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**From the Selected Works of Chad J McGuire**

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January 11, 2015

# Market Failures and Protecting the Environment

Chad J McGuire



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LOCAL VOICES



**Steam and smoke rise from a coal-burning power plant in Gelsenkirchen, Germany. Without regulations, companies that produce waste will choose to pollute rather than pay for handling the waste and pass the costs onto consumers. Energy companies in particular have avoided a lot of the health risks.** AP PHOTO/MARTIN MEISSNER

*Editor's Note: This is the second in a four-part series on climate change written by UMass Dartmouth associate professor Chad J. McGuire. Part 1 (Jan. 4) focused on sea-level rise and flood insurance. Part 2 looks at public and private costs of protecting the environment. Part 3 discusses environmental policy in relation to the voting public. Part 4 explores the role of economics in environmental protection. Look for them in this space over the coming weeks.*



**CHAD MCGUIRE**

Imagine if you and I want to begin a business that produces a product — we call the product a widget. As part of the production process, we create waste as a byproduct. We have no use for this waste and can generate no income from it (we can't sell it or use it in some other revenue-generating activity). So we want to get rid of the waste. Since our facility sits next to a river, we decide to dump the waste into the river and allow it to move downstream. Problem solved.

Now imagine there are costs associated with that waste. Say, for example, the waste pollutes the water downstream. Downstream users can no longer use the water because it is polluted. Effectively, you and I have externalized the costs of the waste in producing our widgets at the expense of those who use the water downriver. Externalization makes our product cheaper, and thus more competitive, because we don't have to pay for the costs of the waste. Externalizing subsidizes our costs of production: We don't pay for the waste we generate. But the waste does have costs, for those downriver, and likely for others. This is a good example of a market failure. The

price we charge for our widgets does not include the costs of the waste and pollution included in making the product. We are relying on nature to absorb the costs for us. In essence, we are using the environment to subsidize the costs of producing our widgets.

In instances like the example above, government must become involved to "correct" a failure in the market. Using our example, government can pass legislation to prevent us from dumping our waste in the water. In fact, this is what the Clean Water Act, a federal law passed in the 1970s, essentially does: It prevents the discharge of certain "pollutants" into waters of the United States without a permit. The goal of the Clean Water Act is to ensure a minimum quality of the nation's waters. The statute exists in large part because, historically, businesses chose to deal with their waste products by pouring them into nearby waterways, burning them into the air or burying them into the ground.

Were these businesses wrong when they decided to dump, burn or bury their waste? Think about it from their perspective. Without government saying the act is wrong, businesses may have good reasons to try to get rid of waste at little to no cost. Consider that the business does not own the stream or river: These waterways are generally public lands, owned by the government. Further, by dumping, the business does not incur

the cost of the waste: Dumping lowers the costs of production. This means the business can sell its products for less, increasing its profitability. The lower costs can also make the business more competitive, allowing it to lower its price against potential competitors in the market place. Polluting makes sense from this perspective.

But pollution does not make a lot of sense when viewed from a public perspective. Pollution creates social ills that can last for decades and longer. And often the polluter does not bear the responsibility. Instead the costs of the pollution are born by society-at-large. Consider the ongoing PCB problem in New Bedford Harbor or other hazardous waste sites dotting the New England landscape as examples. Those who polluted did so to avoid the costs of the pollution. And they often engaged in these actions a long time ago. Many of these actions remain harmful today. And the harm accrues not only to the environment, but also to us humans who drink the contaminated water, live on contaminated soils or eat contaminated animals.

So while pollution might make sense for the individual or company who benefits from the act, it makes less sense from the perspective of the public good. And it is the public good that is the main concern of government. This is one main reason why government intervenes in environmental issues: It attempts to ensure that private

incentives do not lead to bad outcomes for the public-at-large, both today and tomorrow.

Understanding why government is involved in protecting the environment does not necessarily help us decide the best way for government to be involved. For example, should government pass laws that ban certain activities, like the Clean Water Act bans the dumping of pollution into our waters without a permit? Or should government take a different approach, like creating a tax on certain activities or products to ensure the cost of harm to the environment (through the tax) is included in the price of the activity or product? Both banning legislation and taxing can correct market failures. The banning legislation prevents the activity from occurring, ensuring the environment will not be harmed. A tax places a monetary value on the environmental harm ensuring that value will become part of the price of the product or activity.

Some argue that banning legislation is superior because it protects the environment by prioritizing environmental health. Others argue taxes are more efficient because they allow the marketplace to decide. Bill Nordhaus, an economics professor at Yale University, has been a strong proponent of using taxes on carbon as a way of internalizing the costs of climate change. His recent book, "The Climate Casino," details how a carbon tax can operate as an efficient

way of dealing with carbon. By internalizing the costs of climate change through a tax, clearer tradeoffs can be made between products that use carbon and those that do not. For example, coal is a very cheap way to generate electricity, currently much cheaper than solar or wind electricity generation. However, if the carbon in coal was taxed to reflect its damage to the environment (via climate change), then solar and wind (with low to no carbon inputs) would be more competitive. Rather than banning the use of coal in electricity generation, the tax would allow producers and consumers of electricity to make informed choices.

Whether you agree with government intervention, or with the specific form of government intervention applied, it is a fact that government becomes involved in environmental issues because, to date, we have failed to fully internalize the costs of our actions toward the environment in our market systems. So this is why government becomes involved in the first place, to correct existing and recurring market failures. Knowing this important fact helps us better understand, and judge, environmental laws and policies.

*—Chad J. McGuire is associate professor of Environmental Policy and chairman, Department of Public Policy, University of Massachusetts, Dartmouth.*

LOCAL VOICES

# ‘Where have all the cod gone?’ and the sustainability imperative

By **Brian J. Rothschild**

In "Where Have All the Cod Gone" (New York Times, Jan. 2) history professor W. Jeffrey Bolster claims that the "... recent ban on cod fishing in the Gulf of Maine (GOM) was an important step toward restoration." He thinks that the present low levels of cod in the Gulf of Maine are the "tragic consequence of decision makers' unwillingness to steer a precautionary course in the face of environmental uncertainties" and that "decisions could have been made to exploit fish stocks more sustainably" over the last 150 years. He states "overfishing has been the norm for a very long time."

But Bolster's analysis is an oversimplification and a misunderstanding of this important conservation issue. And in a broader sense, it is symptomatic of how we misunderstand and oversimplify our conservation and sustainability issues, and how this limits our ability to develop efficient and cost-effective solutions.

There is a lot at stake! We need to understand that practical solutions require a reasonably accurate understanding of what we know and what we do not know. Faulty assumptions can easily engender unrecoverable societal costs. If decision makers do not use balanced and reasonably correct

information in the development of conservation policy, we cannot hope to emerge intact from our current sustainability crises.

The state of the Gulf of Maine cod makes an excellent case study concerning the sustainability of our fish resources. So let's ask three critical questions: 1) how reflective is the GOM cod of fisheries management in general; 2) is there a GOM cod stock; and 3) has the decline of the GOM cod really been caused by "massive nets dragged along the bottom that snared every fish in their path"(as stated by Bolster — a point in fact, the efficiency of trawl nets is closer to 30 percent than 100 percent)?

The answer to the first question is that fisheries management in the GOM/Georges Bank is very complex. There are 19 stocks of groundfish. They interact ecologically and in the fishery. For example, it is virtually impossible to catch 2 pounds of species X, without catching 3 pounds of species Y. While we can bemoan the state of GOM cod, how do we respond to the fact that of the 100 thousand tons of fish that could be caught from GOM/Georges Bank, only 30 thousand ton are actually caught. In other words, underfishing wastes 70 thousand tons. It is clear that complaints about overfished GOM cod cannot be

casually transferred to the other stocks.

The answer to our second question is that the term "GOM cod" represents an artifice. The boundaries for cod stocks in the northwest Atlantic were established by international treaty organizations in a more or less ad hoc fashion for statistical reporting purposes. They do not represent boundaries between separate cod populations. Cod tagged in the GOM quasi-statistical area are recovered in the Georges Bank quasi-statistical area and cod tagged in the latter are recovered on Browns Bank in Canadian waters. This means that the cod that happen to be swimming in the GOM at any particular time are not unique to the GOM. What is important here is not that the GOM cod might be somewhere else. The point is that the calculations of cod abundance and mortality rates that are used to set catch limits in the GOM, or on Georges Bank, are bound to be in error, since they are made on the assumption that cod are confined to these statistical areas when in fact, they are not.

The answer to our third question is that nets that are too massive or boats that are too efficient have not caused the decline in GOM cod. The effects of fishing on fish stocks depend on how many fish are captured, not on the size of the boat, with or without GPS, or

the efficiency of the gear.

So now we can ask the bigger question: Have too many cod been taken in the GOM? Is the decline in cod in the GOM the result of overfishing?

Let's begin with looking at an instructive history of Canada's northern cod, which inhabits the shores of Newfoundland, and was at one point, one of the biggest cod stocks (about 3 million tons) in the world. In 1985, the northern cod began to disappear. Its subsequent precipitous collapse was attributed to overfishing and as a result, the Canadian government placed a moratorium on cod fishing that created tremendous personal hardships and dislocation in the Newfoundland fishing industry.

However, there were many signs that the collapse of the northern cod over the period 1985-1990 had nothing to do with overfishing. During this period the growth rate of individual fish declined by about 50 percent. The geographic range of the cod contracted substantially. The mortality rate of the population quadrupled. The fish became noticeably skinnier, a possible sign of malnutrition. There were some records of changes in their food. And in the early 1980s, oceanographic conditions were unusual, with huge slugs of cold fresh water overlaying otherwise oceanic

productive areas.

So let's return to the so-called GOM cod. Could the stock have declined for reasons other than overfishing? We really do not know. But we can trace similarities with the northern cod. The geographic distribution of cod in the GOM has contracted. The growth rate of individual fish has been declining for the last 10 years. The natural mortality rate of the population appears to have at least doubled.

We also know that the cod on Georges Bank (most likely mixed with GOM migrants) has been declining for the past 10 years. There is evidence that individual cod there are also becoming skinnier. Estimates of mortality have increased substantially, but these estimates are so high that further study is needed to determine why: Are they correct or statistical artifices?

So what was the fate of the northern cod? If overfishing was the cause of their decline, we could expect the cessation of fishing would allow the northern cod to return to their former abundance. They have not, now 25 years hence. While there have been some increases in abundance, it is fair to say that the stock has not recovered, even under substantially reduced fishing.

It might be argued that if the Canadian government had not issued the moratorium, the jobs and livelihoods lost as a consequence would have been saved, for a time, allowing families and communities more time to adjust.

So, one thing becomes clear. Overly simplistic conclusions on environmental issues can mislead decision makers who are trying to engage in sustainable policies. The press needs to better inform the public on the dividing line between what we know and what we do not know in response to our current sustainability imperatives. In the case of our fish stocks and the families and communities that depend of them, the type of assertions made by Bolster give the public and decision makers a distorted view of the interactions between fishing and fish populations. If we are to develop efficient public policy for sustainable resource use, then we need to understand the boundary between what we know and what we do not know.

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