literature, leading to the development of a newly defined theory-grounded framework that allows informed and coordinated analysis of RoN drivers and actors across and beyond disciplines. This is particularly valuable, when multiple local-to-global and increasingly acute challenges around nature and biodiversity are putting pressure on societies to develop more ‘fundamental’ or ‘transformative’ approaches bridging science, policy, and practice and especially those that can better integrate diverse knowledge systems of Indigenous and local communities (IPBES 2024).

Our analysis unveiled the intricate and case-specific drivers of RoN, significantly expanding our comprehension of RoN itself. The findings demonstrated that the notion of RoN as a ‘revolutionary ecocentric movement’ is overly simplistic. Instead, it should be understood as a boundary object that bridges the gap between place-based non-human and human well-being and relations, as well as formal and informal institutional conditions. The review revealed that key themes such as justice, property rights, and the personal involvement of powerful actors have been instrumental in driving RoN cases globally. Contrary to the prevailing discourse in the literature, environmental concerns are not a common driving force behind RoN, and Indigenous or local communities cannot be universally characterized as advocates for RoN, while undoubtedly it is often their interests that are most affected by RoN reforms. However, RoN-related rules do indeed create space for questioning the purely instrumental and short-term perspectives towards nature and for redirecting the focus to relational thinking in terms of whether non-human nature should have its rights in humanly devised world of rights and who can or should represent them. The analysis also highlighted the role of disciplinary silos

in perpetuating the historically veiled image of RoN due to insufficient engagement with interdisciplinary and decolonizing research methodologies. Further research is urgently needed to understand rapidly evolving developments on RoN, both in the well-established cases around the world, but with decolonizing methodologies, and in places where RoN is relatively new such as in many parts of Europe, where biophysical conditions, social-cultural context, as well as policy-institutional environment can have stark contrasts to the well-documented cases of RoN. The identified patterns in our research provide valuable insights for scholars, practitioners, and policymakers, enabling them to better understand RoN cases globally. This knowledge allows them to build upon nuanced empirical evidence and avoid common misconceptions in shaping relations potentially with far-reaching social-environmental consequences.

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Conflict of interest

The authors declare that there are no known conflicts of interest.

Data availability statement

All data that support the findings of this study are included within the article (and any supplementary files).

Ethics statement

This research is based on an analysis of secondary data available through Web of Science. The theoretical framework was validated with project partners at the workshop dedicated to discussion of analytical approaches potentially applicable for interdisciplinary scoping analysis of RoN as part of the collaborative project on the RoN. The framework was further refined by the authors based on the authors' own reflections after participating in the project's two transdisciplinary workshops. As such only project partners were present at the workshops and no empirical data was collected for this systematic review. Thus it did not involve new data, human subjects, human tissue, or animals; therefore, no ethical approval was required for this research. Accordingly, it does not contain new data beyond the results of the review of the studies available online.

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