

## **Forty Years after the Clean Water Act: A Retrospective Look at the Southern California Coastal Ocean**

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### **EXECUTIVE SUMMARY**

The ocean is a cornerstone of southern California's environment, culture, and economy. Its complex ecosystem features a unique diversity of plants, invertebrates, fish, birds, and marine mammals. Southern California is also home to 21 million people, and its coastal waters serve as a repository for the pollutants produced by human activities. As local and national attitudes changed and concerns about natural resource protection grew through the 1960s, the resulting flurry of environmental legislative activity included passage of the federal Clean Water Act (CWA) in 1972.

Since the CWA became law 40 years ago, tremendous effort has been devoted to managing and monitoring waste discharges and regional conditions in the southern California's coastal ocean. Even so, there has not been an integrated assessment of how ocean conditions have changed over that time period. This report summarizes a collaborative effort to assess historical data, the current status, and ongoing challenges to the integrity of the region's marine environment. By addressing several critical questions about the core CWA goals, it intends both to synthesize knowledge of the early environmental pioneers and to guide those who follow in their footsteps.

### **How Have Pollutant Inputs Changed?**

Pollutant inputs from wastewater treatment plants and industrial facilities have declined markedly over the last 40 years, in large part because these "end-of-pipe" facilities were a primary target of the CWA. Inputs of targeted toxic substances from these sources have decreased more than 95%, despite a doubling in southern California's coastal population. Widely dispersed and much harder to control, pollutant inputs from overland runoff have not seen similar reductions. Controlling pollutants in runoff is now a focal point for water quality management, but more time and additional monitoring are needed to determine the success of these efforts.

### **Is It Safe to Swim?**

Recreational water quality has greatly improved over the last 40 years. This has resulted primarily from improvements in wastewater treatment, relocation of treated wastewater discharges further from shore, and diversion of runoff during dry weather. Visual evidence of sewage, commonplace prior to the CWA, is now rare. Water quality monitoring is frequent and indicates 95% of southern California beaches are safe for swimming during the summer. Recent beach advisories are almost exclusively associated with flowing storm drains or accidental sewage spills.

### **Is It Safe to Eat Fish?**

Contaminant levels in fish tissue have declined as pollutant inputs have decreased. High levels of contaminants such as DDT (a pesticide) and PCBs (a group of industrial chemicals) in fish tissue are now observed mostly in hotspot areas where large quantities of those pollutants were once discharged. In contrast, moderate levels of mercury, which has more diffuse and difficult to manage sources, are still observed in fish throughout southern California coastal waters. As a result, fish consumption advisories

due to mercury, particularly for children and women of childbearing age, can be found along large sections of the Los Angeles and Orange County coastlines.

### **Is the Ecosystem Protected?**

By several measures, the health of southern California coastal ocean ecosystems has improved substantially over the last 40 years. Communities of bottom-dwelling invertebrates living near wastewater outfalls, once severely degraded, have rebounded. Fish communities in these areas have also shown improvement. In addition, fish diseases common in the early 1970s are no longer observed. California brown pelican and bald eagle populations, once endangered by DDT effects, show signs of recovery. Other ecosystem indicators, such as the extent of giant kelp forests and population size of some fish species, remain impacted. These trends are likely related to a combination of factors including habitat loss, natural climatic cycles, and overfishing.

### **What Were the Costs and Benefits?**

Although no formal economic analysis has been performed to calculate total costs and benefits on a regional scale, both financial investments and economic benefits associated with southern California's coastal ocean are substantial. For example, ocean-dependent activities in California generate an estimated \$22 billion annually, over half of which comes from tourism and recreation; however, it is unclear how much of that revenue is linked to water quality improvements. Although it is difficult to estimate total investments in ocean water quality improvement, large wastewater treatment plants in southern California currently spend as much as \$600 million annually. In addition, county flood control agencies spend roughly \$100 to \$350 million each year managing runoff. A thorough cost-benefit analysis is recommended to inform future management directions.

### **What Are the Future Challenges?**

Future water quality management efforts are faced with both technical and financial challenges. While end-of-pipe treatment methods were highly successful in the first 40 years following passage of the CWA, new contaminants, subtle toxicological effects, ocean acidification, pollution-related harmful algal blooms, marine debris, atmospheric deposition, and other emerging issues require novel technology and creative management approaches. Meanwhile, capacity to address both new and lingering issues continues to be constrained by decreased federal funding. Continued cooperation among dischargers, regulators, scientists, and others will be essential to understanding and addressing water quality problems over the next 40 years.

## **Full Text**

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