

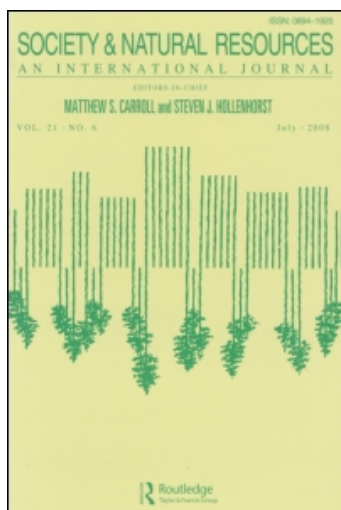
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The *Ius in Re* Model to Analyze Users Rights Within Complex Property Regimes: Two *Ex Post* Applications in South America

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Insights and Applications

The *Ius in Re* Model to Analyze Users Rights Within Complex Property Regimes: Two *Ex Post* Applications in South America

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This article proposes the application of the Ius in Re model of “power over things” from the ancient Roman law to analyze property rights and identify users’ powers within complex property regimes. We specifically propose that people’s independent powers over natural resources should be dissected and independently examined to identify actors and uses inhibiting sustainable management regardless of the prevailing property regime. We employed this model to analyze two cases ex post, in Perú and Ecuador, that evolved from resource degradation to more sustainable management scenarios. Analysis under the light of the Ius in Re model suggests that such outcomes were achieved after users’ powers inhibiting sustainable management were identified and adjusted. Both case studies exemplify the practical utility of the Ius in Re analytical model, showing its suitability to identify who had what powers as a critical first step toward sustainable natural resource management.

Keywords Ecuador, *Ius in Re*, Perú, property regimes, property rights, renewable natural resources

Traditional analysis of renewable natural resource property regimes has focused on the prevalence of property rights and open access based on resource-specific considerations, such as physical attributes and harvest levels (Ostrom and Schlager 1996). The literature discusses the benefits and shortcomings of different property regimes

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(Baland and Platteau 1996; Berkes et al. 1989; Hardin 1968), suggesting that there is not a particular one that brings about the best management practices of natural resources (Acheson 2000).

This article responds to the need to develop resource-specific analysis models (Fisher 1961; Bromley 1992; Schlager and Ostrom 1992). We suggest applying the *Ius in Re* model of “the powers over things” from ancient Roman law to dissect existing property rights and to identify stakeholders’ role within a given social context and resource conditions. We specifically propose that people’s independent *Ius in Re* powers can be examined to identify actions inhibiting sustainable management. We discuss two cases in South America that went from resource degradation to more sustainable management scenarios. *Ex post* examination under the light of the proposed analysis model suggests that such outcomes were achieved after users’ powers inhibiting sustainable management were identified and adjusted.

Property Regimes and the *Ius in Re* Analysis Model

There is a rich academic debate over the defining attributes of property rights and property regimes over natural resources. We attempt to define these terms before introducing the *Ius in Re* analysis model, although it is worth mentioning that these are not universal definitions. In the context of natural resources, property rights refer to a bundle of powers associated with their use and transfer, including selling, leasing, and inheritance capacities (Ciriacy-Wantrup and Bishop 1975). Larson and Bromley (1990) define a property right as the owner’s capacity to claim value over a particular resource that can be enforced by some power. Although one party may hold a property right for a resource, the party does not necessarily hold all the rights over the resource. Property rights define the relationships among individuals regarding their ability to use resources, their exposure to the actions of other people, their privileges, and their responsibilities (Schmid 1995). Open access provides individuals with the ability to use a resource that may imply the appropriation of consumable natural resources (e.g., game animals, grasses) and/or enjoyment of the fruits of certain resources (e.g., right to collect edible fruits) with no or minimal costs, obligations, or exclusions. Finally, property regimes encompass the simultaneous relationship between property right holders and their (varying) property rights over different natural resources within a certain geographic area in a particular social context. Property regimes include private, common, public property, and open access (Demsetz 1967; Bromley 1992).

Property regimes and rights over natural resources can be examined through the *Ius in Re* model developed in ancient Rome. The *Ius in Re* recognizes five powers over things that rule the domain of an individual over natural resources: use (*ius utendi*), usufruct (*ius fruendi*), abuse (*ius abutendi*), alienation (*ius disponendi*), and replevy (*ius vindicandi*) (Argüello 1987). That means that a person can be granted with the power to: (1) restrictively or unrestrictively use a resource; (2) receive all the products, utilities, and advantages produced by other’s property; (3) waste, modify the essence of, or destroy a resource; (4) alienate or convey (sell or donate) the resource; and (5) recover, repose, or retrieve a thing, taking legal actions against an individual who has taken a resource from his or her hold and excludes others from its use (Dahl 2004). Although the powers over natural resources are autonomic and perfectly distinguishable, their joint occurrence is also feasible. A resource user can simultaneously exercise more than one power over a resource or even enjoy *all*

of them over the same resource. Conversely, different users can simultaneously enjoy different powers over the same resource.

The autonomy and distinctiveness of the *Ius in Re* are the foundations for ruling natural resources. Although the extent of property rights varies among nations, depending on their legal system and their prevailing social and cultural norms, all these tenure institutions can be dissected and examined using the *Ius in Re*.

Ex Post Application of the *Ius in Re* Analysis Model to Identify Powers, Understand Property Regimes, and Support Natural Resource Management Decisions

Abundant literature discusses the benefits and shortcomings of different property regimes. It is commonly agreed that assignation of full ownership rights likely results in the protection of natural resources, although it does not secure avoidance of their depletion. A lack of property rights can result in the inability to capture externalities, ultimately resulting in market failure (Fisher 1961; Demsetz 1967; Schmid 1995; Baland and Platteau 1996). Property rights' holders can exclude others from using the resource, limiting the number of potential beneficiaries. Nonetheless, full-ownership rights are not feasible when the costs of enforcement are too high, when the resources are hard to delimit, when the market is not perfect, and when internalization of externalities is unrealistic because of high transaction and enforcement costs (Baland and Platteau 1996). The major benefit of open access regimes lies in enabling use of the resources by a large number of individuals. However, disadvantages of this regime are well known, as use without costs, obligations, or exclusions can lead to resource overexploitation and depletion (Hardin 1968; Hanna et al. 1996; Berkes et al. 1989).

We argue that identifying *Ius in Re* can lead to more sustainable natural resource utilization and the maximization of private and public benefits. Specifically, we suggest using the *Ius in Re* as an analytical tool to identify and dissect powers among users within a particular property regime. The better understanding of interactions can then be used as critical information in the decision process in terms of readjusting such powers to ultimately promote better natural resource management.

The following sections present two cases where actions were taken toward sustainable natural resource management by adjusting different property rights. The first case describes the management of the vicuña camelid (Perú) and the second outlines the evolution of property rights in the Loma Alta cloud forest (Ecuador). According to different reports, both cases have promoted the sustainable management of renewable natural resources, maximizing private users' benefits while protecting the resources for their societal values. The actual measures taken by different governments occurred without use of the *Ius in Re* model. We employed this analytical model as an optic through which we observed two situations *ex post* to exemplify its practical utility.

Comuneros Rearing Vicuña in the Peruvian Highlands

The vicuña (*Vicugna vicugna*) is a wild camelid that inhabits the Andean highlands, 3,000 to 4,600 m above sea level. This species is well adapted to the *puna* ecosystem, characterized by low annual precipitation, high daily temperature fluctuations, and low pasture productivity (Lichtenstein et al. 2002). Perú hosts 61% of its worldwide

population of about 140,000 individuals (Brack 2002; Consejo Nacional de Camélidos Sudamericanos 2008). Vicuñas hold a high societal value, as they are deeply immersed in native Andean traditions. The Incas managed about 2 million vicuñas for meat, leather, and fleece using rotational harvests (Brack 2002; Cox 2003). During the Spanish conquest, the vicuña population decreased when the animals were killed to exploit their fleece (Cox 2003). After Perú obtained independence from Spain in 1821, the numerous laws passed to protect this species were inefficient (Cox 2003), most likely due to little or no involvement of native community members—*comuneros*—in the vicuña management efforts. By the 1960s, the Peruvian vicuña population was at the brink of extinction, mainly due to illegal hunting, with only 5,000 individuals remaining (Lichtenstein et al. 2002).

Remarkably, in 1964, a conservation program involving *comuneros* from the village Lucanas in Ayacucho province was introduced to recover the vicuña population (Brack 2002). *Comuneros* had to watch over the vicuñas, and in return they received the revenues generated from the sale of the meat and leather harvested from old male vicuñas (Brack, 2002). However, social and economic conditions emerged during the 1980s undermining the effects of this program. A severe terrorism crisis in Perú forced the abandonment of the vicuña protection program because ranging pastures were within the territory in conflict (Lichtenstein et al. 2002). The situation coincided with high prices for vicuña fleece in the international market. Poachers, many of whom were terrorists, killed the vicuña to profit from the sale of fleece. In addition, *comuneros* stopped protecting the vicuña because the prevailing legal system did not recognize any private or communal ownership, as it was considered a wild species in public ownership (Cox 2003).

We applied the *Ius in Re* model to analyze the Lucanas situation over that time. We conclude that the Peruvian government legally had all the five powers (use, usufruct, abuse, alienation, and replevin) over the resource but was unable to enforce them. In fact, the illegal hunters were users exploiting the resource without having the legal power to do so. This situation resulted in a loss–loss situation for the Peruvian government and the *comuneros* who traditionally managed the vicuña. The vicuña was vanishing and neither the government nor the local communities were benefiting from this resource.

High societal and commercial values of the vicuña urged action to protect and recover this species. From a societal perspective, there was a strong interest in increasing the vicuña population because it is a vital component of the *puna* ecosystem and because of its ancestral value to Incan descendents. From a commercial perspective, the vicuña fleece is extremely valuable to the fashion industry. One kilogram of vicuña fleece (production of 15 animals per year) can be worth almost 2,000 times more than sheep's wool (Brack 2002). According to Cox (2003), in 2001 a men's scarf containing about 418 g of fleece had a US\$400 retail price in Perú with a production cost of only US\$161.

Peruvian authorities realized that involving *comuneros* in the vicuña conservation endeavor was an opportunity to create economic benefits for local communities while sparing the species from extinction (Cox 2003). *Comuneros'* participation was fundamental to protect this species from illegal hunters in the desolated highlands. Moreover, the Peruvian government wanted to retain ownership over the vicuña to secure control of the resource and encourage its propagation. Therefore, in 1991 the Peruvian government passed Decree 653¹ granting “usufruct rights” over the vicuñas inhabiting communal lands to *comuneros*, who in return had to protect

the animals from illegal hunting (Cox 2003). This decree granted *comuneros* with usufruct powers over the vicuña fleece but excluded other resource outputs such as their offspring. *Comuneros* did not receive full power over the fleece as, after shearing the animal, they had to stock the fleece harvested for its later sale through the Sociedad Nacional de la Vicuña (SNV).² The *comuneros* did not have the right to use or process the fleece into fabric or clothes, preventing them from further adding value to the resource. Supreme Decree 26496 of 1995³ extended the powers over vicuñas inhabiting private lands to their private landholders (Cox 2003). Since then, native communities and private landowners had the same powers over the vicuña: They were only allowed to harvest the fleece from live animals, they were restricted to sell the animals in open markets, and every commercial transaction of the harvested fleece had to be channeled through the SNV.

An *ex post* detailed examination of this agreement using the *Ius in Re* model reveals that *comuneros*—and then private landowners—received the rights to usufruct the fleece of the vicuña and to replevy the animal. Both powers maximized the economic use of the vicuña while promoting its proliferation. The *Ius in Re* model helped us identifying the users and their powers that were inhibiting the sustainable management of the vicuña. Table 1 indicates the powers over the vicuña adjusted by the Peruvian government.

The provision of usufruct powers exclusively over the high-value fleece, along with limits on trading channels, motivated users to increase herd size to augment harvests and gross income. The replevin power assigned to private landowners and *comuneros* served as a right and an obligation that helped secure private and public benefits in parallel. Assigning replevin powers to *comuneros* was crucial because the vicuña herds were free-ranged on communal lands. That free-range management favored the recovery of the Inca's ancestral *chakku* used to annually harvest the vicuña fleece.⁴ Additionally, the replevy power developed and strengthened users' sense of ownership and social legitimacy, which are suggested to improve successful management opportunities (Baland and Platteau 1996). Finally, by retaining

Table 1. Adjustment of the types of powers over the vicuña resources granted to *comuneros* and private landowners (Perú)

<i>Ius in Re</i>	Powers	Resource	Holders by phases	
			Initial	Adjusted (1991 and 1995)
<i>Utendi</i>	Use	Vicuña & fleece	Government	Government
<i>Fruendi</i>	Usufruct	Vicuña	Government	Government
		Fleece	Government	<i>Comuneros</i> and private landowners
<i>Abutendi</i>	Abuse	Vicuña & fleece	Government ^a	Government
<i>Disponendi</i>	Alienation	Vicuña & fleece	Government	Government
<i>Vindicandi</i>	Replevin	Vicuña & fleece	Government	Government, <i>comuneros</i> , and private landowners

^aDe facto, illegal hunters were exercising this power.

the powers to use, alienate, and exploit the vicuña and their offspring, the Peruvian government kept control over the herd, perpetuating the public benefits of the resource. As the resource owner, the government retained the authority to remove usufruct and replevy powers from those who would not take proper care of the resource. In summary, the adjustments introduced in the *Ius in Re* resulted in a significant increase of the Peruvian vicuña population, enabled their repopulation in other areas of the country, and helped to restore Incan ancestral practices and identity (Cox 2003).

Managing the Loma Alta Cloud Forest in Ecuador

The Loma Alta cloud forest case illustrates the granting of different powers by a central government and local communities. This preserved area of cloud forest in Ecuador is comprised of 6,482 ha and is the largest remaining patch of cloud forest in western Ecuador (Hilgert and Andrade 1995). Cloud forests are mountain forests defined and limited by the persistent presence of clouds and mists (Bubb et al. 2004). They can be found within a wide range of annual and seasonal rainfall patterns, from 500 to 6,000 mm of precipitation per year. The presence of continuous fog constitutes a considerable water resource that is captured by the forest canopy. It influences the hydrology, ecology, and soil properties of cloud forests. Specifically, Loma Alta is home to at least 15 species of mammals, including a subspecies of mantled howling monkey, and over 200 bird species, including 12 endangered bird species and 42 bird species endemic to the region (Becker and Lopez Lanus 1997).

The Loma Alta community has traditionally used resources from the cloud forest to meet their basic livelihood needs. Private benefits of this ecological reserve come from both timber and nontimber resources. Loggers have historically harvested high-market-value trees, primarily *Tabebuia* spp. Main nontimber resources harvested include *paja toquilla* palms (*Carludovica palmate*) and vegetable ivory (*Phytelephas aequatorialis*) nuts. The palm, an introduced species, is farmed in cleared forestland and its fiber is used to make Panama hats. Although vegetable ivory is included in the red list of threatened species (Montúfar and Pitman 2003), its nuts are used to manufacture handicrafts. Both products are sold nationally and internationally.

Resource management in Loma Alta has been influenced by the designation of different *Ius in Re* powers. In 1937, the Ecuadorian government passed the “*Comunas*” Law (Decree 142⁵) that established the legal framework recognizing traditional communal property rights over natural resources (Becker 1999). Consequently, Loma Alta rural peasant communities received, as a group, all the *Ius in Re* over the cloud forest natural resources except the power to alienate the forest itself. Since then, local peasants could legally use and usufruct timber and nontimber products as they have traditionally exercised. They also had the rights to alienate the forest resources (e.g., nuts) to others and even transfer their powers (e.g., usufruct of nuts) to nonlocals. The community, in spite of having the power to replevy and protect its rights, was exposed to actions by individual stakeholders within the community and outside ranchers who exercised their ability to modify or destroy the essence of the resource (*ius abutendi*), resulting in mismanagement of the forest (Becker 2003; Gibson and Becker 2000). This situation illustrates how different property rights can be exercised by users over different resources within a property regime.

Consistent with a long history of communal decision making regarding land allocation (Becker 2003), the Loma Alta community established a set of internal

rules to maximize private benefits from assigned forest resources. They allocated 10- to 30-hectare plots among community families for unrestricted use. Soon after, many plots were cleared to harvest high-value timber and to expand palm plantations, converting a large area of Loma Alta into a patchwork of forests and crops. This situation was exacerbated by illegal logging from outside ranchers who entered Loma Alta, taking advantage of the ineffectiveness of local communities to replevy their rights. By the 1970s most of the primary forest trees were cleared evidencing deforestation and forest fragmentation. The result was that traditional land allocation practices and illegal logging caused the degradation of 1,650 ha of forestlands (Becker 2003).

Forest degradation had a rapid effect on the public value of Loma Alta. Indiscriminate harvest of timber resources and expansion of palm plantations reduced water captured from highland fog, affecting water supply for household and agricultural needs of lowland families. In 1994, the nongovernment organization People Allied for Nature (PAN) intervened in Loma Alta, aiming to diminish forest degradation and ensure sufficient water supplies. PAN conducted participatory research activities among Loma Alta residents to raise their awareness of the role of forests as a collector of water used downhill (Becker 2003). Individuals' motivations to engage in collective action are strongly affected by their perceptions of the condition of a natural resource (Poteete and Ostrom 2004; Gibson et al. 2002; Tucker 1999)—thus the need to raise awareness. A study by the International Forestry Resources and Institutions Research Program in Loma Alta revealed the absence of local institutions to provide forest management and determined that residents were destroying their forest because they had not drawn a connection between forest cover and water availability.

After PAN raised awareness of the forest role as a water collector (Becker 2003), the Loma Alta community took action by modifying stakeholders' powers. The first measure was to restrict the abuse powers of community members in two ways: (1) No more plots were allowed to be converted into palm farms, and those that were not in use could not be reclaimed for agriculture purposes, and (2) the harvest of valuable timber species was completely banned. Usufruct of palm fiber was limited to cleared plots that were already in use. The right to use ivory nuts was not modified as it did not interfere with the sustainable management of the ecosystem. Finally, mechanisms to exercise the replevin power were developed within the community to restrict illegal grazing and timber harvest and to enforce nut collection exclusively from the ground. The community created an enforcement system comprised of members whose powers had been restricted by limited powers measures (i.e., no expansion of palm farming plots). These individuals received a salary in compensation for losing their private benefits and as an incentive to attain responsible forest management (Bartley et al. 2008) through negotiation of internal costs (Demsetz 1967). The role of PAN in Loma Alta demonstrates the influence of outside factors (individuals or organizations) in the process of readjusting the powers of different users. Table 2 summarizes the changes in *Ius in Re* powers comparing the rights under the 1937 "Comunas" Law and those assigned by the community following PAN awareness efforts.

The case of Loma Alta cloud forest exemplifies how the *Ius in Re* model can be used as a tool to identify powers and users of specific natural resources. Once again, the model we propose can help in identifying and breaking down users and their specific property rights that are inhibiting sustainable management. This phase

Table 2. Evolution of the powers over natural resources held by local peasant communities in Loma Alta cloud forest (Ecuador)

<i>Ius in Re</i>	Powers	Resource	Management phases	
			1937	1994
<i>Utendi</i>	Use	Ivory nuts	✓	✓
<i>Fruendi</i>	Usufruct	<i>Paja Toquilla</i> palm	✓	✓
<i>Abutendi</i>	Abuse	Forests plots	✓	
		Timber	✓ ^a	
<i>Disponendi</i>	Alienation	Forests plots	✓	
<i>Vindicandi</i>	Replevin	Loma Alta cloud forest		✓

^aDe facto, illegal loggers were also exercising this power.

is critical for pursuing sustainability as decision makers can use this information to adapt property rights to time changing contexts, yet stay in compliance with local traditions. The flexibility of this model to accommodate different societal contexts may increase the potential for sustainable management, as it provides a first and critical step for the improvement of natural resource uses and conditions. In the case of Loma Alta, the trend was toward complete degradation of the cloud forest and its resources in a traditional “Tragedy of the Commons” scenario. The corrections applied to the *Ius in Re* maintained private benefits (nut collection and palm exploitation) and secured community benefits provided by the cloud forest (water capture). Loma Alta showed that resource users can indeed manage a community-owned resource by cooperating for a common interest: to avoid the destruction of the forest (Berkes et al. 1989).

Conclusions

We identified the main pillars of the *Ius in Re* of the Roman law to develop a tool to analyze property rights within complex property regimes. The *Ius in Re* model of analysis can serve as a first step toward identifying users’ powers inhibiting sustainable natural resource management. This step is crucial for decision makers and authorities who can use this information to later adjust property rights to maximize private and public benefits derived from natural resources. We suggest that independent powers over the resources should be examined to identify—and later correct—those halting sustainable resource management.

Ex post analyses of two cases in South America were used to exemplify the ability of the *Ius in Re* model as a tool to analyze different property regimes by identifying different users and dissecting their corresponding powers over resources. In the Peruvian case study, the use of the *Ius in Re* model enabled the identification of users (e.g., *comuneros*, illegal hunters) and powers (use, replevin) that were preventing sustainable management of the vicuña. A later correction of these conditions by the Peruvian government resulted in the maximization of the economic use of the vicuña, promoted its proliferation, and restored Incan ancestral identity and practices. A similar application of the analysis model in Loma Alta cloud forest in Ecuador showed that alienation and exploitation powers over high-market-value

timber species was depleting forest resources and their environmental services (e.g., water supply). Limitation of users' powers resulted in better management practices while securing community water supply.

The *Ius in Re* model sheds light on the maze of property rights in order to identify a critical aspect of natural resources management: *who* has *what* powers over a given resource regardless of the type of property regime. The model can first be superimposed on the modern complexity surrounding the concept of property, allowing decision makers to identify the actors and powers afforded to them, particularly those inhibiting sustainable management. Next, based on a multitude of other contextual factors, including social and biotic dimensions, make decisions to readjust users' powers and promote better management practices. Further application of this model could eventually lead to the construction of context-specific matrices that could become a useful resource management tool for regulators. In the future, we suggest expanding on the applicability of this model to investigate changing traditional property regimes.

Although the article presented examples from two developing nations, the model as an analytical tool can be extended to developed nations. Over time, the lines between private and public property have become less obvious. Instruments that impact management of natural resources in public and private property are certainly reshaping traditional property models. Examples include hunting and fishing leases, carbon sequestration payments, conservation easements, or stewardship contracts, whose adoption influences the ways resources are managed and has brought new complexities to the relationship among users as well as between the powers users have over resources. We suggest the *Ius In Re* model should be further studied and applied to better dissect and understand evolving property regimes.

Notes

1. Decreto Legislativo No. 653 (*Ley de Promoción de las Inversiones en el Sector Agrario*) was passed on July 30, 1991 (pub. El Peruano, August 1, 1991).
2. The SNV is the association of native communities managing the vicuña (Brack 2002). Restriction on the fleece trade was to protect *comuneros* from abusive price-setting strategies of private buyers.
3. Decreto Supremo No. 26496 (*Régimen de la Propiedad, Comercialización y Sanciones por la Caza de las Especies de Vicuña, Guanaco y sus Híbridos*) was passed on June 23, 1995 (pub. El Peruano, July 11, 1995).
4. The *chakku* are rodeos intended to spur the wild animals onto corrals to capture and shear them, after which animals are released and participants enjoy a traditional celebration (Cox 2003).
5. Decreto No. 142 (*Ley de Organización y Régimen de las Comunas*), Registro Oficial No. 558 (August 6, 1937), p. 1517.

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