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Ecosystem Services and Property Rights

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The failure of markets to achieve sustainable throughput, just distribution and efficient allocation

Free markets based on private property rights are the dominant form of resource allocation in the much of the world today. Markets use the price mechanism to balance what is possible with what is desirable. When functioning properly, market prices reflect resource scarcity, and create incentives to use scarce resources more efficiently or develop substitutes as they become scarce. Many economists claim therefore that we will never run out of resources (Solow 1974; Simon 1996). Markets theoretically reward factors of production such as labor, capital and natural resources according to their marginal contribution to market value, which in principle leads to a just distribution of income. Markets also use the price mechanism to efficiently allocate resources towards the most valuable products, then ration those products to the consumers who value them the most, maximizing value on both the production and consumption sides of the equation. Since the dawn of the modern market economy in the 18th century, society has seen unprecedented increases in consumption levels, life expectancy, and material well-being. In the last century alone, per capita consumption, as measured by Gross World Product, has increased nine fold, even as the human population has increased four fold (Daly and Farley 2010).

This economic growth however has not occurred in an empty void. All economic production relies on raw materials from nature and requires energy. Many of the raw materials consumed alternatively serve as the structural building blocks of ecosystems, and when we remove these building blocks, we degrade the ecosystems and their capacity to generate life-sustaining services. The energy used to extract and transform ecosystem structure is primarily fossil fuels, which upon use are immediately converted into pollutants that further degrade the capacity of ecosystems to generate vital services. While the market economy has dramatically increased the supply of market goods and services, it has in the process correspondingly decreased the supply of ecosystem goods and services, many of which cannot be privately owned, and therefore do not fit neatly into the market economy.

Society's most pressing challenge is no longer the sufficient production of economic products. We now face two greater challenges: the sufficient production of ecosystem services required to sustain humans and all other species, and the just distribution of all resources, both natural and human-made. Private property rights and markets are unfortunately ill-suited to these tasks. To solve these new challenges, society must design new economic institutions based on new forms of property rights. Sustainability requires inalienable rights for future generations to healthy ecosystems capable of generating continual flows of vital ecosystem goods and services. Justice

requires fair distribution of property rights to the wealth created by nature and society as a whole.

This chapter explains why private property rights will not ensure ecological sustainability, just distribution or efficient allocation, and how various forms of common property rights can help do so. This does not mean that private property rights are not extremely effective for allocating certain types of resources, but rather that we cannot rely solely on private property and markets to solve all problems at all times. Creating a sustainable and desirable future requires that we find the right balance between private property and community property.

Market failures with scarce resources: overuse, under-provision and unearned income

Many of the resources most essential to human welfare are “non-excludable”. This means that it is difficult or impossible to exclude people from benefiting from these resources and property rights either do not exist or are unenforced. Examples include oceanic fisheries (particularly those beyond the economic exclusion zone), timber from unprotected forests, and numerous ecosystem services, including the waste absorption capacity for unregulated pollutants (e.g. nitrogen, carbon dioxide, and phosphorus). While it is possible to create property rights that ration access to some non-excludable resources, there is no practical way to create excludable property rights to ecosystem services such as climate regulation, flood and drought regulation, pollination, and so on. Degradation of these services is generally the unintended but inevitable consequence of economic activities.

In the absence of property rights there is open access to resources—anyone who wants may use them whether or not they pay. There is therefore no price signal to ration demand among potential users or provide an incentive to increase supply or develop substitutes. Individual users will overexploit or under-provide the resource, imposing costs on others, which is unsustainable, unjust and inefficient. Private property rights systematically favor the conversion of ecosystem structure into market products over its conservation to provide non-priced and arguably priceless ecosystem services, regardless of the relative contributions of the two to human welfare. The incentives are to privatize benefits and socialize costs.

Furthermore, prices are determined by the interaction of supply and demand. The supply of non-renewable resources such as oil inevitably declines over time, while growing populations and economies increase demand. This drives up prices, providing unearned profits for whoever owns these resources. New technologies also increase the value of land, due to its role as an essential input into all production (Gaffney 2008). The supply of land is fixed, so any increase in demand results in an increase in price. Land and resource owners therefore automatically grow wealthier independent from any productive activities. Such unearned income is known as rent. This is particularly true for essential resources with few or no suitable substitutes, such as fossil fuels or water. Such resources exhibit inelastic demand: a 1% decrease in supply leads to a greater than 1% increase in price, so the total value (price times quantity) of the resource rises with increasing scarcity.

Theoretically, higher prices will decrease the quantity demanded of a resource and spur the development of substitutes. However, increased current period demand for both renewables and non-renewables can be met by increased extraction of existing resource stocks, even though this reduces the capacity of ecosystems to regenerate raw materials

and provide essential ecosystem services in the future. Current period scarcity is alleviated at the cost of far greater scarcity in future periods, but the demand for raw materials by future generations cannot be expressed in today's markets and is largely ignored (Georgescu-Roegen 1971). Stock depletion will reduce rent in the current period, but at the cost of greater scarcity and even higher rent in the future. In short, economic growth ensures decreasing supply and/or increasing demand, but prices often fail to signal the growing scarcity and trigger an appropriate response. When prices do signal growing scarcity, then the resource owner captures economic rent.

Even where price-rationing functions as intended however, it does not guarantee socially desirable resource use. The market mechanism weights preference by purchasing power, awarding access to those willing to pay the most for a resource rather than those who benefit the most from its use. For example, in a water scarce country with highly unequal incomes, price rationing might award drinking water to wealthy individuals for flushing their toilets, while the poor drink from rivers into which those toilets are flushed. The price mechanism serves only to maximize monetary value, not necessarily total human welfare. Purchasing power is largely a function of the existing distribution of resources created by nature and society as a whole. The more just the distribution of resources, the more likely that market price rationing will maximize human welfare in addition to monetary values.

Market failures with non-scarce resources: inadequate provision and consumption of key resources and essential technologies

All *scarce* resources are *rival*, meaning that use by one person leaves less of the resource (in quality or quantity) for others to use. Rivalry is a physical characteristic unaffected by policy. Many resources, however, are non-rival, which means that use by one person does not leave less for others to use. When this is true there is no competition for use and the resource is not scarce in an economic sense, even if total supply is inadequate. Examples include streetlights, many different ecosystem services (e.g. climate stability, flood regulation, scenic beauty), and information. Price rationing in this case reduces use and hence value to society without affecting quantity, which is inefficient. For example, if someone develops a cheap, clean solar energy technology then patents it (which makes it excludable), it can be sold at a price. A positive price will reduce use, leading to less substitution away from competing energy sources, such as coal, and society as a whole suffers. Markets will only provide non-rival resources if they are made excludable and can be sold at a price, but this creates artificial scarcity. Paradoxically, the value of non-rival resources to society is maximized at a price of zero, but at that price markets will not provide it (Kubiszewski, Farley et al. 2010).

Most countries nonetheless promote private property rights for information to stimulate private sector development of new technologies. The main factor of production in producing new information is existing information, and there is growing evidence that excessive patents are actually slowing the rate of increase of knowledge rather than speeding it (Heller 1998; Heller and Eisenberg 1998; Paul 2005; Runge and Defrancesco 2006). Furthermore, the costs of R&D are often too high for a single firm to bear, and it is very difficult to prevent other firms from copying the technology for free once it has been developed. This deters firms from investing in R&D (Arrow 1962; Avato and Coony 2008). The energy sector invests only .03% of sales in R&D (Coy 2010). Finally, there is no inherent market incentive to create technologies whose primary purpose is to

provide or protect non-excludable resources (Avato and Coony 2008; Kubiszewski, Farley et al. 2010). Though ‘green’ technologies are likely to play an important role in solving society’s most pressing problems, markets may be an ineffective way to create them.

The Promise of the Commons

The solution to these problems lies with common or public ownership. The basic idea behind common property rights is that resources created by nature or society as whole should belong to all of us, including future generations. The misleadingly labeled ‘tragedy of the commons’ (Hardin 1968) results from no ownership or open access to resources, not common ownership. Abundant research shows that resources owned in common can be effectively managed through collective institutions that assure cooperative compliance with established rules (Feeny, Berkes, McCay and Acheson, 1990; Berkes, ed. 1989, Ostrom, 1990).

When a resource is rival but non-excludable, it can be “propertized” (which is to say, made excludable) to prevent over-use (Barnes 2006). Governments—or in the case of global resources such as atmospheric waste absorption capacity or oceanic fisheries, a coalition of global governments—are generally required to create and enforce property rights. The public sector must cap resource use at rates less than or equal to renewal rates, which is compatible with inalienable property rights for future generations. Since the resources under discussion were created by nature and enforcement of property rights requires the cooperative efforts of society as a whole, rights to the resource should also belong to society as a whole. Individuals who wish to use the resource for private gain must compensate society for the right to do so. The basic idea is a cap and auction scheme, in which the revenue is shared equally among all members of society, or else invested for the common good (Barnes et al. 2008). Preventing the re-sale of the temporary use-rights would reduce the potential for speculation and private capture of rent. Under common ownership, both costs and benefits accrue to society as whole, and the two are likely to be brought into balance. Taxes on waste emissions and resource extraction can serve the same purpose as a cap and auction system.

When a resource is non-rival, excludable property rights are inappropriate, but lack of property rights eliminates private sector incentives to provide the resource. The solution is common investment and common use. The commons sector must invest in the provision of non-rival ecosystem services and in green technologies that help provide and protect such services. Everyone would be free to use the non-rival ecosystem services, but not to degrade the ecosystem structure that sustains them. Resources for investing in non-rival resources can be obtained from auctioning off access to rival resources. For example, society could auction off the right to greenhouse gas absorption capacity then invest the revenue in carbon-free energy technologies.

When a resource is privately owned but generates economic rent, or is used in a manner that socializes costs and privatizes benefits, taxation can achieve the same goals as common ownership. For example, when oil or land prices increase due to growing demand, private owners receive windfall profits that can be taxed away. Such taxes deter speculation, bubbles and busts, and the economic instability they cause. Taxes can also be imposed on land conversion or resource extraction that imposes costs on others, for

example by degrading ecosystem services. In both cases, such taxes can replace taxes on productive activities, such as labor. The principles behind this are “tax what you take, not what you make” and “tax bads, not goods”.

In principle, the public sector should be protecting our common resources. However, in many countries the private sector has too much influence on the political process. When governments have privatized unowned resources, they have often turned those resources over to the private sector free of charge. Not only do governments frequently fail to capture rent, they actively turn it over to the private sector. Society should therefore create a commons sector that has an explicit, legally binding mandate to manage the wealth of nature and the cooperatively created wealth of society for the common good. We require a commons sector to ensure sustainability and a just distribution of resources. Once these two goals have been achieved, the market will be far more effective in its role of allocating scarce resources towards the products of highest value, then allocating those products towards the individuals that value them the most.

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