

Fishing With Dynamite
Knowledge commons
in the
global political economy

abstract

It has become a commonplace that the processes of globalisation include the emergence of a global information society. The central resource information society both produces and exploits is knowledge or information, and thus issues around intellectual property have become increasingly salient to political economic analysis of the contemporary system. In this paper I briefly note the various schemes of justifying (intellectual) property before focusing on justifications centred on the efficient use of (knowledge) resources. This leads me to examine the construction of scarcity in knowledge which is the driving force behind intellectual property protection, and the consequences of this scarcity. I argue that in light of these consequences the distribution of knowledge and the need for global knowledge commons is becoming a pressing political problem. Rather than an arcane problem of legal structures, the TRIPs agreement and its settlement of intellectual property relations represents one of the most important ethical problems of the new millennium. One way forward would be to develop an 'environmentalism of the net' as a new politics of the knowledge commons.

Dr Christopher May, School of Politics
Faculty of Economics and Social Science
University of the West of England, Bristol, UK
email: christopher.may@uwe.ac.uk

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'If we think of an author as having a natural right to profit from his work, then we will think of the copier as some sort of thief; whereas if we think of the author as beneficiary of a statutory monopoly, it may be easier to see the copier as an embodiment of free enterprise values' (Waldron 1993: 842)

Though currently limited in its geographical extent, there is an emerging consensus that the information society is widening the use and value of knowledge or information while dependence on material resources is becoming less important. This is not to claim the material goods we continue to require (perhaps most obviously food) will no longer be produced, rather they will be produced outside the informationalised areas (or economies) of the global system. There are a number of problems with the presumptions that the developed states can build their national competitiveness primarily on the so-called knowledge industries. However, I have explored this theme elsewhere (May

2001 [forthcoming]; May 2000b; May 1998b) and here I want to focus on an issue which arises from my concern with the political economy of intellectual property rights (May 2000a; Sell and May 2001 [forthcoming]).¹¹ In the emerging information society the metaphorical relationship between material property and intellectual property (or as it sometimes rendered between the tangible and intangible) is being utilised to support and maintain the use of patents, copyrights, trademarks and other forms of intellectual property for the commodification of knowledge. However, this commodification is hardly unproblematic, and represents a growing cause for concern for many in our nascent global society.

Scientists have all but completed the construction of the picture of the human biological ‘blueprint’, the Human Genome Project, to much celebration and the expectation of wide social benefits. Utilising powerful information technology and cutting edge bio-technological science we can at last depict the genetic structure of our species (if not yet fully understand all its nuances). However, all is not well...

On stage at the world-renowned Pasteur Institute in Paris, Craig Venter, one of the world’s foremost biological scientists, announced he was just weeks away from completing the greatest scientific endeavour that mankind has ever known: the human genome, the book of life of *Homo Sapiens*. It should have been a victory lap, applause, praise, talk of Nobel prizes and commendations from his peers.

But instead there was silence. For most of the 600 academics in the audience, gathered from research institutes across the globe, Venter was the traitor; a ruthless competitor who sold his soul to American business and who now plans to charge the rest of the human race a fortune to read our own genetic code (Toolis 2000: 11).

Although this is undoubtedly an important scientific advance, it also represents a high-profile manifestation of an ethical problem that will become increasingly pronounced as we move further into the ‘information age’. The problem is how to balance the private rights awarded to those who develop important (and socially valuable) knowledge with the public good of free dissemination of such knowledge resources. Furthermore, in the case of Venter and the human genome the actual idea of owning ‘natural’ genetic resources may also be a problem, not least of all, as the ownership of humans is widely regarded as repugnant and this is often seen as not unrelated to the ownership of rights to human genetic information. Thus, the Human Genome Project may be a special case, but nevertheless since information (and knowledge) was first rendered as property some centuries ago, the balancing of private and public rights has been a key issue (if sometimes under-recognised).

Property itself is hardly ‘natural’, which is to say following Walter Hamilton, that it has always been ‘incorrect to say that the judiciary protected property; rather they called that property to which they accorded protection’ (quoted in Cribbet 1986: 4). Property in a legal sense can only be what the law says it is, it does not exist waiting to be recognised as such, but rather is the codification of particular social relations, those between owner and non-owner, reproduced as rights. Indeed, as Karl Polanyi suggested, the idea that labour, land and money might be commodities required a ‘commodity fiction’ during the transformation from feudalism to capitalism. Without such a fiction capitalism could not have developed in the way it has (Polanyi 1944 [1957]: 72ff). Polanyi argued that the rendering of things not originally produced for sale as commodities required their reconceptualisation and thus their fictionalisation as property. A story needed to be told about these resources which was not necessarily linked to their real existence or production but rather narrated a propensity to be organised through markets. To have a market in knowledge this commodity fiction is again crucial. It is this process of fictionalisation, and thus a similar capitalist process, which has made the protection of intellectual property rights (IPRs) of great importance in the economy of the information society.

In the emerging global information society, Polanyi’s fictionalisation has taken the concrete form of the Trade Related Aspects of Intellectual Property Rights (TRIPs) agreement which is part of the organisational remit of the World Trade Organisation (WTO). I have discussed the negotiations and general implications of the agreement at some length elsewhere (May 2000a) and here will merely note that encapsulated in this agreement is a forceful invocation of the knowledge as property argument. This invocation is powerful because by joining the WTO all members undertake to enact domestic legislation in regard of intellectual property to bring about the ends specified in the agreement. In this sense, like other international legal agreements while TRIPs does not provide exacting and binding domestic legislation, it *does* go further than any other trade agreement in closely prescribing the effects of domestic legislation and the logic that formally independent legal systems should adhere to. The TRIPs agreement represents the most

developed and powerful instrument to construct a metaphorical link between property in knowledge and the legal mechanisms which have been widely developed to protect material property rights. It is 'a remarkable symbolic document because it makes liberal values more globally extensive and intensive', it promotes a specific view of property and market relations, that of (neo-) liberalism (Burch 1996: 216). However, the central metaphorical link between property and knowledge remains problematic, and it is here that ethical and political issues arise.

In this paper I briefly revisit my argument regarding the justificatory schemata of intellectual property rights and explore a further support for commodification centred on claims regarding the tragedy of the commons. In the second section I then move to look at the consequences of this commodification and start to develop a response to the problems which arise from the failure to recognise the legitimacy of knowledge commons. In this second section I aim to establish the salience of the issues that should stimulate the move to an 'environmentalism of the net', a new politics of knowledge, which I outline in the concluding section. Given the current struggle over the ownership of the information that makes up the human genome, this issue seems to me to be central to the political economy of the purported 'information age'.

The justification of intellectual property and the construction of scarcity

Elsewhere I have explored at some length the differing justificatory schemata that are used to support intellectual property (May 1998a; May 2000a: 22-29 and *passim*). Here I will summarise these three justifications before discussing the key underlying issue, the construction of scarcity. Conventionally there are two philosophical schemes for justifying property and one more pragmatic justification, all of which are used to legitimise and support intellectual property in varying combinations. In the contemporary politics of knowledge the assertion that there is a clear metaphorical link, indeed a workable similarity between property in material objects and property in 'knowledge objects', ideas or intellectual creations, is maintained as unproblematic. I will return to the issue of the similarity between material and intellectual property below when I discuss the construction of scarcity, but first I shall briefly outline the two philosophical arguments which draw their inspiration from John Locke and Georg Hegel respectively.

Intellectual property's justificatory schemata

The first, Lockean position argues for labour's desert: the effort that is put into the improvement of nature requires that such effort should be rewarded. In Locke's original formulation this was modelled on the improvement of land. Thus, the application of effort to produce crops and/or improved resource yields justified the ownership of specific tracts of land by the person who worked to produce such improvement. However, starting from this initial position Locke moved to argue that there was also a right in disposal (or alienation), mediated by money. This led him to conclude that all property, even after its separation from the original labourer could be justified on the basis that it had originally been produced through the labour of an individual. Thus, property was justified as it was the just desert for the efforts of those who produced it and perhaps more importantly encouraged the improvement of nature through the reward of effort by producing a transferable resource. The Lockean argument thus supports property by suggesting property plays an instrumental role in encouraging individual effort through the rewards of property and ownership. In contemporary debates around intellectual property this position, that patents, copyrights and other intellectual properties reward the effort that has been put into their development (the research investment made to develop a patented innovation; the marketing expense in establishing a trademark) is a commonplace regarding the justification of IPRs and appears in one form or another in almost all discussions of the politics of knowledge.

However, especially in the realm of copyrights and trademarks this argument is supported through the mobilisation of a secondary justificatory schema; the notion of property's links with the self as proposed by Hegel. In this position, the control and ownership of property is a significant part of the (re)production of selfhood, inasmuch as selfhood relates to the establishment of individual social existence. It is the manner in which individuals protect themselves from the invasions and attacks of others. For Hegel, property, and the rights that are accorded to its owner, protect the individual from the state and competing individuals in society by carving out a sovereign space for the self. The recognition of the individual as a functioning social (individual) actor rests on their property. Thus property is held against the state, which legislates for property as part of its bargain with civil society. Individuals allow the state to operate in certain areas but protect their individuality (and sovereignty) through the limitations that property rights put upon the state vis-à-vis the individual's own life and possessions. In intellectual property on the European continent this supports the inalienable moral rights that creators retain over their copyrights even after their formal transfer to new owners. In Anglo-Saxon law this mode of justification has been less well received due to its implications for the

issue of the final alienability of property. Nonetheless, especially where ‘passing off’ of trademarks, and the use of copyrighted material (sampling of music, for instance) are concerned, this justificatory schema can sometimes be noted in the calls for redress based on the diminution of reputation, or the ownership of (self) expression.

Both these positions can be subjected to an immanent critique centred on the inability of intellectual property to deliver the results on which each justification rests (see May 2000a: chapters 4 to 6). However, there is a third set of justifications, the pragmatic or economic argument for commodification of property. While both of the justificatory schemata outlined above are often present in arguments for the protection of intellectual property, this third, additional and important, justification often underpins the role of intellectual property in information society. This third schema concerns the efficient use of resources. There is a particular story of the emergence of property rights that argues that its emergence was a response to the needs of individuals wishing to allocate resources among themselves (May 2000a: 18-21). In an influential narrative Douglas North suggests the enjoyment of benefits (and the assumption of costs) takes place in social relations through the mobilisation of useful resources, and the institution of property arose to ensure that such resources have attached to them the benefits (and the costs) that accrue to their use (North 1990: 34-35). In this story property rights have taken the place of social (trust) relations, and allow complex trade relations to form over distance. But, part of the continuing fluidity in the legal constitution of property rights has been the widespread attempt by ‘owners’ to secure benefits while keeping costs externalised. Social efficiency would be best served by costs accruing to the property that delivers the benefit; however for individual owners it is more ‘efficient’ to have the costs met by others.

Mobilising an history of material property this third schema suggests that efficient resource use is established through the use of markets in which property is exchanged and transferred to those who can make best use of it. Indeed the development of modern economies is predicated on the institution of property, and its ability to ensure the efficient use of limited resources. And for North (and others) it is this efficiency requirement that drives the historical development of property rights. Thus, it is claimed in an information society it makes sense to make knowledge property so that the same advantages can be enjoyed. This (institutionalist) retelling of the history of property carries with it the implicit notion that property arose, like any institution, to fulfil a certain function: the efficient allocation of scarce economic resources. Even when it is accepted that this allocation may not be ‘optimal’, property is still presented as the most efficient method of allocation available, even though it often produces a less than perfect solution. However the emergence of property furthers the interests of specific groups in society; those in possession of such resources that can be utilised to accumulate more resources, the nascent capitalists. While the institution of property may further efficiency of allocation there is a need to remember exactly what such ‘efficiency’ means and whose benefit it serves. Regardless, for pragmatic or economic justifications it is this history that is appealed to legitimise the institution of property. And in the interests of ‘efficiency’, property as an institution is reproduced (and ‘improved’) through its legal and social use, and supported by those who benefit from its legal sanction. This narrative of the efficient allocation of scarce resources is then bought to bear on the allocation and use of knowledge in the information society.

However, only the view that intellectual *property* itself is plausible in the first place allows the arguments for efficiency/utility to support specific intellectual property regimes. A circular argument needs to be maintained to support intellectual property rights: efficient allocation depends on markets; only scarce resources can be allocated through markets; knowledge must be treated as property because only then will it be scarce and therefore brought to market; and markets ensure efficient allocation. To derive the greatest social benefit from knowledge it must therefore be treated as property. The agenda of choices from which plausible and acceptable arguments about intellectual property can be developed is strictly limited to those which draw explicitly on established property *and* market efficiency themes. Thus the possibility that it only makes sense to propose a market for knowledge if knowledge is *already* conceived of as property is hidden by the assumption that knowledge *needs* to be thought of as property to enjoy the benefits of market allocation. The possibility that the two elements of the argument might be mutually interdependent is obscured by the utilisation of justifications drawn from the other two schemata: the need to recognise a reward for effort made, and the need to allow the author to have property in their creations.

Scarcity and the tragedy of the commons

One of the central purposes of intellectual property rights in the information society is to construct a scarcity which allows a price to be taken in the exchange of ‘knowledge objects’. In a clear statement of this requirement (utilising the labour desert schema) Kenneth Arrow notes that if

information is not property, the incentives to create it will be lacking. Patents and copyrights are social innovations designed to create artificial scarcities where none exist naturally... These scarcities are intended to create the needed incentives for acquiring information (Arrow 1996: 125).

Only through this process can the information society continue to be organised on the basis of capitalist social relations. Indeed, where such imposed scarcity is contested (as it is in scientific endeavour, or in the 'gift-economy' of open source software), 'normal' capitalist relations, reliant as they are on property ownership cannot be fully maintained (Barbrook 2000). Barriers to entry (a source of considerable economic power in any market) are frequently erected on the basis of patented processes or technologies, or in some information sectors on the ownership of specific copyrights. Expanding market share increasingly involves the use of branding, and the dependence therefore on the protection of trademarks (Kingston 2000: 87 and *passim*). The construction of scarcity through the commodification of knowledge plays a vital role in the operation of modern capitalism. But, considerable effort is required to support the argument that such scarcity is socially beneficial, and in one way or another such arguments frequently draw their inspiration from an assertion of the 'tragedy of the commons'. While originally developed as an account of historic over-use and degradation of environmental resources, this position has considerable salience for the property position as regards knowledge in economic relations and is frequently either explicitly (e.g. Carr 2000: 14) or implicitly appealed to.

Garret Hardin's famous and influential rebuttal of the commons is formulated in the first instance as a story of grazing livestock on common land (Hardin 1968 [1993]). While the land's capacity to support the herds is above the total population allowed to graze by all the herdsman life continues happily. However, once the population increases (through a decline in mortality, better health, less poaching and disease) to the point where the population matches the maximum capacity that can be supported by the common land then the 'tragedy' develops. Each herdsman can now only benefit from adding an animal to the herd at the cost of overgrazing the commons. However, while the benefit of adding an animal is fully captured by the herdsman (either by the subsequent sale, or the continuing use of the animal), the cost represented by the problem of over-grazing leading to a decline in food available to each animal and the eventual degradation of the resource itself, is shared equally by all the herdsman. Thus, if rationality is assumed, each herdsman will note that the costs of adding an extra animal (which are shared) are far outweighed by the benefits he can capture for himself. Each herdsman acting in their own self-interest maximises their herd, degrading the common resource and resulting in the final destruction of the common land through over-grazing. As Hardin puts it: 'Freedom in a commons brings ruin to all' (Hardin 1968 [1993]: 9). However, one might presume that knowledge of this situation might go some way to alleviating its effects, if the costs were explained to all herdsman in advance of their additions to each herd. However Hardin is pessimistic in this regard; each generation would have to learn again, there would always be those who wished to free-ride and capture benefits while others held back.

The answer is not to forbid the use of the commons altogether as then no prospective benefits can be gained for society, and certainly when individuals benefit there is some social benefit as well. Thus the question is 'how do we legislate temperance?' (Hardin 1968 [1993]: 12). Hardin suggests that we need to legislate for the social arrangements that will reduce the possibility of the tragedy developing, but importantly any 'alternative to the commons need not be perfectly just to be preferable'. This leads Hardin to suggest that despite its flaws a property rights system alleviates the tragedy. While it replaces merit or justice with wealth as the key allocation mechanism, 'injustice is preferable to total ruin' (Hardin 1968 [1993]: 17).

Every new enclosure of the commons involves the infringement of somebody's personal liberty. Infringements made in the distant past are accepted because no contemporary complains of a loss. It is the newly imposed infringements that we vigorously oppose; cries of 'rights' and 'freedom' fill the air. But what does 'freedom' mean?... Individuals locked into the logic of the commons are free only to bring on universal ruin; once they see the necessity of mutual coercion, they become free to pursue other goals (Hardin 1968 [1993]: 18).

And, therefore property rights, whatever their disbenefits and injustices, by virtue of their support for the overall public or social good of the avoidance of 'universal ruin' are justified even when they enclose previous commons. Indeed, if time will bring acceptance of enclosure then the technical solution of property rights can over-ride any short-term objections because these fail to understand the bigger problem.

Once the solution has been imposed and the political debates have exhausted themselves, behaviour will adapt and the tragedy will not only be averted but will be forgotten with the rules becoming part of generalised legal organisation of

society. Thus the key aspect of the imposition of a property regime over commons is not the enjoyment by users of absolute property over their resources, but rather the cost they have to take into account when their use conflicts with another owner's interests. By awarding property rights, what was previously an externality, a cost others had to bear can now be included by charging users on the basis of their liability where other's resources are degraded. It is not merely the awarding of property that dissolves the tragedy but the rendering of previously externalised costs as internal, the price signal that had been misrecognised. In this sense it is the combination of property rights and the competition for a scarce resource that modifying behaviour through the price system.

On one level this might suggest that arguments regarding the enclosure of knowledge at the level of global society may merely be transitory, are to be expected, and can be safely ignored. Once the generation which disputes the TRIPs agreement has faded from active politics, then the agreement will just become part of the political landscape. If this is so, then supporters of a strong intellectual property regime need only play a waiting game. Once the costs of use of information are rendered through a competitive market, those whose use of information would be most efficient (and are therefore able to offer the higher price) gain the information and it will become clear that the social good is served by efficient use. However, such claims still rest on the maintenance of the metaphorical link between material property and property in knowledge. It is far from self-evident that the treatment of knowledge as property, using this metaphor, produces the social benefits that might be presumed from the logic of the 'tragedy' argument. Nevertheless, the argument that it *does* produce benefits is embedded within the TRIPs agreement itself. The philosophical justifications (derived from Locke and Hegel) take the metaphorical link to be self-evident. If the link itself is examined, then the pragmatic argument regarding the need for property to establish a market, which produces efficient resource is produced as proof of the social benefit of intellectual property. Which is to say, noting the problems of exhaustion through over use, and the unlikelihood of establishing an efficiency price without recourse to property rights, the pragmatic position suggests to maximise the social good, property rights in knowledge must be maintained.

In the 'tragedy of the commons' the social good is relatively easily recognised; it is the avoidance of 'universal ruin'. (Of course, anything in comparison to 'universal ruin' is preferable leading to the possibility that an extreme future predicament is being used to justify an unjust contemporary solution.) Hardin argues, though property rights may produce some levels of injustice, overall they reduce the likelihood of an extreme social cost ('universal ruin') and are therefore beneficial. Importing this sort of argument into the debates over intellectual property requires a particular view of what constitutes the social good in knowledge. Starting from the premise that labour should be rewarded with property, and more importantly that no-one would undertake meaningful labour without such reward, it is then clear that it must be a social good to support and encourage innovation and intellectual endeavour (especially in an information society). Although property rights may produce some injustices they will increase the overall level of intellectual production and thus serve the social good.

Utilising the metaphorical link with property, such a social good can be served by the imposition and support for property rights. But, this leads to a problem if the social good is seen differently. The institution of property in knowledge constructs a scarcity where none necessarily exists. However, knowledge, unlike physical property is not rivalrous. Where things exist in time and space, which is to say they are material (and may be subject to property rights) they cannot be used in two different locations at the same time, or in the same location without some loss of utility to co-users. If I sell you my hammer I cannot subsequently use it, or if you and I both want to use the hammer (even if I agree to you using it at the same time), the ease of use for each of us is reduced by the need to co-ordinate our hammering. However, knowledge (until it is made property) seldom exhibits rivalrousness, contemporaneous usage detracts little from utility except in certain special circumstances, and therefore without imposed rivalrousness only a small amount of intellectual property would become meaningless as useful information or knowledge.

Without some legal manner in which use could be limited to those who enjoyed property rights in trademarks, such marks would become valueless, and convey little of the information they are supposed to. The history of trademarks has been beset by piracy (from early 'marked' copies of Roman lamps made in France and Britain during the Roman Empire to current controversies concerning designer labelled clothes), and the information that such marks might be said to convey regarding origin and quality are compromised when they are rendered non-exclusive or unreliable as carriers of knowledge. The problem of alleged piracy of marks, through the unauthorised use of brand names as domain names has become an area of great importance to trademark holders. Trademarks have until recently been legally limited to particular sectors (i.e. the brand could only be 'protected' relative to the sectors where business was

actually conducted). But, on the Internet (often seen as the defining technology of the information age) domain names have universal applicability (i.e. .com, not a sectorally specific domain), and their protection as trademarks sanctioned by the World Intellectual Property Organisation has again expanded the rights of owners vis-à-vis non-owners (Mueller 1998: 5/6). Where in the past some sectoral non-rivalousness was legally permitted (between sectors), this has now been quashed, as far as the Internet is concerned. However, the prevention of the use of brands as domain names may have little social cost, though some political costs for those wishing to challenge the system of trademarks. But where patents and copyrights (the 'meat' of most arguments regarding intellectual property) are concerned non-rivalousness as a social cost is harder to substantiate.

If the social good served by knowledge and information is related to availability, which is to say if the diffusion of knowledge is itself a social good, then the enforced scarcity of intellectual property becomes problematic. The process of 'enclosure' explicitly does not recognise (or accept) that knowledge can be used without depleting its intrinsic value to society as a whole: IPRs are defined *against* the notion of (economically) freely available knowledge. While it may be possible to argue, as many critics of IPRs do, that to commodify knowledge 'makes ideas artificially scarce and their use less frequent - and, from a social point of view, less valuable' (Vaver 1990: 126), this claim is for the most part ignored. If knowledge can be used in a non-rivalous way, if people can use the same knowledge at the same time without any impact on the benefits from the use of such knowledge, then the rendering of a scarcity in such knowledge (to establish a price) also inflicts a social cost, to those to whom use is blocked. On the other hand, certain sorts of information may be rivalous, especially where such knowledge or information may allow the 'owner' to produce material goods for sale or take advantage of market conditions (differences in prices between markets for instance). Thus inasmuch as knowledge produces material goods or market advantage, it may be rivalous in the sense that non-rivalous use would allow much wider production and thus might reduce the recoverable price from knowledge use.

In the extreme case, a 'tragedy' might result because the price would be driven down below the level at which the costs of the original development of knowledge could be recovered. Thus, encapsulated in term limits in patents and copyrights (trademarks can be renewed indefinitely), there is a balance between social good and private benefit at the centre of intellectual property's legal construction. The owner of intellectual property is awarded a monopoly over the particular 'knowledge object' to allow a return or reward to be gained. Thus, for patents (whose social availability is regarded as important) time limits are currently set at a minimum of twenty years by TRIPs, to allow for a reward to be earned before the subsequent open-ended period of social use. For copyrights on the other hand (where social utility is seen as marginal) creators are protected for their life-time and their descendants for a subsequent fifty years. These terms of protection have been established over the history of intellectual property to balance the private rights of innovators and authors against the public rights of society as a whole. But, the key question is: is this balance as currently constructed still producing the optimum social good for the information society?

Defensible monopolies?

For property the relationship between private and public benefits is the history of the move from the common understanding of property as *physical things held for the owner's use* to the more modern conception of property as assets, which can be used or otherwise sold to another potential user. However, while this transition was hardly noticeable as long as the merchant, the master, the labourer, were combined under small units of ownership, [it] becomes distinct when all opportunities are occupied and business is conducted by corporations on a credit system which consolidates property under the control of absentee owners. Then the power of property *per se*, distinguished from the power residing in personal faculties or special grants of sovereignty, comes into prominence... When to this is added the pressure of population and the increasing demand for limited supplies of mineral and metal resources, of water-powers, of lands situated at centres of population, then the mere holding of property becomes a power to withhold, far beyond that which either the labourer has over his labour or the investor has over his savings, and beyond anything known when this power was being perfected by the early common law or early business law (Commons 1959 [1924]: 53).

It is this move from holding to *withholding*, the ability to restrict use, which is of crucial importance. When the resources required for social existence are scarce then the distribution of the rights to their use (property rights) becomes a central, if not *the* central issue of political economy. It is this issue of withholding use which is the key issue for understanding the debates about intellectual property in an information society.

As has been the case in the history of property, there has been a diminution of the possibility of a public domain of knowledge. The conception of intellectual property solidified for copyright with the rise of the romantic notions of individual creativity (Geller 1994: 168-170). With the need for patents to be lodged by a legally constituted individual, a similar norm has operated for patentable ideas since the earliest patent monopolies were awarded (Boyle 1996: 206). Thus, at the centre of intellectual property discourse is the notion of the individual creative individual, the ‘author’, acting in solitude to produce new knowledge. This individualised notion of intellectual creation constructs an ‘empire of the author’ where all knowledge has a moment of genesis which justifies the IPRs attached to them (Aoki 1996: 1323, 1330; May 2000a: 50ff). This has spread from its original limited coverage (under both patent and copyright law) which sought to protect only innovative knowledge and the expression of individual’s ideas to more recent moves to include patterns of collected information as well as acts of discovery and codification. Intellectual property rights may attach to particular knowledge objects on the basis of the identification of the organisation of extant knowledge *as* new knowledge. The identification of the individualised authorial function lies behind the justification of IPRs based on the author’s encouragement and motivation to continue production. This is easily located within the instrumentalist notion of the required reward for the creator represented by property rights. The individual labours within his or her own intellect and produces a novel knowledge object which attracts property status.

However, knowledge creation is incremental. All knowledge must be *largely* extant by virtue of the extent of knowledge needed to have the insight or creativity (call it what you will) to add something to any field. If the provision of the building blocks of knowledge involves no necessary diminution of utility to previous users/owners when (re)used to create or invent, then the rationale for charging for inputs is not particularly robust. The marginal cost is nil - once an idea has been had there are no extra costs in others rethinking it. As Yochai Benkler notes:

In a digital environment where distribution costs are very small, the primary costs of engaging in amateur production are opportunity costs of time not spent on a profitable project and information input costs.

Increased property rights create entry barriers, in the form of information input costs, that replicate for amateur producers the high costs of distribution in the print and paper environments. Enclosure therefore has the effect of silencing non-professional information producers (Benkler 1999: 354).

This limitation on the availability of information-inputs, as Benkler terms them, means that the independent creator (the very person whose interests are supposedly at the centre of the justification of IPRs) finds their ability to develop further knowledge constrained. While this may have little effect on the producer of fiction this may have serious ramifications for the future development of innovation, and scientific research.

Conversely, however, to argue that much information and/or knowledge is already extant suggests that no-one owns it. Provided that in its public domain form it is still available, informational products derived from this information might be made property without any cost to previous users. Certainly large pharmaceutical companies would benefit from such an analytical position (Dutfield 2000: 284). If, say, traditional knowledge is part of the public domain, then provided ‘bio-pirates’ do not actually patent the raw genetic material, only its modified forms, who could object? The incremental improvement could be rewarded with the patent while the unimproved public variety could continue to be used. Thus, to argue in this way the public domain involves a common, non-proprietary, store of knowledge is to allow the very ‘piracy’ that many critics object to. By taking traditional knowledge and modifying it, ‘bio-pirates’ are avoiding input costs (or more accurately paying for the use of informational resources developed by social groups outside the property regime): hence the key term ‘trade-related’ in intellectual property laws (May 2000a: 77/78). This has led some critics to argue that in the face of the expanding IPR regime, the only response is for communities whose common (public) knowledge is being exported into the wider public domain (prior to the subsequent enclosure of its derivatives) is to assert *their* intellectual property.

This response, however well meaning, replicates the problems of intellectual property and does nothing to safeguard the common availability of the public domain, or knowledge commons. It remains unclear why protecting a particular creator (the idea’s current possessor), over and above the creators who contributed earlier through their ideas is legitimate. Even the indigenous communities who might claim ownership to traditional knowledge are only the most recent keepers of such knowledge. However Graham Dutfield argues that this (reactive) enclosure should be seen as serving the public good by protecting the interests of poor and disadvantaged groups against the ravages of the large multinationals seeking patents in genetic materials (Dutfield 2000: 288/289). As I will suggest in the last section, an alternative to acceding to a property regime (defensively) is to actually to try and reverse the trend to enclosure, to revalue the intellectual commons.

Taking genetic materials as an example; the valuing through patents of new manipulations fails to recognise the long history of husbandry which has produced the plants and animals from which genes are now taken.

Centuries of innovation are totally devalued to give monopoly rights on life forms to those who manipulate genes with new technologies, placing their contribution over and above the intellectual contribution of generations of Third World farmers over ten thousand years in the areas of conservation, breeding, domestication and development of plant and animal genetic resources (Shiva 1991: 57).

Is it ever possible to identify the part of the knowledge product that is completely the labour of the rights owning individual (who is enjoying labour's desert)? The more philosophical justificatory schemata of property (self developmental and instrumental) do not resolve the problem. To deal with knowledge both treat knowledge as monolithic rather than composed of a complex of knowledge elements, none of which are necessarily used exclusively. Labour produces a clearly defined 'knowledge object' but the labour of some is regarded as adding more value than others. Scientific labour adds value which must be appropriated to encourage further work, while past casual (peasant, amateur) labour merely added to the social stock of knowledge.

Whatever the current understanding of intellectual property, the history of the recognition of property in knowledge has not been entirely patterned by the recognition of exclusive *rights*. Rather it owes its origin to the grant of privilege to individuals in exceptional circumstances (Sell and May 2001 [forthcoming]). By re-inscribing the monopoly privileges accorded to the holders of intellectual property as rights, the common interest of all individuals in upholding IPRs is asserted and the possibility of obligations incumbent on the knowledge 'owner' is obscured. The original bargain of intellectual property, that if privilege is being awarded, then some form of connected duty should also be part of the logic of IPRs is continually obscured. Although patents originally emerged as grants of monopolies for other (often economic) reasons, they were regarded as privileges or distortions that were only justified on the basis of their other benefits (often delivered by the holder). The subsequent history of intellectual property has reversed this logic to make intellectual property itself the right which benefits society.

The public realm was originally the corner-stone of intellectual property; justifications of intellectual property always include an expression of social utility. However, when examined closely this utility is now only residual. The public realm represents only whatever is not claimed by the rights accorded to private intellectual property. There are therefore no effective safeguards to halt its erosion; indeed in itself the expansion of private rights in knowledge has brought about the public realm's decline. The limits to the public realm flow from the particular social utility that is recognised.

Business frequently advances the position that intellectual property rights spur innovation, the production of greater wealth and improved well-being. Frequently however, the utilitarian argument of business is based upon a narrow set of stakeholders - those within national boundaries and with direct ties to the company in question (Steidlmeier 1993: 162)

This narrow view of social utility, based as it is on a narrow group, needs to be reformed if any other concept of welfare is to be put forward.

Conventionally when intellectual property is eulogised, it is on the basis of the protection of the creator, the owner of such knowledge as is made property. Their rights are protected so as to act as a general spur to innovation and socially useful activity. Arguments about just desert, and selfhood are allied to the need for social efficiency in the allocation of resources. However, as Jeremy Waldron notes all this talk of property 'sounds a lot less pleasant if... we turn the matter around and say we are imposing *duties*, restricting *freedom* and inflicting *burdens* on certain individuals for the sake of the greater social good' (Waldron 1993: 862). Which is to say IPRs limit the actions of others regarding knowledge vis-à-vis the owners of intellectual property, and as such they are being forced to sacrifice their particular wants or needs on the alter of social necessity. As Waldron points out in the realm of copyright, the limitation on activities (unauthorised copying or plagiarism) is hardly life threatening, but what might be the reaction if we look at areas where intellectual property limits the use of less-ephemeral knowledge, in pharmaceuticals or in bio-technology? Indeed, given the wide-ranging aspects of social life (and social innovations) subject to intellectual property protection, such a defence can hardly be said to hold universally (Waldron 1993: 862-868). The very real consequences of the distribution and enactment of intellectual property rights lead to a more critical conclusion regarding the social good served by their general protection.

The social costs of withholding information and knowledge may actually be quite different in scope and importance to that suggested by the 'tragedy of the commons'. Furthermore, looking back at Hardin's argument, while it has some value perhaps as a rhetorical narrative intended to support a specific reading of the history of the commons, it is not the whole story. As John Frow points out (following E.P.Thompson):

The commons were a governed space, and their destruction has to do with the pressures of capitalist agriculture upon coincident use-rights, together with the sheer political power of the land holding class, rather than with the competition on an equal footing between isolated individuals (Frow 1996: 100).

Thus, not only is the metaphorical link with material property problematic for the construction of intellectual property, the key argument from material property regarding externalities and the social good actually rests on a doubtful reading of the history of enclosures. Indeed, as Susan Cox concludes from her re-examination of the commons before enclosure:

Perhaps what existed in fact was not a "tragedy of the commons" but rather a triumph: that for hundreds of years - and perhaps thousands, although written records do not exist to prove the longer era - land was managed successfully by communities (Cox 1985: 60).

The enclosures were driven not by issues of resource use but rather by the changing social relations of nascent capitalism. While the un-regulated commons of Hardin's analysis probably never existed, the long success of community management suggests there may be other ways of governing such resources and utilising them for maximum social benefit. If it was the development of capitalism that introduced the 'need' for property, this is reflected in the similar and contemporary attempt by information capitalists to enclose the resources of the knowledge commons. It is to the consequences of this 'land grab' that I now turn.

Some consequences of intellectual property rights

Before suggesting some ways an political response might be developed to the enclosure of knowledge through the use of IPRs, it is as well to outline some of the consequences that have provoked such a response. Firstly, taking the example of the human genome, if such information as is developed to identify specific properties of particular segments of the DNA of mankind (propensity to illness for example) are rendered as property their distribution will be subject to purchase. In any area where genetic information may have an impact, from crime detection and risk assessment to genealogy and health insurance, codification will allow commercialisation. The transformation of man's relation to society, or to health and life-expectancies will not however be a neutral blessing, nor will these revelations be freely available. For instance, Craig Venter and his company Celera keep their sequences secret, even while the publicly funded Human Genome Project (part funded by the US go government, part funded by the Wellcome Trust) publish their results on the Internet.

This is not the first time Venter has tried to establish a monopoly over genetic information. In the late 1980s at Venter's researchers were constructing a library of expressed sequence tags (ESTs) which indicate where particular groups human genes are within the entire sequenced genome. The rights to access this information was sold to SmithKline Beecham and other through licensing agreements that enabled the owners and developers of the EST database, Human Genome Sciences, to also demand fees from any subsequent commercial application developed by the licensees. Those companies unable, or unwilling to pay were denied access to the data. However:

SmithKline Beecham's drug rivals, Merck, struck back. Rather than pay HGS fees they gave [a competing team] a research grant to sequence a rival EST library and lodge them free in Genbank - a public depository for genetic material and accessible to anyone. *Overnight it destroyed the economic value of HGS's precious library* (Toolis 2000: 18. emphasis added).

Given such an experience it is not difficult to see why Venter and others have sought the protection of the patent system. Patenting the original databank's ESTs would have mired Merck in an expensive (and protracted) legal challenge. But neither was Merck's motivation entirely disinterested philanthropy. While clearly its strategy was a major problem to a number of its competitors, the company also saved itself considerable fees for access which it might have otherwise had to pay: 'Merck expect[ed] to profit more in absolute terms by making the database publicly available, even if other firms also profit[ed] as a result' (Eisenberg 1996: 570). Recognising that it was not the gene sequences themselves that were most valuable but rather the uses to which this information was put which would generate major profits, Merck banked on its comparative advantage in product development to capture the benefits of publicly available (raw) genetic data.

However, Merck were not the only ones to recognise that it is the applications which can be generated from such

information that will be most valuable. Genetic patent applications are flooding into the US Patent and Trademark Office (US PTO), yet in the majority of cases the potential application remains unknown. However, only by lodging patent applications for specific ESTs can companies attempt to ensure that when an application *is* developed (by them or by another company) they will be able to secure their ‘reward’. And, this is what is rather mysterious. The normal justifications for patent awards are based on three historic criteria: newness, non-obviousness and usefulness. While these sequences may be new, and while the test of non-obviousness may be argued (non-obviousness is generally related as the unlikelyhood of a practitioner adept in the field independently coming to the innovation in the normal practice of the ‘art’), usefulness seems indefensible. Whatever the other considerations, which are many, actually most genetic filings do not warrant patentability. Indeed, it seems that many companies are patenting widely (in a scatter-gun approach) hoping that they will be able to gain some strategic advantage from the applications they will finally be able to defend (even if this is a minority of their claims) (Thomas 1999: 138). And with overworked, underpaid examiners at most patent offices who lack the requisite skills (or perhaps more importantly, time) to examine these applications fully, more often it is left to disputes to clear doubtful applications from the system. Well funded applicants stand a much better chance of defending claims than politically driven disputants. All this seems some way from the ends intellectual property is supposed to serve if we take its justificatory schemata seriously.

It seems clear that the US PTO has relaxed its criteria for awards. (And indeed this is not the only field in which this has happened, with recent patent grants to ‘one click ordering’ and other information economy business practices, the Office is allowing an expansion of the types of knowledge resources which can be subject to protection.) Though patents on genetically related materials had been refused in the past, an appeal in 1980 to the Supreme Court regarding a nine-year old dispute between Indian microbiologist Ananda Chakrabarty (claiming a patent on a genetically engineered micro-organism which consumed oceanic oil spills) and the Patent Office who had refused his original claim was narrowly settled in favour of the grant of patent (Rifkin 1998: 41/42). Despite the original hopes of the court that this precedent would be narrowly construed, it actually become the basis on which patents for genetic sequences would be awarded in the subsequent years. Seven years later the US PTO ‘reversed its earlier position and issued a ruling that all genetically engineered multi-cellular living organisms, including animals, are potentially patentable’ (Rifkin 1998: 44). However, this ruling also took in genetic material discovered, not necessarily engineered, and thus the grounds for patent (newness, non-obviousness, usefulness) no longer had to be fully fulfilled for a grant to be deemed actionable.

On the other side of the Atlantic, despite the European Patent Office (EPO)’s previous practice of blocking patent applications that might be regarded as morally unsound, the office has never expressly excluded genetic material. Like the Chakrabarty case in America this has essentially allowed genetic material to be awarded patents. Margaret Llewelyn, of the Sheffield Institute for Biotechnology Law and Ethics, suggests in these cases,

Morality appears to be determined by a two-part test: whether the public would find the invention ‘abhorrent’^[2] and even if it does, whether the invention has beneficial uses. If convinced of the latter, even if this is a speculative benefit, the patent office has proved reluctant to deny a patent on grounds of the former (Llewelyn 2000).

Where it is assumed the health impact would be beneficial it is regarded as self-evident that any moral concerns would be rendered immaterial: given the choice between life and morality, the EPO assumes we will choose life. Of course, all this really means is that patent applications in this area now always include detailed speculation about the likely future health benefits of applications drawn from the patented material. Like other areas of intellectual property law, where there is a choice to be made, the potential owner of intellectual property is favoured. Thus, the slow but sure enclosure of the available knowledge and information resources (in this case linked to the human genome) continues.

Introducing an ethical dimension

From the perspective of scientific ethics, one of the most often voiced objections to the patenting conducted by companies involved in genetic research has been the costs such practices impose on other experimenters, as well as the limitation to the flow of scientific knowledge which might otherwise be freely available to the scientific community (Crespi 2000: 164). In this sense the commercialisation of scientific endeavour is limiting the general benefits which could be derived from open communication of results.^[3] There is also a question regarding the justice of patenting aspects of a resource that might be (arguably) regarded as the property of all humans. If we all share the vast majority of genetic code (as the Human Genome project has underlined) then how can companies ‘own’ particular parts of

sequenced genes. These issues have been at the forefront of much of the popular disquiet regarding patenting of human (and other biological and agricultural) genetic information (see for instance *The Guardian* 2000). However, as one might expect, the biotechnology companies involved have repeatedly invoked the labour desert justification for patenting: without such a reward how would they earn a return on the investment, and without the promise of a return how would they secure further funding to continue research? Any moral problems have been regarded, as Llewelyn suggests, as secondary to the interests of discovering new uses for genetic profiling and information. However, many of the promised benefits of this genetic revolution have actually been slow to arrive (indeed many have proved, at least currently, more chimerical than actual), while those that have been developed are not self-evidently socially beneficial.

Nevertheless the tendency to patent shows no signs of abating, and has led to a number of patent claims and grants including the rights to genetically modified cotton and Soya. As Geoffrey Hawtin, director general of the International Plant Genetic Resources Institute notes:

The granting of patents covering all genetically engineered varieties of a species, irrespective of the genes concerned or how they were transferred, puts in the hands of a single inventor the possibility to control what we grow on our farms and in our gardens. At the stroke of a pen, the research of countless farmers and scientists has potentially been negated in a single, legal act of economic hijack (cited in Rifkin 1998: 48).

Indeed, the recent move to patent the human genome underlines and expands Dr Hawtin's warning. With the ability to identify who is at risk from particular genetically derived health conditions, in a privatised health insurance system even before they have developed symptoms individuals will see their health insurance costs spiral. Companies will no longer be making a risk analysis, but rather will cost on the *expectation* of illness. This may allow insurers to cherry-pick those less likely to fall ill for discounts and those more likely for higher premiums.

However by reducing the need to pool risk (as future health will be much more predictable) the use of health insurance may decline rather than rise, as those who are at risk are priced out of the market, while those who are low risk opt out of general insurance schemes. Insurance is essentially a form of gambling, and when the outcomes (the need to claim) become less uncertain, the desire to insure will lessen. And those who (on the basis of genetic testing) expect to need medical cover become much less likely to be able to buy economical insurance. Even the normally free-market Economist recognises that this may support the retention of public service medicine to ensure those who are unable to get cover are not rendered as an underclass through the availability of better genetic information (Economist 2000b). It is therefore no wonder that insurers have been slow to celebrate and extensively utilise such advances. I will return to this issue of market failure below, but these advances also bring with them potential injustices.

These developments prompt two important questions which exemplify the more general ethical problems with the commodification of information: firstly who has control of this sort of information and knowledge (here implying issues of access to and benefit from its medical use); secondly, the risks that deployment of such information will (re)produce divisions in society between those regarded as genetically low risk and those who through no fault of their own find themselves subject to exclusion or 'red-lining' (similar to the way that credit-scoring has become a mechanism for exclusion from financial services), or are discriminated against on the basis of their likely future health problems. Indeed, as Weinberg pointed out ten years ago, the work on human genes was likely to prompt some form of genetic determinism (Weinberg 1991 [1997]). In subsequent years, the increased possibilities of genetic engineering, cloning and screening have done nothing to dampen such fears. And while in America genetic testing of job applicants has been ruled out by Federal agencies, in the private sector such practices continue to allow companies to turn down job applicants on the basis of genetic profiling (Lewis 2000). While this is currently a reasonably high profile area of concern, the rendering of knowledge as intellectual property also has profound effects elsewhere in the social relations of health.

If property constructs scarcity and requires a price to be paid for the use of information and knowledge resources, then we can expect that there will be a wealth effect on the patterns of use. When we examine the use of AIDS drugs, this is most evident. The yearly cost of keeping HIV+ patients alive on the cocktail of drugs which are currently available is in the region of ten thousand times the annual health expenditure per-capita of many developing states. Recently Ghana and other African countries have run into trouble for trying to import generic versions of the cocktail's component drugs manufactured by Indian companies ignoring patent protection. While this has prompted some multinational pharmaceutical companies to offer discounts on some drugs, these discounted prices still remain well

above what the health systems of developing countries can afford for mass utilisation. Furthermore, as *Medicine sans Frontiers* have noted, these combination cocktails are made up of drugs that were originally developed with the help of public funds in the USA (Boseley 2000). Arguments that IPR protection in this case is based on the need to reward (and recoup) investments therefore ring rather hollow. The ability of patent owners to withhold information-related goods is in this case all the more stark for the clear effects it is having on the lives and welfare of people throughout Africa.

For other sorts of information the problems associated with intellectual property are not of this magnitude. Indeed, the term limits of IPRs are much longer where the dangers of a lack of dissemination have historically been seen as low or negligible. Thus historically, copyrights, which have only covered the (artistic/creative) expression of ideas have been enjoyed not only by the originator but by their heirs for a period after death. The public benefit of free use of such expressions was not particularly highly valued relative to the reward to the author or creator. That said there is a considerable body of comment that sees the threat to the public domain represented by the ever-widening notion of copyright as quite severe. The law over compilations of publicly available information in directories or databases is a case in point: 'If protection is denied to information because facts are not original, then works conveying information in unoriginal form (alphabetical, for example) should receive little or no protection under the copyright law' (Litman 1990: 1014). But, the protection of a right in databases

is being pushed by large publishing companies lobbying hard to obtain a sui generis (one of a kind) property right to monopolise database content [in current negotiations regarding the revision of the Berne Convention, which covers copyright]... This has the potential for creating private monopolies on data and document sources that have traditionally always been in the public domain in democratic societies.

Exploiters have sought to restrict the public's right to use information without even the very limited types of safeguards for public access that exist in current copyright law (Venturelli 2000: 26).

Here, the Lockean justification is usually deployed to justify such an expansion, related to the effort to collate and collect such information but as Venturelli rightly argues this results in the constriction and reduction of the public domain. However, especially in the United States, the record of the courts regarding the protection of compilations of data or publicly available information is mixed with some cases succeeding in the defence of such property while others have not. Thus, while contested, there is still some life in the public domain (at as perceived by certain courts).

In the area of creative works, the public domain has historically served a particular purpose: it is the fund of social and cultural resources out of which authors fashion their creations. Without such a resource, authors would have to negotiate with rights holders for all those elements which might be needed to fashion a new cultural creation. Given the impossibility of absolute originality (Littman 1990: 1000-1012; May 2000a: 51), all authors need to use some common elements (not least of all language), and thus the public domain allows for this use and supposes that only when the creator's immediate heirs have also profited that the creation should return to the public realm. In this sense a public realm for copyright always exists, but may be shaped by current copyrights in specific creations. This goes back to the most basic distinction between copyright and patent, while patents are usually regarded as protecting an idea, copyrights protect only its particular expression. Thus the plot is never protected, only the way it is told in any specific fiction; the pose or colour juxtaposition is not protected only its exact copy. However, when technological tools start to be rendered in language, i.e. as computer software, the long terms of protection for copyright (which software companies are constantly trying to achieve) come into conflict with the traditional manner in which tools with social usage have been protected, through patent.

In patents, historically the balance has been tipped in the other direction, with the public danger on non-disclosure (or to be more correct the limitation put on dissemination by protection and licensing) being much more evident in relation to private benefits. Thus, for patents, term limits have usually been limited to twenty years (though the point at which the term started varied until the advent of the TRIPs agreement). However, in a fast moving global information society, even these term limits have become problematic. If we assume that the control of patents for instance has some link with the control of useful (and up-to-date) knowledge in economic processes, then the widespread private control (by owners in the 'advanced' economies) of the knowledge that might enable technological development approaching the current 'state of the art' represents a problem of unequal access to important resources. Even in developing countries the vast majority of patents applied for and granted belong to those domiciled in the richest, most developed countries. And often these patents are not 'worked' being deployed only to protect technological imports, allowing not even a minimal transfer of technology. Given the speed of technological innovation at the end of the last century and now

into the new millennium, this represents (quite apart from any other socio-economic factors) an important drag on development for those countries whose need for some form of poverty alleviation would seem unarguable. The lag between innovation and its entry into the public domain while still twenty years, compared to generations of technological systems is now relatively longer. Protection, by leaving term limits untouched (and indeed by reinforcing them through TRIPs), has been enhanced.

Whatever the claims regarding reward, in the main patents are not used to ensure licensees pay a 'just' price for the use of a particular technology, but rather patent grants are used to contain (or even halt) competition. Though there are a number of issues apart from patents that may impede technology transfer and economic development (May 2000a: 112-124), they remain a significant impediment to the deployment of new and competitive technologies in countries whose entrepreneurs do not hold the relevant patents (or who for one reason or another cannot afford the licensees). However, one of the arguments often put forward for the medium to long term positive effects of the TRIPs agreement is that protection of intellectual property will encourage domestic innovators to produce new indigenous technologies and innovations which will enhance development (e.g. Sherwood 1997). But, if the process patents element of TRIPs is taken as emblematic of the protection of current owners rights this seems optimistic.

In the area of process patents, the burden of proof has switched from the plaintiff (the owner of the patent) to the defendant. Where a product has been produced that is new, and a competing manufacturer suspects a process patent has been infringed, it is up to the defendant to prove that the patented process has not been used. Thus, if the manufacturer is to prove that no infringement has occurred in circumstances where the patent's 'owner has been unable to determine the process actually used' the methods of the new manufacturer will be forced into the public domain (GATT 1994, A1C: 16). And while there is provision for the 'legitimate interests of the defendant in protecting his manufacturing and business secrets [to] be taken into account', once again the balance of rights has shifted quite significantly to the owner of the patent (Verma 1996: 345/6). It may not be too farfetched to imagine that when a new process to produce a particular product is developed in a particular jurisdiction, the patent holder of the previous process will find it possible through the courts to push their competitor into revealing the new process. Thus, where reverse engineering has failed there is now the possible recourse to law to force competitors to reveal how they are competing. And the richer company can then use their resources to either improve their own process or mobilise a newer process based on the revealed innovation. Whether this provision will lead to this sort of case is hard to predict but even the likelihood signals once again where the benefits of TRIPs are to be enjoyed: it is an agreement for private ownership. The belief that defendants might be innocent until proven guilty has been eradicated where the interests of corporate intellectual property holders deem it obstructive to the benefits they enjoy from their property.

In addition, given the web of patents already awarded and the likelihood of breakthroughs to be based on 'prior art', the possibility of producing a breakthrough which might be controlled outside the extant patents in any particular industry is unlikely. The public realm which is still to some extent taken for granted in the developed economies (not least of all through the movement of staff and the wide availability of higher education) is much more limited elsewhere in the global economy. That said, through labour law (contracts that restrict subsequent employment with competing firms) and in America the growing doctrine of 'inevitable disclosure' have also started to eat away at the public realm of tacit technological knowledge in the developed economies (May 2000a: 120-122). What were once transferable skills are increasingly being re-conceptualised by companies (and their contract lawyers) as the company's intellectual property, which employees must be stopped from removing for use in their next job. The key issue here is the ability of the law of intellectual property to render what might have been in the past public resources, as private. Information and communication technologies through their ability to codify and collate diverse and complex knowledge resources have made such 'enclosure' more feasible, and by doing so have enable a concentration of important knowledge resources.

The public realm of information and knowledge

An ethically driven response is required if the balance between private rights and public benefits is to be reconstructed in light of the new possibilities of information and communication technologies. These new technological developments require a re-examination of the accepted and previously reasonable legitimate settlements in this area of property law. The claim that the decline of a public domain may be problematic for society (overall) is hardly new (see for instance Sennett [1978], or more focused on IPRs, Lange [1981]), though currently in the realm of information it seems particularly pressing. Given the dependence of intellectual property on the structures of law, I concur with

Rainer Moufang, who suggests that ethics and law are both concerned with the justification of decisions and rules: 'A strict separation of both normative structures is feasible neither with respect to legal policy nor with respect to the application of law' (Moufang 1994: 497). It is important to recognise that 'the law is a moral topography, a mapping of the social world which *normalises* its preferred contours - and, equally importantly, suppresses or at best marginalises other ways of seeing and being' (Corrigan and Sayer 1981: 33). By coding certain outcomes and practices as legal and others not, law structures the social relations of market societies, given that the market is itself constructed through the law of contract and property. However, even in the early 1990s,

the mere thought of patents on human genes and cells [gave] rise to a feeling of uneasiness not only in the general public. Serious efforts should be made to determine the roots of this uneasiness, inasfar as it can be explained rationally, and to take them into consideration when examining the legal-ethical dimensions of patent law (Moufang 1994: 513).

Which leads to the question why does the notion of patenting such materials lead to 'uneasiness', or perhaps more generally why does the commodification of information and knowledge that might initially be presumed to belong to some sort of public realm seem problematic?

David Lange has argued these sort of 'problems will not be resolved until courts [and legislators] have come to see the public domain not merely as an unexplored abstraction but as a field of individual rights fully as important as any of the new property rights' (Lange 1981: 178). While the rights of the knowledge 'owners' are accorded much importance and weight, the rights of access to knowledge resources, the rights of those who may need vital knowledge resources are accorded much less (if any) weight. The public is seen as an amorphous sphere, *diluting* just benefits, rather than a collection of *other* individuals who may well have just claims on the resources being granted intellectual property protection. However, there is an increasing awareness of the restrictions that might be put on our behaviour by the operation of intellectual property. Though perhaps facile, the general side-stepping of copyright in music recordings on the Internet is an example of which most of us are aware. Few individuals think they have necessarily done something 'wrong' when after having bought a CD they upload the tracks onto a newsgroup so they can benefit from the similar tracks uploaded by other members. No money changes hands and as the uploader has received no economic benefit there is no perception of wrongdoing, indeed gift-economies of this sort are seen as a positive social act.^[4] However, this is not how the music industry sees it and indeed the current prosecution of Napster (a browser which enables specific tracks to be easily found) has raised many issues about the fair use of CDs purchased but then uploaded.

This (re)construction of a public realm from below is not a novel nor unprecedented form of resistance to intellectual property. Historically there has been a failure on the behalf of the 'educated' public to perceive the photocopying of articles, sections of books or particular illustrations as a troublesome activity (Litman 1991). This form of copyright infringement may well result from the incomplete understanding of what copyright awards its owner. Rather than transferring the rights with the product (CD, book, journal), the new owner cannot use it in any manner they choose as the owner of the intellectual property still has the right to restrict certain uses. But, this is seldom recognised by the purchaser, leading to (in the age of the Internet) widespread (formal) piracy, the posting of copyright material for free downloading and access. This in one sense has started to establish public knowledge commons, though its establishment is not organised (a positive advantage when it comes to avoiding legislative action) but is also based on a rather casual ethic. Currently these actions are concentrated on consumer goods which bear information (copyright) and has not in any meaningful way spread to patented knowledge and information.

While this resistance may be welcome, I am unsure quite how big a blow for information equality being able to download the Macy Gray CD as an MP3 file at no cost really is. And while Lawrence Lessig regards the technological possibilities of 'code' to be such that there is a distinct possibility copyright on the Internet will be strengthened as all use can be tracked and billed (Lessig 1999: 122-141), previous technological fixes in intellectual property law have always fallen to hackers one way or another. In a sense this is a response to the participation gap as regards the legislative determination of public goods (Kaul *et al* 1999). If only a limited segment of stakeholders are being served by the institutionalisation of property in knowledge, it should not be surprising that the disenfranchised should take matters into their own hands. Laws that are regarded as illegitimate are much harder to maintain than those with widespread legitimacy, as the history of copyright 'piracy' indicates. How this plays out remains to be seen. Where information and knowledge might be useful for economic activities (apart from piracy of consumer goods), such

intellectual property remains much more firmly controlled. But, it is this sort of 'knowledge object' where the restrictions of dissemination have a much larger social cost, in terms of the denial of a public realm or knowledge commons.

One approach is to argue that multilateral actions are required to enhance the identification of a global social utility in information and knowledge flows. Perhaps the easiest action, though contradicting the current political dynamic, would be to reintroduce differential patent and copyright protection. Prior to the TRIPs agreement there was a *de facto* acceptance of some form of piracy and a lack of IPR protection in developing states. Thus, while some states did not even have intellectual property laws that related to developed states' companies conceptions of what was necessary, even those that did hardly enforced them. In a sense this was an intellectual property development strategy by stealth. However, the current system of patent

protection has the effect of transferring income from consumers in the protected market to the monopoly inventor/producers. Since technological innovation is itself part of the development process and seems to occur more rapidly the more developed a country is, these monopolists reside permanently in the richest countries in the world. Therefore, extending patent protection to poor countries involves a transfer of welfare from the poor to the rich. Assuming that greater world-wide income equality is a desirable goal, for any number of reasons, this surely suggests that it should be the poorest of countries that are exempted [from the provisions of TRIPs] (Deardorff 1990: 505)

This sort of solution to the development issue comes up against three problems: firstly, it is not self-evident that in the short to medium term neo-Liberal models of economic organisation favour moves towards income equality. Indeed, given the emphasis in neo-Liberalism on rewarding effort so as to encourage economic activity, a tendency towards income equality might not reward actors sufficiently to ensure continued innovation. To assume this is not the most important and prioritised social utility is to go against the prescriptions of neo-Liberalism itself. However, secondly, even if differential protection of IPRs were reintroduced, this strategy can hardly have been said to have been a development success in the past.

The problem with allowing some form of unlicensed diffusion of patented technologies, or other intellectual property, is that the aspects which it is possible to copy may not represent all the knowledge components of the item. Technology transfer has stalled not only because of the lack of protection afforded to new technologies but because of an inability in many cases to take full advantage of technologies that are transferred. Even mature technologies and the know-how needed to maximise their use have been slow to appear in developing countries. And when the technology does arrive, the tacit knowledge required to make the most (or even actually operate it at all) may not be fully developed or widely distributed. While weaker or absent patent protection may be a necessary condition for the resurgence of technology transfer (and with it a posited decline in global inequalities of wealth) it is not a sufficient condition. There is a connected need to establish the basic skills and technologies upon which newer developments can be deployed. It is seldom possible to leap-frog several stages of technological development effectively without major educational and infrastructural investment. Therefore, to actually enhance global social utility, where such utility is seen as the promotion of welfare and the promotion of more wealth equality, a more positive programme than just free or cheap patent availability is called for.

Thus, John Frow has suggested the construction of a positive public domain which produces the rights to the raw materials of human life, in which he includes language and ideas. While currently language may in the main be free of intellectual property restrictions, Frow's inclusion of ideas is interesting. He suggests rights to intellectual property in such a positive public domain

are not 'natural' rights, located in an ordinary contract or a state of nature, but customary social rights, developed and recognised as a provisional end state of the struggle for civilised conditions of life... Like all rights, they represent a balance between conflicting demands, and they carry with them a corresponding set of obligations to the common good (Frow 1996: 106).

In this positively constructed public domain, social obligations, on which the enjoyment of rights would rest, might plausibly include the transfer of patents and copyrights to a multilateral body which could then distribute them to developing states on a need basis rather than through the market. But, if there were obligations such as these, which states would benefit? This brings us to the third issue raised by the proposal to re-establish differential protection: the identification of those states not required to have intellectual property laws or to only provide some modified coverage. This group could not be fixed, rather it would need to be constantly reviewed. As countries developed there would

become a need to introduce them into the global system, and therefore there would be an issue regarding the boundary moment. The review process would have to balance the interests of intellectual property owners in being rewarded for the exploitation of their IPRs, with the need for such property to be available socially to particular developing states' populations, at particular stages of development.

Alongside a reformulation of the notion of social utility (from a narrow innovation focus, to a wide global social welfare approach), some new multilateral body would be therefore required to govern the limits, but also subsequent re-extensions of the intellectual property regime. This body would then act as the clearing house for the flow of knowledge to those who needed it within the global system but lacked the immediate means to pay. This might plausibly be carried out by an agency of the United Nations, or some body affiliated to the WTO. Indeed, in a limited way the Consultative Group for International Agricultural Research (CGIAR) through its scientific centres in some developing states has collected, codified and recorded bio-mass resources, which it can then be established belong to a public domain, by putting these records into the hands of the United Nations Food and Agriculture Organisation (FAO) as part of the Plant Genetic Resources for Food and Agriculture programme (Braman 2000). This is a public sector echo of Merck's EST strategy. While establishing these resources as public, there remains considerable potential for the patenting of these resources when they are combined or synthesised, which while possibly still problematic would at least limit the coverage of patents to novel or innovative (genetic/bio) products, provided such criteria were upheld (though current practice does not lead to much hope that this would be the case).

Even so, without considerable political pressure this sort of shift at the level of the overall global intellectual property settlement will not be possible. Indeed, for any change to be promoted, the issue of IPRs in the global system needs to attract more widespread political attention than it does currently. This of course may well be prompted by the arguments over patenting and the Human Genome Project. But, any change is likely to be expensive: in political terms for those parties (in or out of government) prepared to take a position that goes against the dominant discourse of neo-Liberalism; for the current owners of IPRs who would see their income effected; and in the financial support required for some sort of global mechanism to positively manage any new system. But,

armed with the vocabulary of rights in property and with a significant international organisation to point to, impoverished countries and labourers can now ask from within the liberal orientation how and why the benefits of open trade often appear so elusive... Thus the vocabulary of IPRs may provide a means for halting, slowing, or retarding cultural infringements and cultural appropriations by the industrialised economies from the developing world (Burch 1995: 227/228).

In this sense, the language of TRIPs and the historic recognition of the public realm in the history of intellectual property may open up the possibility for a political realignment within the current settlement. The first step in any such political process would be for the public realm to be re-valued as a political priority, to justify limitations to private rights, and to recode the remaining rights more as privileges (as they were at the birth of intellectual property). James Boyle has suggested that this programme could be achieved in a similar manner to the Green movement's re-valorisation of the natural environment.

Environmentalism of the net and a new politics of knowledge

James Boyle's important argument is predicated on the recognition that a public realm of knowledge is being curtailed and degraded in various ways through the machinations of the global information society. To develop a politics of intellectual property that might start to address this problem, Boyle looks for inspiration to another movement which reacted to the degradation of a public realm: environmentalism. He notes the environmental movement was deeply influenced by two powerful perspectives: ecology and welfare economics. It drew from ecology the recognition of complex and unpredictable connections between living things in the real world, and from welfare economics the recognition that markets frequently (and quite normally) fail to fully internalise the costs of property use. Crucially, these ideas were not developed in the mainstream of political discourse but on the margins and then popularised. A similar position may currently obtain in the nascent global politics of intellectual property, though at present 'we have no politics of intellectual property in the way that we have a politics of the environment' (Boyle 1997: 89). This is a problem as in 'terms of ideology and rhetorical structure, no less than practical economic effect, intellectual property is the legal form of the information age' (Boyle 1997: 90). There are many crucial areas where IPRs have a profound effect, yet they are still treated as arcane almost non-political legal instruments.

Decisions are currently made on behalf of a small group of intellectual property owners whose perception of costs is

linked to the narrow issue of individualised innovation and reward. Though information flows can be economically modelled there is little real public awareness of the interconnectivity of various types and flows of knowledge or of the way they work together to bring about effects both nationally and globally. While this brings together a number of disciplines in the social sciences (for instance, the sociology of knowledge, social psychology, information economics, philosophy), the overall complex knowledge environment is incompletely understood. A similar political effort that produced a change in the politics of natural resources and the environment could perhaps shift the conception of the knowledge environment to establish a significant role for a broad view of global social utility. The knowledge commons could be established as a global resource *not* one that should, or needs to be, carved up for individual gain. In this sense Boyle suggests the politics of intellectual property is in a similar stage of (under)development as the environmental movement was in the late 1950s or early 1960s. Despite flurries of interest and outrage at specific environmental problems or genetic issues, two things are notably lacking:

The first is a theoretical framework, a set of analytical tools with which the issues should be analysed. The second is a perception of common interest among apparently disparate groups, a common interest which cuts across traditional oppositions (Boyle 1997: 108)

It is here that the frameworks of ecology and welfare economics did the work of constructing a politics of the environment, revealing some disturbing conclusions on which a popular movement could build.

Therefore, in much the same way that the environmental movement in one sense ‘invented’ the environment, a politics of intellectual property needs to (re)invent the public domain of knowledge; to re-embed individuals in the socialised body of knowledge. As Boyle notes, the

structure of our property rights discourse tends to undervalue the public domain, by failing to make actors and society as a whole internalise the losses caused by the extension and exercise of intellectual property rights. The fundamental aporia in economic analysis of information issues, the source-blindness of an ‘original author’ centred model of property rights, and the political blindness to the importance of the public domain as a whole... all come together to make the public domain disappear, first in concept and then, increasingly, in reality (Boyle 1997: 111/112).

By individualising creation, by disembedding it from the social milieu from which all knowledge is drawn, IPRs deny the importance of the public realm, and by doing so reward only a small group of rights holders rather than the carriers of social knowledge. Indeed, use in the public domain is considerably constricted by the individualisation of knowledge ownership.

However, as Harlan Onsrud points out (in his more limited discussion of a knowledge commons for publicly funded information and knowledge) there is considerable difficulty trying to put an economic cost to such constrictions. This analogous to the problems of social cost accounting encountered by the environmental movement when trying to establish the economic costs of environmental problems. Nevertheless,

a full cost accounting of the effects of actions that might diminish or despoil a commons remains one of the most powerful tools for protecting the commons [because] if there is no cost in allowing an information commons to be destroyed, the rational business or governmental decision-maker will allow this to happen (Onsrud 1998: 151/2).

In this sense, one of the first steps an ‘environmentalism of the net’ must take is to try and establish in political debates the extent and seriousness of this cost. But like the environmental movement, there are different levels of commitments that may be adopted. Joseph Stiglitz (until recently at the World Bank) has argued for a less overarching programme, which *does* recognise some of the problems but limits the actions to the areas of ‘basic research and many other *fundamental* forms of knowledge’:

Knowledge is a public good requiring public support at the global level. Current arrangements *can* be made to work effectively, but if they are to succeed we must be aware of the dangers and pitfalls. Some countries may try to free ride on others; they may try to capture more of the returns that are available from the use of the global knowledge commons; they may see their self-interest enhanced more by taking out of the global knowledge commons than contributing to it, *in supporting research to design patentable applications rather than supporting basic research.*

The efficient production and equitable use of global knowledge require collective action. The challenge facing the international community is whether we can make our current system of voluntary, co-operative governance work in the collective interest of all (Stiglitz 1999: 320/1, emphasis added)

Thus, those who have the audacity to use the knowledge commons to produce patentable innovations without funding

basic research (which might be taken to typify the innovation efforts of newly industrialising, and developing countries) are the threat to the knowledge commons, not the bio-pirates or the multinational corporations who own important patents derived from their use of the commons.

The agenda of the global knowledge commons is therefore already being contested and is amenable to dilution and capture even before the movement has got under way. For Richard Falk this is the danger of ‘normative cooption’ of the idea of a ‘common heritage of mankind’ (such as a global knowledge commons) and is illustrative of the problems when ‘global civil society is relatively passive and global market forces are mobilised in defence of [sectional] interests’ (Falk 2000: 327). If nothing else this should reveal the perceived threat such a movement might represent to the knowledge owners. Their concern to defend and consolidate the role of IPRs in the information society (stretching from genetic resources through to industrial information use) represents a triumph for the ‘anti-commons’, and as such is a reversal of the problem Hardin’s original argument addressed (Aoki 1999). In the anti-commons, too many have the right to exclude from use (in the commons no-one has this right) and this leads to a problem of under-utilisation of the resource, in this case knowledge (rather than its over use and depletion). And where costs of cross licensing are bid up (or even, as in the case of radio technology prior to 1914, where two competitors refuse to licence each other complementary innovations), innovation and social benefit will decline. Thus, by responding to a largely fictional problem (the ‘tragedy of the commons’) the intellectual property regime has engendered its own ‘tragedy’.

In the earlier part of this paper I briefly revisited the sorts of justifications that have been mobilised by knowledge owners to establish the justice of their ownership of knowledge and information resources. Claims to justice, suggests Michael Walzer, are a combination of three distributive principles, variously weighted by different social groups: free exchange; desert; and need (Walzer 1983: 21-26). In an earlier analysis of social justice David Miller regarded the elements as rights, deserts and needs (Miller 1976: 17-153). Whatever the arguments about social justice overall, the way these elements have appeared in discussions of intellectual property is instructive. The notions of free exchange and desert are often appealed to in the justifications of intellectual property through arguments for alienation of property and the Lockean schema of reward for effort, while the idea of rights is a central aspect of both Lockean and Hegelian schemes. However, the only need that appears in these debates is the need for ‘efficiency’ mobilised in the economic or pragmatic justification. The idea that the use of intellectual property might be based on the discovery of social needs (as opposed to overall efficiency) is much less developed. Indeed in many ways this is contrary to the strong Lockean story frequently told about IPRs. However, this does not necessarily contradict social justice. If Walzer is correct and ‘we do justice to actual men and women by respecting their particular [cultural] creations’ (Walzer 1983: 314), then one of the reasons that the justificatory schema of intellectual property remain relatively robust is that they appear to mobilise a common understanding of justice: to you the results of your creative activity. But if the ethical landscape is enlarged beyond a recognition of individualised rights, then intellectual property law lacks the language (and conceptual equipment) to respond (Sherman and Bently 1998). Indeed, any recognition of the justice of non-individualised interests is rendered invisible, or merely residual after the more important (owners’) interests have been dealt with.

An important slippage has further compromised this logic of social justice: it is not only individuals themselves who can claim rights to intellectual property but also other bodies the laws of most countries recognise as individuals; companies (May 2000a: 172-178). Thus, justificatory schemata legitimated and predicated on the individual’s rights to protection are reinscribed as rights for collective, profit driven organisations.^[5] While the need to distribute useful ideas has always been recognised in patent law through their term-limited character (at the end of the term of protection the knowledge enters the public domain), the period of protection has been robustly defended by powerful knowledge utilising companies. Indeed while patents are (‘only’) protected for a minimum twenty years (set by the TRIPs agreement), copyrights are protected for much longer, one of the reasons many software companies now seek protection for their innovations not as tools but as a form of written composition. Furthermore, the notion that certain aspects of important knowledge should remain outside the system of intellectual property has been eroded and compromised by the recognition of genetic-patents which do not fulfil the formal and long-standing criteria of patentability. The underlying difficulty is the manner in which ‘needs’ are identified, and more importantly, whose needs are given priority where they come into conflict. Thus, the central problem is how a need for knowledge is defined, and whether this can be accommodated within the current intellectual property regime.^[6] Again as Walzer notes, to ‘argue against dominance and its accompanying inequalities, it is only necessary to attend to the goods at

stake and *to the shared understanding of these goods*' (Walzer 1983: 320 emphasis added). Which is to say the politics of the distribution of intellectual property must, and will be, primarily concerned with defining such property.

The problem for a putative politics of knowledge in the information age is that the type of property that has become normalised is private property. An important aspect of an environmentalism of the net is to re-open this question and present alternatives to the dominant paradigm of property ownership. This will not be easy, but neither is it without precedent: as Boyle suggests such a campaign can draw sustenance and inspiration from the environmental movement, but it can also draw some useful analysis from elsewhere. While, as I have already stressed, there are problems with arguing from a direct metaphorical link between material and intellectual products vis-à-vis property, at least as regards ways of dealing with public goods problems, such a link may prove illuminating. Carol Rose argues that there are two clear historical exceptions to the overall preference for private property relating to 'properties' that are inherently public (Rose 1986 [1994]). Firstly, inherently public property is often recognised where a resource's boundless character is clearly evident: the costs of privatisation (most obviously the costs of policing exclusion) outweigh any benefits gained through resource management (the air and the oceans are relatively uncontentious examples). However, in more problematic cases (roads, for instance), Rose argues that a general presumption of social benefit of interaction (often related to commerce) is often also asserted. Secondly, where market failure is evident, publicness is often claimed. This is particularly cogent where the public interest has previously not been organised, and remains fragmented as regards use of the resource. Without a corporate representative, market interactions do not sufficiently recognise individualised public interests: 'many persons use or would like to use some portion of a given resource - air, for example - but they are too numerous and their given stakes are too small to express their preferences through market transactions' (Rose 1986 [1994]: 109). In the past, governments have acted as a corporate interest and provided (or regulated) the public provision of such resources.

Keith Aoki (1999) suggests an argument for public goods based on their boundlessness and market failures as regards individual use may be a way forward in thinking about the global knowledge commons. Certainly, if withholding knowledge and information precludes certain activities, and individuals are unable to enumerate their interests through the market this seems to make sense. However, currently there seem to me to be two problems which though usefully illuminated by this approach, remain problematic for establishing an environmentalism of the net. Firstly, the history of IPRs has already recognised these public goods related issues and has encapsulated them in the term limits which make any intellectual property essentially temporary. The problem for information society is not so much the lack of balance between private and public rights over knowledge, but rather that the acceleration (prompted by scientific, technological and organisational advances) of innovation has disturbed a previously legitimate balance. By leaving term limits where they are in a period of accelerating innovation, the current regime of protection for intellectual property has essentially extended and expanded the advantages for owners. Thus, we need to historicise the legal methods of dealing with property in knowledge to reveal that while intellectual property is currently once again being contested this is by no means the first time that amendments to the regime have been required, and negotiated (Sell and May 2001 [forthcoming]). Secondly, and perhaps more fundamentally, if we are to suggest that there is a need for a corporate body to represent the global public interest in these public goods, as implied above, then where might such authority be vested, and how would it become accountable? In this sense the discussions of the global knowledge commons become one facet of a much larger problem, that of global governance and democracy.

Intellectual property therefore is not merely some arcane technical legal issue; the emergence of information society has made information and knowledge an important area of political conflict. And it is this rise in its importance that make the comparison with environmental politics apposite. While some might argue that the problems of the environment are much more serious than the shortcomings of IPRs, like Boyle, I would suggest that actually in an information society there is no more central issue than the ownership and availability of knowledge resources. As this becomes increasingly recognised, the effects of the mal-distribution of information and knowledge will become politically sensitive. It is likely that as the emerging information society affects more and more aspects of our lives, the shortcomings of intellectual property will become increasingly apparent. As Tim Hubbard from the Wellcome Trust puts it:

[the patenting of genes] is like fishing with dynamite. You catch a lot of fish, but you destroy the environment for everyone else (quoted in Morgan 2000).

When these effects start to become more explicit, we can expect the justificatory schemata I have explored will become more widely promulgated as the 'common-sense' of the political economy of information and knowledge, to neutralise

political responses. A political effort will be required to organise against this narrowing of the agenda, and environmentalism offers a good model from which to initially develop a grass-roots politics of intellectual property. Only by revaluing the public domain, only by establishing and legitimising the global knowledge commons can the profound inequalities that seem possible in the information age be avoided.

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[2] Article 53(a) of the European Patent Convention excludes from patentability any invention where 'the publication or exploitation of which is contrary to morality or ordre public' (Crespi 2000: 162).

[3] Copyright has also been used to halt the dissemination of results unfavourable to the funders of research, where they claim ownership of the results rather than the scientists themselves (May 2000a: 111).

[4] On the other hand:

Of about 31,000 people who connected to [the Gnutella Internet music file-sharing] system during the survey period [of 24 hours], 70% offered no files to download [in return for those they downloaded themselves]. And those who did share their collections [of CDs] did not contribute evenly. A Mere 20% provided 98% of the material. Indeed the most generous 1% served up about 40% of it (Economist 2000a).

Perhaps the gift economy is a little less public spirited than its promoters suppose?

[5] Such an assumption of individuality is not total. Companies resist legal individuality where it might prove costly, perhaps most obviously where the death of workers is concerned. Suddenly the responsibility to which an individual might be held, is regarded as impossible to enact.

[6] In his parallel analysis Robert Ostergard (1999) has argued that one way forward is to try and rethink how intellectual property is regarded as a human right. Currently the Universal Declaration of Human Rights treats all intellectual property the same, however Ostergard argues for the need to recognise that intellectual property is graded according to a hierarchy of needs dependent on context, and this context should be fully included in the consideration of the needs for (protected) knowledge. This explicitly draws from the work of Amartya Sen (1982) regarding entitlements and lack of resources and while I have not considered this approach here it has a resonance with the environmentalism laid out above.