CASE STUDY 8

NONPOINT SOURCE POLLUTION CONTROL IN CALIFORNIA

Situation

Recreational facilities such as marinas and activities such as boating can be sources of dangerous contamination in nearshore waters. Toxic compounds from antifouling paints, batteries, detergents, and sewage are a threat to water quality, living resources, and human health. Management safeguards and other control measures to prevent pollutant runoff could, in the long run, cost less than environmental clean-up costs.

Background

In the Coastal Zone Management Act (CZMA) of 1972, as amended, Congress declared it to be national policy that state coastal management programs must provide for public access to the coasts for recreational purposes. Clearly, boating and adjunct activities and facilities are an important means of public access. The availability of public access facilities and services such as marinas has helped boating to become a major industry in California. More than 650,000 pleasure boats are registered with the state and during 1986, recreational boaters engaged in an estimated 56 million boating-days.

Boater spending supports a wide range of businesses, among them, boat and equipment manufacturing, retailing, and various types of boating services. A 1986 inventory of 5,035 boating businesses throughout California revealed that these businesses had total gross receipts of $2.6 billion, employed 40,000 people, and paid $476 million in payroll. Businesses that support recreational boaters paid over $191 million in state and local taxes during that year. The direct spending by boaters on goods and services stimulates the entire California economy. Including all the other businesses that support the boating industries in California, the

total economic activity traceable to boating in 1986 was more than $6.7 billion.[1] Clearly, marinas and other public access facilities and services are integral to California's economy.

However, when these facilities are poorly planned or managed, they can pose a threat to the health of aquatic systems; they can also introduce other environmental hazards. Because marinas are located at the water's edge, there is often no buffering of the release of pollutants to waterways. Adverse environmental impacts may result from the following sources of pollution associated with marinas and recreational boating:

- Pollutants illegally discharged from boats and fueling stations
- Pollutants transported in stormwater runoff from marina parking lots, roofs, and other surrounding impervious surfaces
- Physical alteration or destruction of wetlands and of shellfish and other bottom communities during the construction of marinas, ramps, and related facilities
- Pollutants generated from boat maintenance activities on land and in the water[2]

Recreational boating and marinas are increasingly popular uses of the California coastal zone. In areas such as San Diego Bay, the growth of recreational boating, along with the growth of coastal development in general, has led to a growing awareness of the need to protect waterways. Normal marina operations such as waste disposal, boat fueling, and boat maintenance and cleaning generate contaminant runoff. Moreover, storage areas for the materials required for these activities are also a source of pollutants. Of special concern are substances such as paint sandings and chippings, waste oil and grease, batteries, fuel, detergents, and sewage that can be toxic to aquatic biota, or degrade water quality and pose a threat to human health.

Historically, point source wastes from shipyards, boatyards and other repair facilities, and marinas were dumped or washed directly into the San Diego Bay. Environmental legislation over the past 20 years has put an end to these practices. However, large sinks of sand blast material and other paint-containing waste are still present in the Bay's sediments. The effects of these sinks on water quality is not known.[3]

Non-point source pollution continues to be a paramount concern as current boat maintenance activities, such as the use of antifouling paints on boat hulls, generate contaminants that can harm the marine environment. These paints that contain chemical pesticides are applied to the hulls of boats to deter the attachment and growth of aquatic organisms — the buildup of such

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[1] D.M. Dornbusch and Company, Inc. 1988. Economic Impact of the Boating Industry in California. Prepared for the California Department of Boating and Waterways.

[2] U.S. Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Polution in Coastal Waters. EPA Document 840-B-92-002, pp:5.2-5.3.

[3] Conway, J.B. and L.P. Locke. 1994. A Final Report on Marine Fouling and Underwater Hull Cleaning in San Diego Bay. Prepared for the California Regional Water Quality Control Board, San Diego Region.

organisms can promote hull corrosion and increase drag.

Biocides from antifouling paints generally enter the marine environment in different ways: (1) through the normal leaching process of paints as they age, and (2) through paint chips abraded from vessels' hulls in the water during underwater hull cleaning. The concern is that the copper-based biocide chemicals released from antifouling paint applied to boat hulls may be deleterious to the marinas' aquatic environment. Because of the poor tidal flushing characteristics of San Diego Bay, copper concentrations can become elevated to levels harmful to aquatic organisms.

Numerous studies have shown that the concentrations of antifouling biocides are highest near marinas and small yacht basins. A recent study assessing the average concentrations of total and dissolved copper in San Diego and Mission Bays found that while ambient copper concentrations appeared to be non-toxic, several marinas did have average dissolved copper concentrations that were above the U.S. EPA's Ambient Water Quality Criteria for saltwater aquatic life.[4]

Another study attempted to measure the deleterious effects (within the water column) of in-water maintenance of boats at recreational marinas. The study revealed that although copper releases can be significant in the immediate vicinity of a boat hull during cleaning, the water rapidly returns to pre-cleaning concentrations. However, the findings were inconclusive as to the extent and degree of dispersal of the contaminant plume and the total load to the Bay from a hull cleaning operation. Other studies have found evidence of elevated levels of copper in the tissues of organisms living in the San Diego Bay. These studies suggest that boat owners should be educated about biofouling processes and antifouling paints so that they can make sound, informed, and environmentally sensitive decisions.

Nonpoint Source Control Solutions

It is important that marina operators such as those in San Diego Bay recognize that there are alternatives to obtaining permits to pollute. They can take steps to control or minimize the entry of polluting substances into marina waters. For the most part, this control can be accomplished with simple preventive measures such as locating service equipment where the risk of spillage is reduced, providing adequate and well-marked disposal facilities, and educating the boating public about the importance of pollution prevention. Benefits of effective pollution prevention to the marina operator may be realized in terms of lower direct pollution control costs. The costs of pollution prevention could well be lower than environmental clean-up costs.

Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states (including Great Lakes states) with approved coastal zone management programs to address nonpoint pollution impacting or threatening coastal waters. States must submit Coastal Nonpoint Pollution Control Programs for approval to both the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA). Requirements for state programs are described in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* and are summarized in a separate fact sheet. Some of the

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[4] McPherson, T.N. and G.B. Peters. 1995. The Effects of Copper-Based Antifouling Paints on Water Quality in Recreational Boat Marinas in San Diego and Mission Bays. Prepared for the California Regional Water Quality Control Board, San Diego Region.

management measures outlined in the guidance include practices related to the best possible siting for marinas, best available design and construction, and appropriate operation and maintenance (e.g., solid waste management, liquid waste management, and petroleum control management). Other management efforts might include staff and boater education programs on all areas of nonpoint source control and best management practices; petroleum station management; improved sewage pumpout systems; and installation of fuel spill controls.

California is currently revising its Nonpoint Source (NPS) Pollution Management Plan pursuant to the 1990 CZARA. For each management measure, a Technical Advisory Committee accepted or modified EPA's management measure as it should be applied to California; for each management measure, the report also addresses applicability, methods of implementation, specific implementors, enforcement mechanisms, triggers of enforcement actions, and the actions that are necessary to begin implementation.

Costs of Compliance

The California Regional Water Quality Control Board, San Diego Region, could choose to implement some of the operations and maintenance management measures outlined in the *1994 Marina and Recreational Boating Technical Committee Report* in an attempt to improve the quality of San Diego Bay. Implementation of these measures, unlike compliance with cleanup and abatement orders by boatyards, is not expected to impose significant costs on marina operators in the area. The cost of providing recreational boating services will likely increase with implementation of management measures affecting the San Diego Bay marinas.

Nonpoint source control requirements have the potential to delay new facility construction and/or business failures of existing marinas. Some of these costs are expected to be passed along to recreational boaters. In addition to costs passed on to boaters by marinas, boaters may incur costs associated with more expensive non-toxic paints (silicone) and hull cleaners who are licensed, insured, approved under best management practices; higher cost boat maintenance (experienced labor, more frequent cleanings, required draping); and higher cost oil-change services which recycle.

Case Table 8.1[5] , though not directly related to the implementation of boat-cleaning management practices, presents some high estimates of the potential costs to San Diego Bay marinas of selected operation and maintenance practices. While operations and maintenance management measures include waste disposal, education and boat-operation practices, this analysis is restricted to solid-waste disposal practices and liquid-waste disposal practices. The specific costs are associated with purchasing a commercial vacuum to collect debris at hull-maintenance sites, providing covered dumpsters for solid-waste collection, and purchasing liquid waste containers for storing and recycling oil, antifreeze, gasoline, diesel fuel, and kerosene.[6]

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[5] U.S. Environmental Protection Agency. 1992. Economic Analysis of Coatal Nonpoint Source Pollution Controls: Marinas. Original estimates have been adjusted for the purposes of this hypothetical case study.

[6] These cost estimates are based on large-scale repair facilities. Boat maintenance at San Diego area marinas is actually small-scale, general upkeep done on individual boats

Case Table 8.1. Costs of Selected Operation and Maintenance Management Practices: High Estimates.

	Liquid Waste Management		Commercial Vacuum		Covered Dumpster	
Marina Number	Capital ($)	Operating ($/yr)	Capital ($)	Operating ($/yr)	Capital ($)	Operating ($/yr)
1	90	112	1,063	19	0	1,620
2	360	174	1.063	93	0	1,620
3	4,080	407	1,063	372	0	7,056
4	4,170	485	1,063	465	0	7,056
5	15,980	1,652	4,252	1,860	0	21,168
6	15,980	1,652	4,252	1,860	0	21,168

Key Assumptions:

1. **Assume one vacuum is needed for every 250 slips of capacity.**
2. **Assume one filter must be replaced annually for every 50 slips of capacity. Each filter costs $93.**
3. **Assume model marina owners pay for dumpster rental and collection.**

Sources: Dickerson, George. Sales Representative for Capital Vacuum, Raleigh, NC. May 13,1992. Personal communication with Julie Duffin, Research Triangle Institute.

Musgrave, John. Sales Representative for Waste Industries, Inc., Durham NC. May 13, 1992. Personal communication with Julie Duffin, Research Triangle Institute.

ROW (Revitalize Our Waterway). 1992. Comments of the Economic Analysis of Coastal Nonpoint Pollution Controls. Marinas. July 11 and August 18.

Benefits of Marina Operations and Management Measures

Numerous benefits are associated with the implementation of nonpoint source marina operations and maintenance management measures. For example, increases in water quality will provide improvements in the integrity of the San Diego Bay environment leading to increased recreational boating and fishing values, aesthetics and nonuse values, and reduced costs for dredging when sediments are less contaminated. The steps in determining the benefits of such control measures include:

1. Determination of the benefit categories which match potential management measures

2. Estimation of the benefits of each management measure in terms of how each measure will affect natural resource parameters. For example, if non-toxic hull cleansing is required, an attempt must be made to determine the linkage between reduction of pollutants such as copper and the improvement of water quality.

3. Determination of how changes in ecological parameters affect human health, recreational enjoyment, and aesthetic appreciation through impacts on market and nonmarket services provided by the Bay. For example, how does an increase in water quality affect the quantity or quality of recreational boating and other uses of San Diego Bay surface water?

4. Translation of these public health, recreational, aesthetic and ecological effects into estimates of monetary values.

In addition, there may be benefits from some best management practices such as the use of underwater hull cleaning. These benefits include increased vessel maneuverability and fuel efficiency as well as the potential for increased paint life with a corresponding decrease in total antifouling chemical discharge.

Exercise

Given the information provided above, develop an economic argument in favor of or against the implementation of boat-cleaning management measures in San Diego Bay marinas.

1. Do you see a role for environmental valuation in the development of your argument? Would it be most appropriately used in a case-by-case (marina-by-marina) implementation decision basis or as an overall policy decision?

2. What natural resources and resource services do you think should be analyzed?

3. What techniques would you recommend in order to determine the values of these resources and services?

4. What are the limitations to the existing methodologies in this case?

5. Boat-cleaning management measures are only one set of management measures and practices recommended in the EPA nonpoint source pollution control guidance. Using the economic techniques described in the seminar, how would you decide whether focusing on operations and maintenance management actions is appropriate?

6. Would other economic approaches outlined in the seminar be of use to others in the decision process?

- Developers
- Local agencies making decisions regarding supporting public investment decisions
- Interest groups
- Public at large
- Federal regulators/decision-makers

How would this information be developed and presented by each group?

How can these tools aid in the developing consensus among the various stakeholders?

7. There are numerous benefits that can be attached to the implementation of nonpoint-source management measures for marina operations and maintenance. These benefits may not be directly incurred by individual marina operators (though some cost savings may be expected), but are more likely to be felt by the public at large. Should those benefits be weighted similarly in your decision process or should one group or another be weighted more heavily? Should the marina operators be compensated for the capital costs that they will incur to implement the management measures?

8. To describe and measure the benefits of these measures, it is necessary to identify linkages between the measures, the resources of the Bay, and the activities and user groups that derive economic value from the Bay. These relationships are complex and a single measure may affect several different resource services at once. Conceptually, what would those linkages look like? What kind of data would you need to collect to analyze those linkages?