REPORT OF THE WORKING GROUP ON ECONOMIC ASPECTS OF MARINE DEBRIS

(Kenneth E. McConnell, Chair)

The problem of marine debris is a classic example of markets failing to allocate resources efficiently. When firms and individuals use materials which escape into the marine environment, they impose costs on others. These costs--external costs, as they are known to economists--may be nonmarket, as in the aesthetic degradation of beaches or the killing of noncommercial species of birds and mammals. The external costs may also be incurred by market forces; for example, fishing vessels may have their propellers entangled in abandoned gear. Regardless of who suffers the external cost, its presence indicates a problem which requires some form of public policy to solve.

The marine debris problem is dominated by plastics and other nondegradable materials. Plastics have advantages in production and consumption processes that other materials lack. The replacement of plastics will therefore impose direct or inconvenience costs on consumers and producers. There are three basic ways to reduce marine debris: (1) reduce the loss and disposal of materials that may end up in the marine environment, (2) reduce the production of plastics and other nondegradable materials by using substitutes, and (3) engage in cleanup efforts.

Currently, knowledge of the economic aspects of marine debris is quite limited. This document outlines the basic economic issues and suggests research projects which would help in the process of reducing marine debris. The research projects can also serve as terms of reference for the economic issues of marine debris.

ECONOMIC COSTS

The economic costs of marine debris are the lost economic values that occur when the debris directly influences people and their behavior. These economic costs may be categorized as aesthetic, fouling of gear and vessels, and impact on fish stocks. Knowledge of these costs can help motivate government action. This requires information not only on the physical and biological effects of marine debris but also on the economic costs of these effects. The U.S. Office of Management and Budget, for example, is especially influenced by benefits and costs, not by physical effects. These economic effects require careful research because they do not show up in market transactions.

Aesthetics

Debris makes beaches less attractive. It traps fish and wildlife. Each of these entails an aesthetic loss to some individuals. Currently we

In R. S. Shomura and M. L. Godfrey (editors), Proceedings of the Second International Conference on Marine Debris, 2-7 April 1989, Honolulu, Hawaii. U.S. Dep. Commer., NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFSC-154. 1990.

know practically nothing of the economic costs of either. We recommend two types of studies to help understand the magnitude of the economic costs of marine debris.

A Study of the Economic Costs of Debris on a Specific Set of Beaches

This study would pick a set of beaches and investigate the economic value of lost services that result from different levels of debris on the beach. The techniques for undertaking this research are well known to economists, but they have not been applied to marine debris.

A Study of the Economic Costs Incurred When Some Individuals of a Noncommercial Species (e.g., Birds, Mammals) Are Entangled in Marine Debris

Economists have some experience in estimating the loss in economic value from the threat of extinction of a noncommercial species but little or no experience when only a small number of the species are lost. This study would begin the investigation of this problem.

Fouling of Vessels and Fishing Gear

When vessels and their gear are impaired by contact with marine debris, there are two kinds of costs. The obvious cost is the repair or replacement cost for the damaged gear. Less obvious is the opportunity cost of the vessel and gear when it is not in productive service. Very little is known of this cost in the United States. There is evidence from Japan that the cost to fishing vessels is quite substantial. We suggest the following research.

Investigate the Incidence of Impairment and the Magnitude of Costs for One of the Following Industry Groups: Commercial Fishing, Shipping, or Recreational Boating

This research project would involve a small survey among owners or operators in one of these industry groups for a well-defined region.

Impact on Fish Stocks

The biggest impact of marine debris on fish stocks is ghost fishing. But there is also the possibility that consumers' perception of contamination of fish stocks by marine debris can influence the demand and price of selected fish products.

Ghost fishing

The nature of physical or biological effects of ghost fishing is well known, but the quantitative effects are hard to estimate. Ghost fishing has an economic cost in terms of the lost resource. We suggest gauging this cost with a joint project involving economists and biologists.

The Impact of Perceived Contamination on the Price of and Demand for Fish

A project which collects and describes incidence of market effects from perceived contamination would provide especially convincing evidence on the economic costs of marine debris. We suggest a survey of literature and of knowledgeable people to gather these incidents in the form of a research report. This evidence comes in the form of market price changes induced by perceived contamination.

POLICIES TO REDUCE MARINE DEBRIS

Economics, the study of choices and behavior, is sometimes useful, sometimes essential, in thinking about and designing policies to reduce marine debris. Research on the costs of reducing marine debris needs to investigate the direct costs of adopting different techniques, the demand for the use of nondegradable materials, and the rate of compliance with various regulations among different sectors of the public and industry.

Policies to reduce marine debris require people to change their behavior. Behavior can be changed through a variety of means: education, moral suasion, lobbying, incentives, and direct regulation.

Incentives

In 1987, 12 U.S. senators wrote to the President expressing their concern over the marine debris problem. They urged the study of various methods of reducing debris, including instituting deposits "and other incentives for retention and retrieval of debris." Incentive schemes may be especially cost-effective in controlling debris when education and moral suasion fail. The following projects investigate the use of fees and incentives as part of the solution. These projects are not listed in the order of priority.

Deposits on the Return of Nondegradable Products

The efficiency of deposits on beverage containers as a means of controlling land debris is well documented. This research project would investigate the potential for deposits for the return of plastic marine debris. It should focus on coastal states which have experience with deposit systems.

Fees on the Use of Nondegradable Materials

Business firms and households are good at allocating scarce resources when they pay for them. Fees on plastics would induce substitution of other materials. This project would investigate the feasibility of fees on potential debris in the marine environment.

Incentives at the Production Level

Debris in the marine environment is part of the larger social problem of solid-waste management. The disposal of nondegradables is a crucial component of this problem. Fees on the use of nondegradable raw materials, including plastic pellets, in the production process would guide producers to substitute other materials. Such fees would raise the relative costs of nondegradable materials and make it economically more attractive to develop degradable substitutes and to sponsor research in developing substitutes. This research should investigate the demand for raw materials at the production level and the potential for fees and incentives to spur the development of substitutes including recycled plastic materials.

Compliance

The typical approach to solving environmental problems is: to pass a law to prohibit behavior causing the problem, to devote a small amount of money to enforcing the law, and to engage in education and public awareness campaigns to persuade people to comply. This approach frequently fails, raising demands for more enforcement funds, harsher penalties, and so on. It may be fruitful to investigate alternatives to this traditional approach to compliance.

Investigate Alternatives to Traditional Methods of Compliance

Policies combining punishment and reward which partly subsidize the adoption of techniques to help people comply and impose clear penalties for the absence of compliance are used elsewhere. For example, sewage treatment has been enhanced by Federal subsidies to construct waste treatment plants linked to the requirement that all households hook up. Methods of linking compliance to rules and regulations for handling marine debris can be used to access to other beneficial programs. For example, the registration of boats might be linked to evidence that boats have systems for handling solid wastes. This research program would study compliance programs which include education, incentives, and penalties for a specific portion of the industry. The recreational boating industry is an especially good candidate for study because boating is so widespread and boaters so heterogeneous in attitudes.

Evaluate the Effectiveness of Moral Suasion Programs

Public campaigns to reduce pollution by moral suasion have been attempted for other forms of pollution. A study of these campaigns would help understand their failures, which have been many, and their successes, which have been few. This study should cover different countries and different times.

Onshore Disposal

The new laws require that vessels bring their nondegradable wastes to port. Ports are required to handle the solid waste. Within particular

regions, it may be economically very costly for all ports to handle all of the vessel-borne waste. We suggest the following research project.

Investigate the Economic Gains That Can Accrue to a Particular Region as a Consequence of Consolidating Waste Handling Facilities

Some ports are unable to handle wastes. Other ports may have excess capacity. An economic study of the costs of onshore waste handling would prepare ports for the resource demands and for setting port fees. When the costs differ among ports, there may be incentives to use different ports. Further, there are incentives to dump the trash if fees are based on the trash that is brought ashore.

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