Exxon Valdez: 25 Years Later

AFTER I WAS CALLED UPON IN 2010, AS DIRECTOR OF THE U.S. GEOLOGICAL SURVEY, TO HELP WITH well control and flow estimation for the Deepwater Horizon (DWH) oil spill, I reviewed what had been learned from the Exxon Valdez (EV) oil spill. Although EV and DWH differed in their spill characteristics and impacts, I suspected that insight gained in the decades since EV could help guide how to best invest research funds targeted for DWH recovery and future oil spill prevention.

The EV oil tanker went aground on Bligh Reef on 24 March 1989, releasing approximately 42 million liters of oil into the pristine Prince William Sound, Alaska. The spill covered at least 1990 km of shoreline. Oil cleanup was hampered by the overall inaccessibility of the region and poor preparedness. Only about 14% of the oil was recovered, with some 15% of the remainder coating rocks and contaminating the sandy soil of the sound and Gulf of Alaska beaches.*

A challenge in measuring the recovery of Prince William Sound from the EV spill was the lack of a pre-spill baseline for the ecosystem. Therefore, in the early days of the DWH, scientists undertook a biological and geological sampling program before any oil hit the shoreline. One recommendation from the experience is that all large marine ecosystems should be routinely surveyed.† Another important lesson from the EV spill is to consider recovery time scales in terms of decades or longer. Trace amounts of oil, degraded to an amount expected after 2 weeks of exposure (not decades), can still be found along the Alaska shoreline;‡ Chronic exposure to such oil may still be elevating the mortality and delaying the recovery of sea otters in Prince William Sound. A corollary of this lesson is that natural variability in ecosystems on decadal time scales will confound attempts to monitor recovery from a spill.

Both spills affected the marine ecosystem at multiple trophic levels. Clearly, both impact assessments and response actions should treat all elements of the habitat as a coupled ecosystem. And yet I recall attending a meeting during DWH in which a wildlife management official claimed, “Your opinion on the use of dispersants depends on whether you are a bird person or a fish person.” My response was, “Don’t the birds eat the fish?” The cleanup also prompted scientists to ask: “How clean is too clean?” Local Alaskan communities wanted the region returned to as close to its pre-spill state as possible. One unfortunate action was an attempt to “steam clean” the shoreline with high-pressure hot water. The unintended effect was to destroy the resident microbial population that could have facilitated metabolic breakdown of the oil. For this reason, officials were cautious in the amount of cleanup during the DWH accident in the fragile Gulf Coast marshes, arguing that trampling marsh grasses in the process of oil recovery would do more harm than good.

Science can not only address oil spills after the fact by guiding actions for response and recovery, but it can also be applied to avoid spills through safety engineering. In a number of industries, accidents have declined through a deliberate consideration of potential failure modes in engineered systems and in their interfaces with humans. Such an analysis is well overdue to prevent oil spills.

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