Property Rights and the Development of Industrial Forestry in Victoria.

by
Luke Wilson
School of Agriculture, La Trobe University, Bundoora, Victoria, 3083.

Abstract

The property rights framework has been increasingly applied to natural resource problems in recent times. It is a convenient means of assessing the merits of policy development in industrial forestry in Victoria since colonisation. Sawlog licences have undergone a series of changes since the gold rushes involving different specifications of rights, varying enforcement intensities and varying tenures. In general, those which are seen to move closer to the 'perfect' property right model have had the greatest positive impact. It is also apparent that the property rights framework, developed to cater for simple situations such as those found in agriculture, is not sufficiently defined to allow for an efficient allocation of resources. Application of a property rights framework to complex systems such as forests requires extension and modification. Necessary extensions and modifications are suggested.

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Introduction

Recent developments in property rights theory have caused it to become a popular tool in the analysis of natural resource issues. In particular, it allows for a very rapid appraisal of natural resource issues to be made prior to intensive data collection and analysis. Later work can then be directed to accurate and useful goals.

Unfortunately, due to the recent nature of much of the property rights theory, it is still a theory which apparently means many things to many people. Whilst theoretical flexibility is desirable, a flexible theory is not. As a basic platform for sound resource economics, property rights theory should be robust.

When described in undergraduate texts (eg. Tietenberg, 1988), or as described by Randall (1975), private property rights are normally defined in the context of four necessary conditions; *universality, exclusivity, transferability* and *enforceability*. Each condition can be strictly defined and, when collectively fulfilled, they purport to create a non-attenuated property rights structure from which efficiency may be achieved. It is the contention of this paper that this result does not ensue and that an extra condition must be explicitly included. The misinterpretation of property rights is also found to result in some difficulties with the use of the theory. In particular, the use of the concept of 'non-attenuated' rights is a tautology from which problems arise.

This paper uses examples of property rights development in Victorian forestry to demonstrate the theoretical implications of natural resource allocation. The 140 year history of organised hardwood sawmilling in Victoria is rich with examples of the conflict inherent in the allocation of forests through a variety of licensing

systems. Beginning with the chaotic public policy era of the gold rushes, licences have ranged from periodic, set-fee, operating licences to tradeable sawlog volume quotas. The effort required to reach this stage alone has been considerable. However, the path taken can be seen to generally follow that which would be laid out by property rights adherents.

Property Rights Overview in Natural Resources

Economic considerations of natural resource use have been intensely scrutinised over the past two decades. However, it is not a new area of study, with earlier scholars spending considerable effort on optimal extraction paths and rents for various natural resources (Malthus, 1815; Faustmann, 1849; Hotelling, 1931). These early works tended to concentrate upon single product systems such as timber or ore, and examined optimal depletion or harvest rates. More recently, social values have stressed the multiple-use nature of resources and thus work has proceeded to consider the economics of multi-output resources. To further complicate matters, the rise in importance (scarcity) of non-market goods has added the dimension of trying to optimise multiple outputs in situations where market prices do not exist for some outputs. The resultant literature has been busy, to say the least.

Dynamic programming and optimal control theory have pursued the multiple output issue to determine optimal depletion or harvest rates in forests, a recent example being the wood and water production study for the Thomson river catchment (Read Sturgess and Associates, 1992). This work was triggered by the need to give the catchment forestry agency an incentive to deal with water production from the forest. In the Thomson river case it involved bringing domestic water values to the attention of the Department of Conservation and Natural Resources. Even where stable and optimal solutions can be estimated

mathematically, failure to address initial problems with the structure of property rights will cause socially inefficient results; the only difference being that people would now know the final answer. In our democratic political system, knowing the answer is only a small step in solving a policy problem.

The purpose of studying property rights is to understand the incentive structure facing players in an economy. This is of value as revealed 'irrational' behaviour by players will actually be a response to the incentive they face. Institutions may be the 'irrational' components of an economy, rather than the players within that economy.

The accepted version of the theory is that an efficient allocation of resources is possible when private property rights are allocated for all resources. These rights must be non-attenuated (ie. not conditional or weakened), in order that players trade resources to one another. Four necessary conditions are offered to which property rights must adhere. These are found in most texts as noted earlier and are the culmination of works more recently by Coase[1] (1960), who described how private ownership can be sufficient to lead to efficiency, and further examination by Demsetz (1967), Cheung (1969), Furubotn & Pejovich (1972) Alchian & Demsetz (1972 and 1973) and others since. Much of this work concentrates not only on the structures themselves but on how they evolve.

The four conditions defined are as follows:

The first condition to be considered is *universality*. Universality means that

[1]The investigation of property rights did not begin in 1960. Some authors cite back to Locke or Hobbes, whose writings in the 1600's dealt with similar concepts. However, even these men were influenced by the often ignored ancient writers such as Cicero, Xenophon and Plato. Indeed, as civilisation depends upon some form of rights structure it would be foolish to nominate any starting point. However, Coase's paper did give an enormous fillip to recent investigations.

rights exist to all aspects of all entities. The rights must also exist for as long as the aspects exist. Therefore, even those things which do not yet exist, or are not yet known to exist, must be represented in the rights system.

Second is *exclusivity*, a condition related to a 'right' rather than a 'property'. As a right imposes an obligation upon the holder, it is necessarily an exclusive right to the specific property or it will fail to be a right in the strict sense. After all, a 'non-obligatory obligation' refers to a right which may be ignored both by its owner and non-owners. A right holder must be obliged by that ownership to have exclusive access to the costs and benefits accruing from the entitlement.

Third comes *transferability*, a condition which must have exclusivity in place to be meaningful. Microeconomic theory shows how an efficient allocation of resources may be achieved by allowing their trade between parties. Thus enacted, those for whom the benefit of a right is low may trade to those for whom a higher benefit would accrue, to the betterment of both parties. Of course, were exclusivity to fail, trade would be pointless as parties could steal benefits or offload costs without recourse or payment.

Finally there is *enforceability*, which means that the above three conditions are enabled and protected, and a failure by parties to adhere results in recourse to punishment. Without enforceable rights, thievery and vice would soon have the potential to render inefficient outcomes. Courts, lawyers, jails, police and armed forces are all practical signs of the importance of enforcement.

If fulfilled, players may thus exchange the rights in trade, and resources will end up at their highest value end uses. Given four such simple conditions it is rather easy to initially analyse resource issues by quick comparison against the conditions. Should it be considered that activity is not efficient (such as some of

the forestry activities to be raised in this paper) an analysis of the property rights involved may reveal that a failure to meet one or more of the conditions has led to incentives giving rise to different outcomes. This is not only a useful result but assists the public acceptance of economics by passing judgement on institutional structures rather than labelling persons as 'rational' or 'irrational'. All players can be comfortably assumed rational.[1]

This framework of analysis can now be applied to a short study of an example of sawmill development in goldrush Victoria. The story, interesting in itself from an historical perspective, is replete with typical property rights issues.

The Wombat Forest, circa 1870.

The political separation of Victoria from New South Wales almost perfectly coincided with the massive influx and creation of capital due to the discovery of gold. Sawmilling is not alone among industries in being greatly affected by these events. Also beginning to be recognised at this time was the need for a better defined property rights structure, as the burgeoning population was creating great demand for previously plentiful forest resources. Although never reaching an advanced stage of development[2], rudimentary definition of such rights was attempted on several occasions.

The creation of new townships such as Ballarat and Bendigo required building materials for housing, commercial and public constructions and mining operations. Firewood was also required as it was the main source of energy for some time to come. Sawmilling, at last a legitimate and recognisable industry,

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[1]Furubotn & Pejovich (1972) make the distinction between traditional profit maximisers and constrained utility maximisers in this incentive version. In both cases, the player is rational.
[2]By current standards.

developed to meet the needs of the new economy. Participants in the gold rushes were large consumers of wood products and close-by resources were soon exhausted. The development of larger sawmills, deeper in the forest and linked by railway or tramway to their markets and their log supplies, caused government to enact some forest policy measures. Although it shall be shown that the policy initiatives were to lead to difficulties, the government at least appeared to be facilitating forest utilisation.

The story of sawmilling in the Wombat forest near Ballarat can be used as an example of the development of this industry, and the themes derived could be equally found in a study of other areas affected by the influx of gold, people and technology. The Wombat forest exists today to the north-east of Ballarat and is an important source of timber products in Victoria. It is composed of mixed species eucalypt forest, with messmate (*Eucalyptus obliqua*) in particular, providing highly durable building products. At the time of the gold rushes the forest had been hardly touched by white settlers and thus was a good source of quality timber for the goldrush towns.

A history of some of the sawmilling activities in the forest has been written (Houghton, 1980) from the point of view of someone interested in the use of steam transport systems. In fact, quite a large part of the relevant history has been prepared under the auspices of the Light Railway Research Society of Australia due to the heavy use of tramways in early sawmilling. The stories of the Wombat and other areas can be equally fulfilling to the property rights investigator.

The sawmilling licence system at this time required the payment of annual fees. Separate licences were required to operate a sawmill, to cut trees and to operate a tramway. They permitted the mill to operate at the location chosen by the owner.

Timber was then cut and hauled from areas surrounding the sawmill as selected by the sawmiller. As more than one sawmill could set up in an area, mills would have to compete for trees without the ability to set aside areas for future use. The result was vigorous and even violent competition for trees. Many forests, including the Wombat forest near Ballarat, were cut out. Indeed the Wombat was declared a ruined forest around the turn of the century and required many years of care and management to bring back into timber production.

There were attempts to control logging but they were commonly half-hearted or doomed to failure. From 1869 to 1873, royalties were introduced, requiring sawmills to pay a per log fee. These were removed however, due to the impact of the cost of the measurement and bookkeeping required. Whilst sawmiller welfare was probably not foremost in the minds of parliamentarians, mining timber costs bore heavily on the costs of deep lead gold extraction. No doubt the miners influenced their local members.

Enforcement was also tried, but as licences had few conditions to police (eg. until 1870 there were no size restrictions or area maintenance regulations) and the few bailiffs employed were hopelessly unable to effectively cover the vast and rugged areas involved, it did not place much constraint upon harvest rates. Worse still, until the formation of a Forests Commission in the 20th century, forests came under the care of either the Lands, Mines or Agriculture departments, none of whom had the charter to conserve the forest resource. Indeed they were all active alienators of forest land. The results were overcutting, waste, degradation and continual conflict.

The Anderson's versus Crowley & Fitzpatrick (hereafter C&F) saga demonstrates the rent dissipation such a situation involved. This story can be found in Houghton (1980). Anderson's located to the Wombat forest in 1856 at Dean, later

building a large sawmill (even by current standards) at Barkstead in 1866 with extensive tramway investments throughout the forest. C&F appeared in 1872, siting a sawmill close to Anderson's main tramway, although some distance from Anderson's mill, as the tramway, by that time, traversed over 10 miles in the search for timber. Eventually, cutting by both firms extended until there was an overlap of economic cutting zones for each firm. C&F complained to authorities that Anderson's were deliberately destroying forest ahead of C&F's operations to deny them timber (a good way of ruining your competitor in an open access forest). In a major step forward (to the property rights economist) C&F were awarded exclusive rights to the area in question, although this seems to have occurred via a parliamentary buddy system rather than impartial adjudication.

Anderson's were, of course, unhappy with this outcome. Although licences normally did not grant exclusive access, they had expected to have 'quasi-exclusive' access to this area of forest as they had gone to the trouble of laying the tramways to tackle it. Furthermore, the loss meant they would have to move their logging operations almost next door to C&F's mill, requiring further tramway construction. Considering this ridiculous they decided to ignore the now exclusive and enforceable C&F grant and continued logging what was now illegally theirs. Initially, C&F responded by harassing Anderson's fallers and blocking their tracks with fallen trees. Eventually the Minister entered the fray, ordering Anderson's to leave the area and compensate C&F for the trees taken. Upon refusal Anderson's licences were not renewed and their operations subsequently closed. In the space of five years, Anderson's went from a huge sawmilling operation to a near-broke firm. Through that whole time, timber remained a profitable venture due to the move to more timber-intensive mining techniques. However, despite the extent of rents clearly lost to conflict, it was the incentives offered by the property rights system that were to blame, not

irrational sawmillers. Without the ability to store forests for future use, it was quite rational to over-exploit them in an attempt to appropriate the rents first.

Stories such as this are not rare, as Houghton regularly relates often violent contests between sawmills in his works (eg. the price and politics of tramways near Healesville; Houghton, 1986). Clearly a failure in exclusivity, tradeability and enforceability occurred here. Exclusivity failed due to the open access sawmillers had to forest of their choice. Tradeability failed as there were no exclusive rights for owners to exchange thus sale of a licence was largely pointless. Enforceability failed as sawmillers apparently sought to correct perceived wrongs by intimidation rather than legal proceedings even though legal options were open. It is perhaps ironic that similar (but not identical) licence problems in nearby goldfields were rectified largely within ten years (accelerated by the Eureka uprising), whereas 140 years later, forestry is still lagging.

Interestingly, the two parties in the Wombat case never came to an agreement over the forest. This can be traced to several factors. Firstly, unlike Umbeck's (1981) unpoliced California gold rush, there was enforcement available if the right connections were made into the political arena. Secondly, as C&F discovered, sufficient weight (or favour) could be brought to bear on parliament to have exclusivity allowed, an achievement worth considerable effort. Thirdly, with an open access resource, an agreement between these two parties would have no bearing on other sawmillers and the problem could recur continually. Even had all the existing sawmills entered into an agreement (and sufficiently policed their private cartel), the actions of new entrants and the omnipresent wood splitters (roaming, uncontrollable, timber-intensive, paling splitters) could not be stopped. Regardless, the whole area was industrially useless in a further ten to fifteen years.

Weaknesses - Property Rights Theory

It has been demonstrated that the property rights theory can be used to effectively assess problems in sawmill licensing. However, beyond such a simple analysis it is necessary to reconsider the accepted property rights theory. In order to begin this, the actual term 'property right' should be defined. The word property refers not only to the real estate concept of a physical feature, but must also be extended to consider all properties or attributes of entities. A commonly used analogy is a landholder's titledeed as property. A better choice would be the chemist's interpretation, where iron, for example, not only physically exists but also displays other attributes such as magnetic ability, electrical resistance, boiling point, specific gravity etc. and exists through time and space. Thus a property rights system must display coverage of properties other than the obvious physical and current actualities.

Coase (1960) came close to this when he described property to be a factor of production; Umbeck (1981) noted the various attributes of oranges which one considers when purchasing eg. colour, smell, texture, even though the purchase is made by price per weight. Unfortunately other authors may cite these works but still maintain the landtitle attitude, probably because it is easy to grasp and sufficient for many applications. Earlier property theorists had a due concentration on land as it was the most obvious topic for their political discussions. This mode of thinking persists but is under pressure to change (MacPherson, 1978).

Rights, as referred to under property rights, mean legal obligation. Often assumed to mean a legal document giving private ownership, a right must actually refer to an obligation (net positive or negative) held by any party, parties,

on behalf of parties or indeed by no-one, to a property as defined above. Therefore, rights cannot be attenuated as any diminution of a right causes it to cease to be a right. Where authors discuss the variance in rights, they should in fact discuss the variance of properties, or attributes, to which rights are held. An example is the oft used car ownership. It can be said that a car owner has some rights to that car. However, it cannot be said that the owner has partial rights; a right is absolute. What the owner does have is a bundle of rights to various properties associated with the car.

Taking rights as absolute and property as an attribute, then a fifth condition which is sometimes seen in writings (eg. Scott & Johnson, 1985; Hartwick & Olewiler, 1986; Johnson, 1992) must be added. This condition is separability, which must be included as an infinite set of attributes cannot be bundled and still achieve efficiency. This separation must not only include obvious situations such as field and crop, but cover all attributes. Using a current Victorian forestry example, rights are allocated to, topsoil, stumps, leaves, branches, A grade sawlogs, B grade logs, C grade logs, C+ grade logs, D grade logs, E grade logs, residual roundwood, streamside vegetation, fauna, seed trees, habitat trees, seeds etc. Although the manner in which allocation occurs may be arguable, it is the case that the attributes of the forest are separated to this degree to allow for more efficient use. The theory of product grading (eg. Freebairn, 1967) supports the value of separability, as it allows a more complete satiation of desires.

Noted earlier, in the definition of universality, was the fact that rights must exist for those things which do not yet exist, or are not known to exist. The reason for this is simple: time is an attribute which dynamic optimisation tells us cannot be ignored. The discovery of new resources, whether they be gold in Ballarat or timber in the Wombat requires a reappraisal of the optimal outcome. This can be a costly process if no-one can claim the rights to the resource. The system of

leaving residual property rights (including unknown ones) to the government, such as Crown rights to all gold, at least provides a starting point for bargaining.

Current activity in industrial forestry in Victoria demonstrates the need for these additions to the property rights theory as the landtitle version is of little value to the forest manager. Scott's (1983) comment that forest rights have developed little because they do not separate land and tree is both correct in substance and lacking in understanding of the complexities of forestry required to efficiently manage a forest. Use of the landtitle view of rights causes this misunderstanding. Luckert (1988) used a list of forestry related subconditions for property rights in a study of licensing in British Columbian forestry. Whilst the list was unnecessarily large it did demonstrate the need to separate the attributes of a forest to enable efficient management. The end result of gold rush forestry was the eventual use of area licences for sawmills. This result was an improvement in exclusivity, but also contributed to recent difficulties for the sawmilling industry as separation was not possible. The solution, to be found in the following review of current sawlog licences, matches the attribute theory more closely.

Modern industrial forestry in Victoria

The year 1939 provides a convenient cut-off point to mark the beginning of the modern era of Victorian sawmilling. In January of that year, bushfires wiped-out a large proportion of the state's stock of tall timber as well as a large number of forest-based sawmills and their associated communities. World War II also began, providing an enormous demand for wartime timber and causing the fire salvage operation to be completed despite manpower and equipment shortages.

The destruction of many sawmills and the subsequent inquiry blaming much of

the loss on their location within the forest meant a rebirth of the industry occurred, this time in forest fringe townships. This restructuring required the development of new transport systems, substituting motor vehicles, crawler tractors and roads for bullocks and railways. Sawmill power also changed with electricity and diesel power replacing steam, although the sawing technology was still reminiscent of that used in the 1860s. (Dargavel, 1988).

Previously such changes were slow to occur and were often only a reaction to natural disasters such as fire and flood on a local scale. This time nearly the entire industry was forced to alter its structure at once. This had implications for timber supplies for the war effort and the post-war boom. The extension of logging to more distant areas to compensate for the loss of stocks close to Melbourne in the 1939 fires increased transport costs to the major markets. As a result the government altered its sales arrangements, providing exclusive area licences to sawmills and charging royalties on a residual pricing basis to feed the population boom in Melbourne with timber. This moved forest licensing closer to the theoretical model of property rights, with exclusivity explicitly enforced in certain properties.

Later, rising incomes and leisure opportunities led to the adjustment of social valuation of non-wood values of forests. The rise of environmentalism forced a reassessment of management and industrial organisation. Recently, there has been a reduction in local hardwood output due to reservation of forests. Technology also continued to advance, causing a replacement of labour with capital in sawmilling. Although the replacement of labour in this manner has not reached the levels of the highly automated softwood industry, employment opportunities in forest towns have declined.

The general industry decline over the 1970s and 80s was again due largely to the

incentives offered by the property rights structure. The government found that harvesting was impacting upon other values, but the rights (to wilderness etc.) had not been defined. When they had been defined it was found that they were actually already bundled into the sawmills' area licences and it was not easy to resolve the resulting conflict. To reclaim the bundled rights, the government had to cancel whole licences. Much of the security in the licence system was gone, as implicit, and thus unenforceable, tenure arrangements and the ignorance of other outputs from forests created an investment and confidence drought in the industry. It is ironic that an industry whose mills did not change greatly for over 100 years should share the difficulties often associated with new technologies such as IVF, genetic engineering and pay TV.

Current Forestry Rights

In 1986 the Victorian government published the Timber Industry Strategy (Government of Victoria, 1986), an attempt to rationalise forest policy and account for the inability of the existing rights structure to allocate forest resources.

A change to the sawmill licence system was foreshadowed in that document; the change has now been implemented. Termed the Value Adding Utilisation System (VAUS), sawmills now purchase a licence entitling them to a volume of sawlogs to come from state forest. No longer does a sawmill have exclusive access to a certain forest area; rather it is only exclusive access to the specified volume of sawlogs. Such a system places responsibility for scheduling squarely upon the state forest service. The new licensing system also contains aspects which leave the dynamic nature of property rights unclear. These aspects will be addressed later but involve the potential for government to alter the quality mix which a sawmill receives. A review of part of this system has been recently

carried out (Wilson, 1993).

The result of this implementation is that a sawmill is licensed to receive a volume allocation of sawlogs from a broad area of forest. Logging areas may be used to supply several licensees depending upon the volumes and grade allocations involved. The licences also specify penalties to either party for failing to supply or accept those amounts and an escape clause for the government in the case of catastrophic fire. Licences, or parts thereof, are tradeable amongst sawmill operators.

This licence structure moves closer to 'theoretical purity' in terms of the timber output of a forest. By allowing sawmills a tradeable, separable licence in sawlogs rather than an area licence (area is not a sawmill input), the industry can allocate sawlogs amongst itself. The result has been an increase in investment ($60 million identified by VAFI (1992)) despite generally poor timber markets. However, two problems can still arise with the new system. One is the unstable allocation of grade and lack of definition of species within the licences. Grade may be reallocated by government to promote value added production. This can divert sawmills from profit maxima in order to safeguard their high grade allocations. The other is the relationship of other forest rights with sawlog rights.

Discussion

The review of property rights issues throughout the development of Victorian industrial forestry has shown that forest resource allocation has followed the model offered by an 'attribute' property rights theory. Also demonstrated was the need for the condition of separability, as forced aggregation had resulted in a sub-optimal industry structure during the 1980s. Using these conclusions, the current system of sawlog licensing in Victoria can be analysed in the context of the

current industry structure, to determine how rights can be improved.

Current sawlog rights offer a means of allocating all sawlogs amongst sawmills according to willingness to pay. Tradeability exists and recent experience has demonstrated the use of this feature (O'Regan & Bhati, 1991). Licences are legal and enforceable contracts which include both dispute resolution guidelines and catastrophe clauses. Unfortunately, they are not fully separable in all identified attributes as grade is not exclusive, despite being identified by government as a key element of sawmill operation. A sawmill tour in 1993[1] by the author also revealed a desire to see the introduction of species definition and separability within licences, to allow further specialisation.

The potential for government to penalise production decisions by removing high grade sawlogs creates a similar dilemma to that experienced in the 1860s Wombat forest. Sawmills must operate on the understanding that their resource is insecure and therefore face an incentive to incur costs to increase security. In the 1860s that meant blocking tracks and burning tramway bridges. Now it may mean wasting production. The proposed answer (Wilson, 1993) is to include grade in the saleable and enforceable licence. Such a move would not only add to efficiency but would increase returns to government as growers can pay for licences and/or sawlogs with a higher degree of certainty.

The broader issue is one in which we view sawlogs as just one set of attributes of a forest. Despite the new licensing system which improves this set's allocation, it is not immediately obvious that this move necessarily adds to the ability of government to resolve conflict. In particular, and in line with new technology problems (eg. IVF), does the allocation of 'neat' sawlog rights (even including

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[1]The tour was funded by an award from the Maxwell Ralph Jacobs Fund, administered by the Australian Academy of Science and the Institute of Foresters of Australia.

grade and species) improve the problem where new 'property' is discovered (eg. Leadbeaters Possum), and conflicting rights must thus be defined and allocated? At least government can now separate the attributes of a forest without reclaiming an entire sawlog licence.

Sawmill licences do offer a resolution process of compensation where inability to supply is penalised. Catastrophic inability, via fire disaster in particular, is added as an escape clause. One must wonder whether a large scale environmental discovery (eg. a species with vital curative properties) would be a penalised failure or a non-compensatory catastrophe.

The path to be taken, in theory, involves defining all rights, known and unknown, and allocating them to owners with government as a residual holder. Unfortunately, practice is not so simple. From the point of view of the sawmill industry observer, rights must be allocated which account for the industry's needs but which do not unfairly heap a burden upon society. A contract rider giving future right to government to opt out largely negates the purpose of a contract. Similarly, tying the government to an agreement over many years without scope for adjustment places the burden on society.

It is apparent that sawmill licences have gradually moved closer to the theoretical model of property rights with more explicit definition of obligations of the holder. However, they still fail to meet all requirements and, furthermore, they demonstrate a failing which is not included in the current four conditions. The current licences issue rights to all volume and grade, however the grade allocation is not stable and therefore tradeability is impaired. The rights are not separable in terms of grade. The requirement for separability in this sense is quite clear.

Separability is also demonstrated as necessary by the government's move to issue sawlog volume licences rather than area licences. As such, efficiency can improve with the separation of different properties of a forest, sawlogs being one property, and allocation of these separate rights. The fact that pulplogs and minor species logs can be sold under separate licences again show how properties (in the chemist's sense) rather than property (in the realtor's sense) are what a rights system must take into account. It is contended that separability be a fifth basic condition for a property rights system. It must be included in conjunction with a change to the view of rights as absolute and properties as attributes.

Conclusion

This paper has addressed the shortcomings of property rights theory in the context of Victorian forestry, a field rich in examples of property rights abuse. Common difficulties have been addressed in line with the theoretical basis of universality, exclusivity, transferability and enforceability of property rights.

Property rights must be seen as absolute rights to minutely defined properties. A car must be seen as a multi-attribute entity in four dimensions. Maintenance of a landtitle view with variation in rights bundles rather than property bundles does not offer sufficient scope to deal with complex situations such as those found in forestry.

Theory was shown to be deficient due to the lack of separability, a requirement to allow for the extension of efficient allocation of resources. Lack of separable rights can be a cause of market failure, even when universality is achieved. The addition of this condition to the base theory is required, occasional appearance is not sufficient.

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