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Global Property Rights in Genetic Resources: An Economic Assessment

Abstract

In recent years, growing economic globalisation has been accompanied by rising social support for market systems as a means of managing resource-use. In turn, the free market movement considers definite and secure property rights (especially private rights and, sometimes, communal rights) in resources to be the necessary basis for a desirable market system. Global policies for managing the Earth's genetic resources have been influenced by this approach. As outlined in this article, there has been a global expansion of property rights in genetic resources, and further extensions have been advocated. In order to assess the possible social benefits and costs of granting property rights in genetic resources, they are classified. This classification is shown to be useful in discussing economic and legal reasons for granting or denying property rights in genetic resources. Furthermore, it is shown to be pertinent to the consideration of market failures that may accompany the granting of property rights in genetic resources and which limit the potential social economic benefits from establishing property rights in these resources. It is concluded that many advocates of managing genetic resources by means of secure property rights and market systems have been overly optimistic about the potential of this policy, its social benefits, its impact on the conservation of biodiversity, and its workability. There is a need for more informed debate on these matters before concluding that wholesale global extension of property rights in genetic material is desirable.

Global Property Rights in Genetic Resources: An Economic Assessment

1. Introduction

Liberal economic philosophy, involving the use of market systems and private property rights, in recent times, has come to dominate thinking about economic policy globally. As a result, there has been growing support for the global creation of (or recognition of) private property rights and communal property rights in genetic resources (Bhat, 1999; Swanson, 1997) and for these resources to be managed by market operations rather than by government regulation, as an alternative, in some cases, to global open-access to these resources.

Advocates of this policy foresee several advantages for it compared to previous policies. They consider that such an approach is likely to be more effective in conserving genetic resources, will be more efficient in the utilization of such resources, and that it will strongly encourage 'improvements' in the genetic resource base, for example, the development of new plant varieties and new breeds of livestock. In addition, some argue that this approach will promote distributive justice by ensuring that a larger share of the economic returns or rents from the use of genetic resources will flow to the guardians or developers of these.

The matter is, however, quite complex. There is a danger that such policies may be 'oversold'. In several circumstances, such policies can prove to be less supportive of the conservation of biodiversity and less efficient in managing genetic resources than claimed by their supporters because of inescapable market failures. Furthermore, in some instances, their fairness is open to question (cf. Jugale, 2001). The purpose of this essay is to provide a preliminary assessment of these matters.

This is done by first noting some changes in the nature of international policies governing economic rights in genetic resources and considering how these might be related to a classification of natural assets. Then a variety of reasons for favouring private or communal property rights in genetic resources are outlined and these are compared with reasons sometimes given in support of intellectual property rights,

such as those granted by patents. The penultimate section of this essay explores how market failures may undermine (at least, in some cases) the reason given for favouring property rights in genetic material and the final section concludes.

2. Global Development in Legal Rights in Genetic Material

Globally there is now much greater legal recognition of property rights in genetic resources than in the middle of the 20th century.

Developments that have extended property rights in genetic material include the UPOV (Union international pour la Protection des Obtentions Vegetales) Convention. In English, this is the International Convention for the Protection of New Plant Varieties. This convention came into effect in 1961 and provides international property legal rights in new plant varieties (involving 'improved' genetic material) to plant breeders who develop these varieties and register these with the relevant authorities. These rights are recognised in nations that are signatories to the UPOV Convention.[1]

Originally, however, this approach was rejected by developing nations. They felt that it was economically unjust to them because germplasm was taken free of charge from developing countries, 'improved' in more developed countries to produce more desirable varieties of plants, and these in turn were liable to be sold back to developing countries at high prices and without recognising the benefit obtained by the developer as a result of using the original germplasm.

"In 1986 this controversy resulted in the adoption of the International Undertaking on Plant Genetic Resources (IUPGR) in which the developing world agreed to recognise the legitimacy of the concept of plant breeders' rights in return for the creation of a reciprocal concept termed 'Farmer's Rights'…These are rights granted in recognition of the contributions of farmers toward the conservation of genetic resources for use in the plant breeding and seed industries generally" (Swanson, 1997, p.102). While this has been internationally agreed in principle, and the possibility of a body such as the FAO collecting funds for farmers and distributing these to relevant nations and for these nations to distribute these in turn to farmers has been aired, this agreement has not yet been implemented (Swanson, 1997, p.102). With international property rights

in genetically modified organisms (GMOs) legally recognised, developing countries have also expressed additional concerns about lack of rents from genetically modified crops such as GM soya beans (Xie et al., 2004). In fact, GMOs can be given patent protection.

Jugale (2005) outlines legislation that has been passed in India to protect farmers' rights in genetic material. He argues that the UPOV Convention is unfavourable to less developed countries and is concerned about the Trade Related Intellectual Property Rights (TRIPs) agreement which requires all WTO members to legislate to protect new plant varieties.

In no jurisdictions are property rights granted in naturally occurring organisms. Currently, exclusive marketing rights are only granted when "it is demonstrated that human intervention has produced an organism that was not previously existing in nature" (Swanson, 1997, p.103). However, the Convention on Biological Diversity which came into effect in the 1990s opens the way for the granting of national property rights in naturally occurring genetic resources. Swanson (1997, p.105) argues strongly in favour of the granting of property rights in naturally occurring genetic material.

He believes that bias in the legal system has undermined the conservation of natural genetic stocks. He states: "In essence, the legal system has contrived to treat the informational products of nature as 'open access'. And thus the only appropriable genetic information is that which results from human intervention. Again, such a bias actively discourages any investment in the maintenance of the stocks of natural genetic capital, instead of encouraging the development of capital stocks that are compatible with the international property rights structure" (Swanson, 1997, p.105).

Swanson (1997) is also of the view that property rights regimes and greater international trade in wildlife and their products (the products of natural genetic material) are likely to be more supportive of wildlife conservation than restrictions on such trade, as exemplified in the Convention on International Trade in Endangered Species (CITES). His attitude has been influenced by his joint study of bans on trade in ivory (Barbier et al., 1990). The Convention on Biological Diversity, in contrast

and to some extent in conflict with CITES, appears to be supportive of the type of approach recommended by Swanson (1997). However, as Tisdell (in press) points out, Swanson's preferred approach is only likely to be effective in conserving some wildlife species. Globally, many economically valued species (for example, those with high non-use economic values) would disappear under such an approach unless conserved in protected areas. Unfortunately, due to market failures (missing markets or partial markets), private and communal property rights regimes combined with marketing of genetic materials and natural products does not in itself result in a socially optimal outcome.

3. Classification of Genetic Material and Related Property Rights

Private and communal property rights in genetic resources are in a state of flux. In general, property rights have only been firmly assigned to legal entities able to show that they have developed organisms that do not occur in nature. However, such rights have been agreed in principle for farmers who have communally or over long periods of time evolved organisms that would not have evolved without their intervention or which would not have been conserved without their intervention. Nevertheless, a similar funding mechanism has not, it seems, been considered for hunters and gatherers who may also have, in a somewhat similar manner, conserved or even to a limited extent developed genetic material. In principle, however, the Convention on Biological Diversity would make such an approach possible.

Nations are increasingly claiming global property rights in indigenous genetic material. However, these rights cannot be enforced retrospectively, but could be enforced in relation to future global use of indigenous genetic material not previously known to be useful and still contained within a country's borders.[2]

In order to envisage the type of property rights that have been or could be granted in genetic resources, it is useful to classify these resources in a systematic manner. This is done in Figure 1. As a first approximation, genetic resources or assets may be divided into those that produce organisms that occur naturally (Set A) and those that produce organisms that have not evolved naturally but are the product of human intervention in natural processes (Set B).[3] The latter (Set B) can be further subdivided into organisms that have evolved, often by co-evolution and communal activities, as a

result of efforts of several generations of human beings. Designate this as set C. Farmers' rights are being sought for genetic material in this set. Set D covers new organisms that have been produced in modern times by legal entities manipulating or selecting genetic material to produce organisms that previously did not exist. A legal entity is able to obtain legal rights in such genetic material via plant variety rights or patents, for example, for GMOs, depending on the nature of the genetic change.

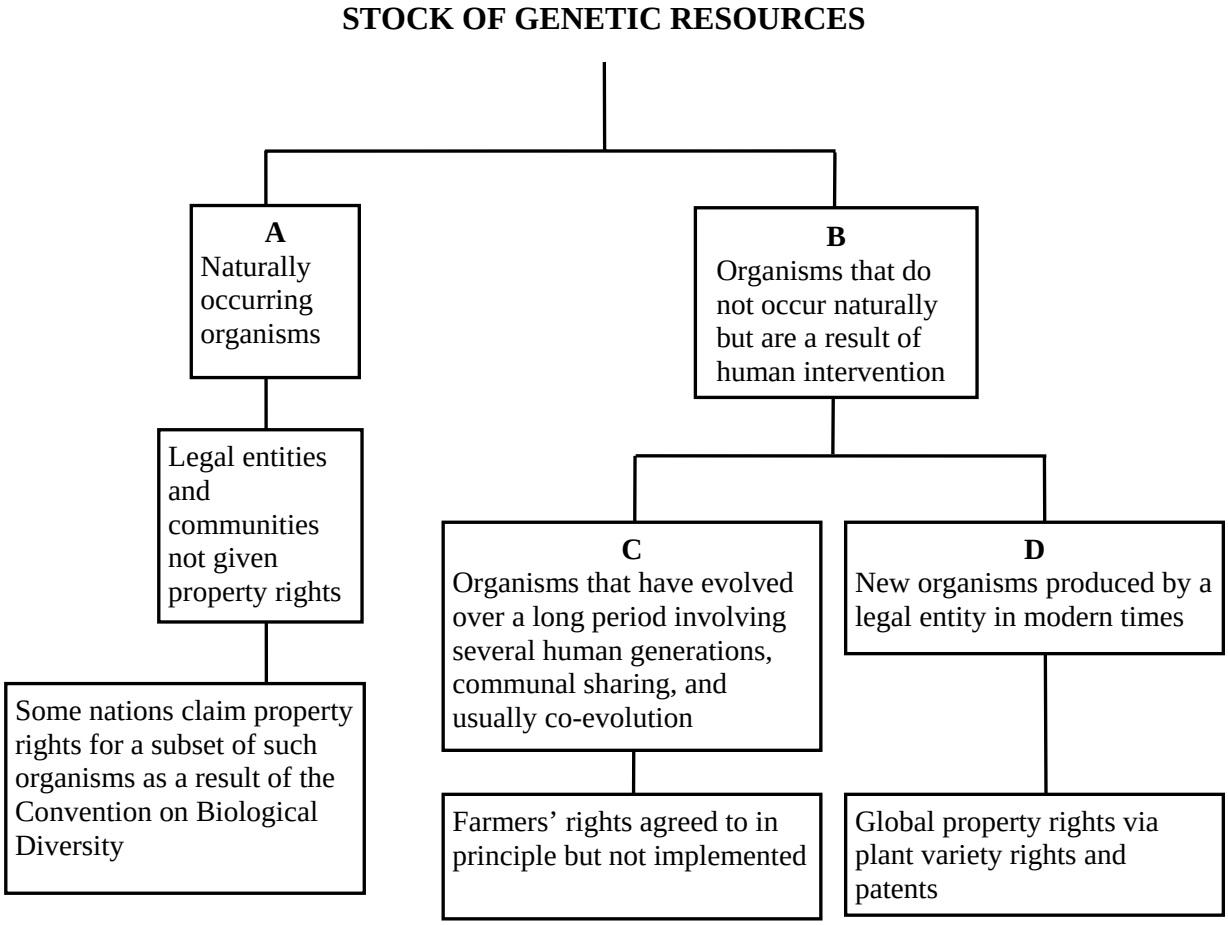

Figure 1 A classification of the stock of genetic resources and associated regimes of property rights in genetic resources.

Currently, global property rights are biased in favour of set D, the areas in which more developed nations have the lead. Farmers' rights have not yet been supported effectively. Legal entities or social groups have not yet been granted legal rights in the genetic material contained in natural organisms but several nations now claim such rights, an outcome supported by the Convention on Biological Diversity. Thus, it is

clear currently that property rights in genetic material are patchy and show bias in favour of Set D in Figure 1. It is therefore useful to consider why this bias may exist and the reason often given to justify property rights in genetic resources.

4. Reasons for Granting or Denying Property Rights in Genetic Resources

Legal views about the granting of property rights in genetic resources appear to have been strongly influenced by earlier practices in relation to intellectual property, particularly patents. Patents provide a legal monopoly in a new invention to the patent-holder for several years.

A variety of arguments have been advanced in favour of patent systems (Tisdell, 1972, Ch.20). These include the following: (1) These systems provide an economic incentive for advances in applied intellectual knowledge and hence promote economic growth; (2) They provide a reward for effort in research and development. In the eyes of some, this is just. The granting of property rights in genetic material in category D, in Figure 1 satisfies these considerations.[4]

The main rationale for giving property rights for genetic stock in category C is not so much that it will lead to further advances in intellectual knowledge but that it would reward past efforts and may encourage the conservation of this genetic material. However, this raises the question of for how long such property rights should be granted. If they are granted in perpetuity, this would differ from the practice adopted in relation to the granting of property rights in category D. These rights are only granted for a finite period of time.

In relation to the granting of property rights to local communities or national governments for genetic material in category A, the reasons cannot be that it is an economic reward for adding to intellectual capital. A possible rationale, however, is that it is an economic reward or incentive for conserving natural capital (compare Swanson, 1997). However, in many cases, payments arising as a result of such rights would constitute a rent because some or much of the pool of natural genetic resources may be conserved incidentally rather than consciously.

Thus, it is clear that different economic reasons need to be advanced to support the granting of property rights in different types of genetic resources.

Given the degree of support globally for property rights regimes and the use of markets, the question needs to be asked of how effective this approach is likely to be in conserving biodiversity and to what extent the possible economic benefits of this approach are likely to be limited by market failures. Let us consider this matter.

5. Market Failures Restrict Social Benefits from Property Rights in Genetic Resources

The potential for using patent systems and property rights in genetic resources to provide social benefits is limited by a number of market failures. The operation of such systems rely on those who are granted property rights being able to appropriate a significant proportion of economic benefits from the genetic resources involved.

The ability of holders of property rights in genetic material to appropriate economic benefit is likely to be greatest when use value constitutes a high proportion of the total economic value of such material, that is, when private goods are mainly produced by such material. Conversely, other things equal, the higher is non-use value as a proportion of the total economic value of genetic material, the less is the ability of economic entities to appropriate economic benefits from it. In such cases, a high public good element is present.

Thus, the property rights method in genetic material is likely to favour private goods in comparison to goods with high public good component.

Secondly, the granting of property rights in genetic material usually takes no account of any externalities generated. For example, the granting of patent rights in a GMO or property rights in a new plant variety depends merely on whether the GMO or new plant variety constitutes a novel organism. The body granting such rights does not take account of any externalities that might be generated by its use. It is usually the function of other public bodies to take account of possible adverse environmental externalities from new organisms and limit their use if necessary. Fears exist that such screening processes may prove to be inadequate and could result in new organisms

being used which yield high private economic returns to business but generate significant adverse environmental externalities. For example, one such concern is that genetically engineered herbicide-resistant crops will give rise to herbicide-resistant weeds (Tisdell and Wilson, 2004).

Market transactions usually involve costs and these can be quite high in the case of property rights in genetic material (Swanson and Göschl, 2000). This limits the scope for economically using market systems for determining economic activity, and this applies to their use for using and developing genetic resources. For example, the transaction costs involved in ensuring Farmers' Rights might be so high that no economic benefit is received by farmers (see Tisdell, 2005, Ch.5). It may also be that the transaction costs involved in marketing genetic material and protecting private property rights in it favours very large corporations because economies of scale occur in transaction costs. Small firms are liable to be at a disadvantage in enforcing their property rights in genetic material. Therefore, a property right system for genetic material appears to be relatively more beneficial to big business compared to small firms, including farmers.

It is also the case that such a system can reduce biodiversity. For example, genetic items in category D involve additions to the genetic stock, that is, they involve the creation of new organisms. However, if these are commercially successful organisms, they are liable to replace or displace existing organisms. Thus, the composition of the genetic stock alters. Both natural genetic diversity and existing genetic diversity due to human intervention could conceivably be reduced. There is a risk that commercially successful new organisms, such as some GMOs, could, as a result of their consequences, reduce rather than add to biodiversity. This is the fear of some conservationists, many of whom in turn are worried that this reduction in biodiversity might threaten economic sustainability.

Even in cases where genetic property rights do not legally exist, for example, for wildlife, some economists, for example Swanson (1997), and conservation groups (IUCN-UNEP-WWF, 1991) advocate the granting of property rights to local communities or individuals in harvested wildlife and greater international trade in this wildlife and its products. They favour the concept of conservation of wildlife by

means of sustainable use. If such a strategy is successful, it will also conserve the genetic material inherent in this wildlife. Tisdell (in press) argues that while such an approach can be effective in conserving some species, it will fail to do so for many, even when they have high economic value. Once again, the property rights approach, when combined with market guidance, is shown to be subject to failures.

6. Concluding Comments

The new global policy approach favouring the granting of private, communal, or in some cases, national property rights in genetic resources is not likely to be as effective a policy for promoting conservation of biodiversity, overcoming failures in genetic resource use, and promoting sustainable economic growth, as its strongest advocates claim. Furthermore, this approach is limited in its capacity to ensure a just distribution of economic benefits from the conservation and development of genetic resources.

It is important to be aware of such limitations because they have institutional implications. The main implication is that it is dangerous to entrust the conservation and development of genetic resources solely to the private sector. It is necessary for the public sector to play a significant role in the stewardship of genetic resources and the development of these resources. The exact role that the public sector should play needs investigation. A step towards this, taken here, is to demonstrate that the private sector cannot be expected to husband and develop genetic resources in an ideal manner because it is bound to exhibit predictable economic biases.

7. Acknowledgement

This research has benefited from an Australian Research Council grant for studying the economic impacts of property rights and commercial use on wildlife conservation. The usual *caveat* applies.

8. Notes

1. The UPOV Convention was revised in 1972, 1978 and 1991. Its objective is to protect new varieties of plants by means of an international intellectual property rights in these. The 1991 revision allows for the granting of patent rights in new plant varieties. Jugale (in press) suggests that is very unfavourable to less developed countries.

2. Retrospective enforcement by a government of property rights in indigenous genetic material that has already been distributed internationally as a result of previous open access does not appear to be a legal possibility. Most nations now have obtained, as a result of open access, genetic material from many other nations without payment for using the genetic resources involved. For example, soya beans were introduced to the USA from Asia and maize was introduced from the Americas to most other countries of the world, including India. Similarly, the potato. The list of such introductions is in fact very long. To give an Australian example, the macadamia nut *Macadamia intergrifolia* is a native of southern Queensland. Although it is now cultivated in Australia, cultivation did not begin until 1963. Cultivation first commenced in the United States in Hawaii in the early 1900s using seed exported from Australia (Low, 1991, p.92). No payment was made for access to this Australian genetic resource. The potential commercial value of the resource would have still been uncertain in the early 1900s and Australia has probably obtained reverse economic benefits from the development of macadamia nuts as a cultivated crop in Hawaii.
3. In practice, it may be difficult to decide whether some organisms belong to set A or C. For example, the genetic composition of some wild species is altered by human activities.
4. The economic benefit from greater technical or scientific progress as a result of the patent system have to be weighed against the social economic deadweight loss resulting from the grant of a monopoly in the invention for a specified period (Tisdell, 1972, Ch.20). Greater technical or scientific progress does not in itself provide sufficient justification for patent systems, and in particular for granting patents for GMOs (Tisdell and Wilson, 2004).

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