nature and knowledge:

sustaining our commonwealth

Herman Daly

Let's look at the maintenance and proper management of our commonwealth. By commonwealth I mean that wealth which no one has made, or that wealth which practically everyone has made. So it's either nature—nobody made it, we all inherited it—or knowledge—everybody contributed to making it, but everyone's contribution is very small in relation to the aggregate total.

By sustaining, I don't mean preserving inviolate; I mean using, without using up. Using with maintenance and replenishment is an important idea in economics. It's the very basis of the concept of income, because income is the maximum that you can consume while maintaining capital intact.

In managing and dealing with the commonwealth of nature, our big problem is that we tend to treat the truly scarce as if it were non-scarce. The opposite problem arises in the commonwealth of knowledge, where we tend to treat what is truly non-scarce as if it were.

Clarifying Scarcity

There are two sets of distinctions one can have with goods, and they make four cross-classifications. Goods can be either rival or non-rival, and they can be either excludable or non-excludable. My shirt, for example, is a rival good because if I'm wearing it, you can't wear it at the same time. The warmth of the sun is non-rival because I can enjoy the warmth of the sun and everyone else can enjoy it at the same time. Rivalness is a physical property that precludes the simultaneous use of goods by more than one person.

Goods are also excludable or non-excludable. That's not a physical concept, that's a legal concept, a question of property. For example, you could wear my shirt tomorrow if I let you, but that's up to me because it's my property. My shirt is both rival and excludable, and that's the case with most market goods. But the warmth of the sun is both non-rival and also non-excludable. We cannot buy and sell solar warmth; we cannot bottle it and charge for it.

So goods which are rival and excludable are market goods. Goods which are non-rival and non-excludable are public goods. That leaves two other categories. Fish in the ocean are an example of goods which are rival and non-excludable. It's rival: if I catch the fish, you can't catch it. But it's also non-excludable: I can't stop you from fishing in the open seas. Rival plus non-excludable gives rise to the famous tragedy of the commons, or the tragedy of open-access resources as it's more accurately called.

Now, the other problematic category is goods which are non-rival and excludable, such as the commonwealth of knowledge. Knowledge is non-rival, but it often is made excludable through intellectual property and patent rights. So those are two difficult categories that create problems. One is the tragedy of the commons, and the other one we could call the tragedy of artificial scarcity.

The Commonwealth of Nature

Natural goods and services that are rival and have so far remained non-excludable should be enclosed in the market in order to avoid unsustainable use. Excludability can take the form of individual property rights or social property rights—what needs to be avoided is open access.

Let's consider a market-based institution for dealing with this broad class of rival, but up to now, non-excludable goods that should become excludable. The so-called cap-and-trade system merits consideration not only for its practical value, but also because of the light it sheds on a fundamental issue of economic theory: the logically separate issues of scale, distribution, and allocation. Neoclassical economics deals mainly with the question of allocation: ninety-five percent with allocation, maybe five percent with distribution, and zero with scale, completely off the radar screen. Allocation is the apportionment of resources among competing uses: how many resources go to produce beans, how many to cars, how many to haircuts. Properly functioning markets allocate resources efficiently, more or less, but the concept of efficient allocation presupposes a given distribution. Distribution is the apportionment of goods and resources among different people: how many resources go to you, how many to somebody else. A good distribution is one that is fair or just - not efficient, but fair. The third issue is scale: the physical size of the economy relative to the ecosystem that sustains it. How many of us are there and how large are the associated matter-energy flows from producing all our stuff, relative to natural cycles and the maintenance of the biosphere.

The cap-and-trade system works like this. Some environmental asset, say fishing rights or the right to emit SO2, have been treated as non-excludable free goods. As economic growth increases the scale of the economy relative to the biosphere, it becomes recognized that these goods are in fact physically rival. The first step is to put a cap—a maximum—on the scale of use of that resource, at a level which is deemed to be environmentally sustainable.

Now setting that cap, deciding what it should be, is not a market decision, but a social and ecological decision. Therefore, the right to extract that resource or emit that waste, up to the cap, becomes a scarce asset. It was a free good; now it has a price. We've created a new valuable asset, so the question is: Who owns it? This also has to be decided politically, outside the market. Ownership of this new asset could be social with yearly quotas to deplete or emit auctioned to the highest bidder and the proceeds entering the public treasury. Or rights could simply be given to the historical private users—a bad idea, I think, but frequently done under the misleading label of *grandfathering*.

The cap-and-trade system is not, as often called, free-market environmentalism. It is really socially constrained market environmentalism. Someone must own the assets before they can be traded in the market, and that is an issue of distribution. Only after the scale question is answered, and then the distribution question can we have market exchange to answer the question of allocation.

Another good policy for managing the commonwealth of nature, is ecological tax reform. This means shifting the tax base away from value-added (income earned by labor and capital) and onto the resource flow from nature. Taxing what we want less of, depletion and pollution, seems to be a better idea than taxing what we want more of, income. Unlike the cap-and-trade system, ecological tax reform would exert only a very indirect and uncertain limit on scale. It would go a long way toward improving allocation and distribution.

With a cap-and-trade system we could prohibit growth in material throughput (resources) and reduce through it as needed.

The Commonwealth of Knowledge

If I use the Pythagorean Theorem, I don't prevent you from using it at the same time. Once knowledge exists, it is non-rival, which means it has a zero opportunity cost. As we know from studying price theory, price is supposed to measure opportunity cost, and if opportunity cost is zero, then price should be zero.

Certainly new knowledge, even though it should be free, does have a cost of production. Sometimes that cost of production is substantial, as with the space program's discovery that there's no life on Mars. On the other hand, a new insight could occur to you while you're lying in bed staring at the ceiling and cost absolutely nothing, as was the case with Renee Descartes' invention of analytic geometry.

Many new discoveries are accidental, or maybe the joy and excitement of research may delight and motivate you to work hard, independent of any material motivation. These things are well known and maybe not so much disputed, but in spite of these facts, the idea has somehow grown up that new knowledge would never be produced or discovered unless some people were paid a great deal of money to provide them with an incentive to undergo the drudgery involved.

Patent monopolies and intellectual property rights are urged as the way to provide an extrinsic reward for knowledge production. The dominant view is that unless knowledge is kept scarce enough to have a significant price, nobody in the market will have an incentive to produce it. But even within that restricted vision, keeping knowledge scarce still makes very little sense, because the main input to the production of new knowledge is existing knowledge. If you keep existing knowledge expensive, that's surely going to slow down the production of new knowledge. Abolishing all intellectual property rights tomorrow is draconian, but I do think we could shorten the time of the monopoly for intellectual property and grant much more stringently in fewer and fewer cases.

In Summary

Managing the commonwealth of nature and knowledge presents us two rather opposite problems and solutions. The commonwealth of nature should be enclosed as property, as much as possible as public property, and administered so as to capture scarcity rents for public revenue. Examples of natural commons include: mining, logging, grazing rights, electromagnetic spectrum, absorptive capacity of the atmosphere, and the orbital locations of satellites. On the other hand, the commonwealth of knowledge should be freed from enclosure as property and treated as the non-rival good that it is.

This is an edited version of Herman Daly's September 2005 speech at The University of Massachusetts' Political Economy Research Institute. Video of the speech is available at: http://www.peri.umass.edu/Daly.282.0.html

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