



*Creating the Nation's first BioPark*

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Letter From the Desk of David Challinor  
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In 1968 Garrett Hardin, a Professor at the University of California, Santa Barbara, wrote an important article entitled "The Tragedy of the Commons." He described the human pressure that existed on communally owned property such as the New England grazing commons of the 17th and 18th centuries. Most villages then had a central area set aside by the local authorities on which townspeople could graze their livestock. The Boston Commons, now a downtown city park, is a relict of this practice. The system worked well until too many people became eligible to graze their livestock on a finite pasture. With no personal investment in the commons itself, the people exploited this system for profit by grazing as many of their animals as possible on the grass while it lasted.

Predictably, when too many herders in the late 18th and 19th century followed this strategy, none flourished and the pasture disappeared. One might hope that people would learn from such experiences, but in the 19th century the crush of human population which we experience today was merely an idea in the mind of Thomas Robert Malthus. This letter will discuss some examples of current human behavior that illustrates that, even now, when everyone is aware of past disasters concerning non-renewable resources, most humans are too greedy and too short-sighted to learn from experience. The tragedy of the commons continues.

A contemporary example is found in the mineral extraction industry. The exploiter's investment is limited to securing the legal rights to extract the relevant mineral, usually by purchase from a national or local governing body, or sometimes in the U.S., from a private landowner. The other major investment is extractive machinery; its cost can be considerable. Since replacement of the extracted mineral requires time periods longer than human civilizations, the miner or oil driller has the incentive to extract as much as he/she can as cheaply as possible. Some states (e.g., Texas) recognize the danger of uncontrolled crude oil pumping and set limits on the daily production of each oil well. A former example of uncontrolled production was the flaring of the then unmarketable natural gas from the oil wells of west Texas in the 1950's. Flaring, incidentally, continues in the Arabian Gulf states today. The consequences of exploiting a non-renewable resource such as oil are predictable; we can reasonably anticipate the end of the petroleum era some time in the next century.



If mineral extraction is a graphic example of depleting non-renewable resources, then global fisheries is an example of the tragedy of the commons for a potentially renewable resource. Fish are a major protein source for humankind, but until recently, with the development of fish farming, it has been impossible to determine individual ownership of this resource. Therefore the pressure is to build ever more efficient fish-catching devices to catch as many marketable fish as possible while the resource lasts.

Clearly no lesson was learned by local fishermen from overfishing the California sardine stock in the 1960's, and shortly thereafter the overfishing of the Peruvian anchoveta. The catch in Peru went from 10 million metric tons/year to zero in less than a decade. Although it was assumed such commercially valuable schooling fish would replenish themselves, neither stock has returned. Scientists do not even know where they went.

On a considerably longer term, the bottom dwelling codfish stock of the North Atlantic has been exploited by Europeans off New England and the Maritime provinces of Canada since before Columbus arrived in the Caribbean. Today the stock is exhausted and the fishery has been shut down by both Canadian and U.S. governments. Taxpayers are now financing government grants to New England fishermen to keep them from defaulting on their fishing boat payments. The idea behind this policy is to insure that these commercial fishermen will be ready to sail again when fish stock replenish themselves. This may be an optimistic assumption, for the apparently defunct fisheries off California and Peru have not come back, and we do not know whether cod and other bottom-dwelling fish such as haddock and hake will ever recover sufficiently to be commercially exploitable.

Until relatively recently the concept of maximum sustained yield (MSY) was popular among many scientists and government fisheries managers concerned with determining allowable catch sizes. This approach has now fallen into disfavor as fish stock sizes could never be measured accurately nor were the conditions for optimal repopulation well enough understood. Even when partial or total fishing bans were enacted by international control bodies, enforcement was virtually impossible and local governments often defied such regulations as happened in the case of whaling moratoria.

If humans lack the ability to foresee the consequences of their actions with regard to renewable and non-renewable resources, then perhaps it might make sense to try to change human behavior to insure efficient harvest of the declining in-shore fisheries around the world. However, as we have learned to our sorrow, it is very difficult to alter human behavior.

Indiscriminate exploitation is not always practiced. For example, in the Chesapeake Bay oysters for many years could only be dredged by sail power as a way to conserve stocks. Even today hand tonging for oysters and clams is required by law as a conservation measure. Sadly the total shellfish stock seems to be inevitably declining in the Bay from factors such as pollution, which have little to do with harvesting techniques.

Another step to conserving fish stock would be to reduce the enormous waste from discarding the by-catch. This term refers to fin and shell fish that are accidentally caught when netting a specific animal. Shrimping is a good example. Shrimp are a luxury commodity, and when trawls are set on an echo-located shoal of shrimp, sometimes as much as half the biomass of each trawl load dumped on deck for sorting consists of by-catch. Shrimp, however, are so valuable relative to the other animals caught that it pays the shrimper to dump the by-catch over the side. Mortality of the discards is very high; shrimp boats are always followed by a hoard of gulls feeding on the rejects. Rather than just nourishing gulls, it should be worth the effort to retain the by-catch and try to create a market for it.

When a luxury crop such as shrimp or oysters are threatened by overharvesting, raising them commercially is often profitable. The nutrient-rich waters of northwestern Spain, for example, are used for raising oysters and mussels, which are grown on vertical lines hung from rafts in those harbors where the water is still clean enough. Mangrove swamps on the Pacific coast of Panama to as far south as Ecuador are being cleared and converted to lagoons to raise certain shrimp species that are adapted to inshore waters. Shrimp and other cold-blooded animals will grow as fast as you can feed them. The problem, however, is that the more food they are given to promote rapid growth, the more nitrogenous waste products are created. The more waste, the greater the risk of disease wiping out the entire crop. Therefore, the solution has been to build shrimp lagoons where the tidal range is great enough to flush the lagoon of waste twice daily. This practice may ameliorate sanitary problems for the shrimp growers, but little thought and almost no research has been done on where the tides carry the waste and what effect it has "downstream."

Besides oysters and shrimp, salmon -- another high priced commodity -- is being increasingly raised commercially. The almost complete ban on commercial salmon fishing in Washington and Oregon, however, will have little effect on the salmon supply in the local fish market because about 80% of the salmon sold in the U.S. today comes from commercially raised fish in Norway and Chile.

There are clearly long-term costs to producing fish crops in such large quantities, but these are generally disregarded in the economics of this industry. Just as the cost of heavily subsidized irrigation projects in our own southwest are now being recognized (see my letter of April 1994), so might it be necessary some time in the future to require waste water treatment processes at the outlets of shrimp lagoons and salmon pens.

The examples of the problems created in harvesting a natural resource such as fish from the commons of the ocean apply equally to the harvesting of trees from our national forests or grass by the flocks of those few migrant pastoralist cultures that still survive. Calls to action generally are heard only when the resource is no longer commercially viable. We can undoubtedly use our resources more efficiently, but such an approach can be achieved only with adequate economic incentives. For example, if irrigation water were priced high enough, it would provide incentives for farmers to install drip irrigation systems, which could cut water use by almost half. Fresh water is clearly more renewable than minerals so that there is little incentive other than economic return to save on such products. Trees are renewable, but most species grow too slowly for investors, which in turn leads to commercial monoculture of fast-growing species.

Is it unrealistic to think that human behavior can change? Hardin's warning of twenty-five years ago is certainly relevant today, but there have been examples where fishing and other extractive industries have changed their operations to conserve a common resource. These changes are most successful when they are directly tied to an economic incentive -- making an alternative resource saving practice pay. Federal and local governments have the power to accomplish such changes by taxes, fines or incentives. Ideally voluntary constraints by commercial exploiters of scarce resources is the best way and perhaps such an approach is not unrealistically utopian. We must keep before us at all times the story of "The tragedy of the Commons."

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