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—Barry Commoner—

What Price Productivity?

Japan seems a long way from the United States. But the distance is only geographical; the links that are established by industrial technology, the economic forces that govern it, and political factors behind both bring the two countries much closer than they seem. And in its typical way, the factor that reveals this complex set of interactions most clearly is environmental pollution.

Japan is today probably the most highly polluted nation on earth. Japan is, of course, very densely populated and it might be imagined that this is the cause of its intense pollution — that the waste generated by so many people living in such close proximity would be a serious strain on the ecosystem that supports them. But, in fact, most of Japan's pollution problems, and certainly the most serious ones, originate not from the density of its population but from post-World War II changes in its industrial and agricultural production.

In a way, Japan seems ideally situated to avoid pollution problems. Its islands are relatively narrow land masses, and most rivers flow quickly to the sea, where the swift-moving waters that surround the Japanese islands can rapidly dilute waterborne wastes. The country's air is also cleansed by frequent winds. Yet since the end of World War II, Japan has been visited with a modern version of the biblical plagues — a series of different, but uniformly disastrous pollution catastrophes.

The first disaster was the affliction of several hundred people with the Itai-Itai disease (which translates as "ouch-ouch"). It was first described by Dr. Noboru Hagino in 1946, who attributed the disease — which causes extremely painful joints and in its later stages loss of bone calcium, weakness, and eventually death — to cadmium poisoning originating in mine effluents. Despite epidemiological evidence (the victims drank water from a river system that received heavily contaminated mine waste waters) and analytical data (the victim's tissues contained as much as 3,800 ppm of cadmium, as well as considerable zinc and lead), Dr. Hagino's theory was not accepted by Japanese health authorities until 1968. Now, the Itai-Itai victims and environmentalists are locked in a battle with industry and government to place more stringent controls on mine effluents.

Then, in May 1956, Minamata disease struck. The disease is named after its location, Minamata Bay, in the southwest area of Kyushu Island. The initial symptoms are neurological: constriction of visual field, impaired speech, loss of muscular coordination; in its more severe manifestations the disease involves convulsions and, in children, severely retarded mental development and death. According to the most recent estimates, about 10,000 inhabitants of the area have suffered irreversible damage from the disease. It took six years to work out the etiology of the disease — the dissemination of mercury wastes from a petrochemical plant, which, in the form of methyl mercury spread through the food chain, contaminating the fish that are the local population's chief source of protein. More than any other event, the Minamata disaster has aroused public concern over pollution; it has also been documented as a remarkable and moving photographic essay by W. Eugene and Aileen Smith (*Minamata*, Holt, Rinehart and Winston, 1975).

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Next came the Kanemi rice oil disease, named after the commercial product that poisoned, in less than a month in 1968, several thousand people who used it. The causative agent was PCB (polychlorobiphenyl), which had leaked into edible rice oil during the manufacturing process. The disease was, in fact, chloracne, recognized earlier in the U.S., where PCB was first manufactured, as the cause of severe skin eruptions and liver damage among chemical workers and others exposed under occupational conditions. A rice oil by-product used in animal feed concurrently poisoned a million or more chickens in western Japan. PCB production in Japan had increased more than 50-fold between 1954 and 1968, having been used as an insulating fluid in transformers, as a solvent in carbonless duplicating papers, in heat-transfer equipment, and as an ingredient of plastics.

Other events have been less spectacular but equally serious. According to a 1968 study by the Food and Agricultural Organization, Japan uses more agricultural chemicals (largely pesticides) per acre under cultivation than any other country — 10 times larger than the U.S. figure. The pesticide content of human tissues in Japan is correspondingly elevated, again 10 or more times larger than values (in body fat and mother's milk) measured in the U.S. The mercury content of human hair in Japan is several times higher than it is in Western countries; mercury is widely used, not only in industry but as mercurial pesticides.

One reason for the high levels of pesticides is that increasing amounts of them, relative to crop production, must be used as insects develop resistance to the pesticides. For example, in rice paddies, in order to maintain an approximately constant level of insect damage, between 1956 and 1970, the amounts of pesticides applied per acre nearly tripled.

All this is evidence of the super-rapid modernization of Japanese production technology following World War II. The process hardly needs documentation in the U.S., where we have become acutely aware of the competitive force of Japanese optical and electronic equipment, automobiles, and textiles. Japan has far outstripped the world in the rate of investment in new production technologies since World War II. In Japan, capital investment in new production has averaged 35% of the real (that is, corrected for inflation) national output; the next highest figure is 25.8% for West Germany (the U.S. figure is 17.5%).

One reason why Japan and West Germany are able to devote so much of their national output to new, modern production facilities is that they are forbidden by the peace treaties that ended World War II to create armies on the scale to which we, the victors, have become accustomed. The U.S. now devotes about 10% of the national output to military expenditures — resources which, if added to our present rate of investment would bring it up to about 27%, or into the Japan–West Germany class.

The heavy burden of pollution that Japan is now struggling with is the outcome of a great global irony: having lost the war, Japan was forbidden to rearm, at least on the victor's scale; unable to divert resources into this destructive channel, a much larger share of the nation's output could be used to build a modern system of production; by rapidly introducing new production technologies — such as the petrochemical industry that yields pesticides and PCB and uses mercury catalysts to do so — Japan became the world's worst victim of modern technological progress. The belligerents in World War II made peace with each other. But they forgot to make peace with Nature.