

## Pollution and the Society of Japan

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Toshio NOH

## Introduction

It has made such a sudden appearance on the stage, this monster of the late 20th century, pollution of the natural environment, that the concept of pollution is not clearly defined, not to speak of measures to place it under control. We Japanese still remember the days when people talked with some feeling of pride about the black smoke over the sky of Ōsaka, or the busy automobile traffic on the streets of Tōkyō, as symbols of prosperity. But the accumulation of pollution, slow at the beginning, has become very rapid especially in the last decade. The number of complaints against pollution which were accepted by municipal governments reached the large figure of 63,433 in 1970. Thus, when we began to miss, nostalgically, dragonflies in the blue sky on an autumn afternoon, or the loaches and other little fish in wayside brooks of the countryside, already the situation had gone too far, almost to the extent of irrevocability, and the problem is particularly serious in big cities where pollution and human activity are concentrated in relatively small areas. For instance, out of the 63,433 complaints referred to above, 14,208 and 9,348 were accepted in Tōkyō and Ōsaka, respectively (Report of the Prime Minister's Office). Thus, urban pollution has become the most serious problem of Japan today, and *Kōgai* as a symbol of shame has become a topic of nationwide debate. The hurriedly fashioned term *Kōgai* literally means "public damage", which in its implication is close to "environmental contamination", although the concept of *Kōgai* is still vague. Because of its complex nature, it is very urgent for the various fields of science to cooperate in seeking a solution to it. So far, many different fields of science are working separately, and it is the main purpose of this paper to point out and emphasize the necessity for such cooperation.

## Spreading Pollution

Already too many shameful stories of disasters due to pollution of the environment have been announced from Japan to other countries of the world. The most notorious case is the incidence of Minamata disease\*, wherein more than fifty inhabitants of the small city of Minamata, Kumamoto Prefecture, lost their lives and hundreds more lost their sight or were crippled for life, as a result of what was

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\* Two representatives of the victims were sent to the U.N. Environmental Conference in Stockholm in June, 1972.

first thought to be an unaccountable disease. The symptoms, which started with a narrowing of vision and loss of hearing, were at first attributed to some unknown virus. It took years to confirm that the disease was caused by continued ingestion of fish polluted with methyl mercury compounds, and after elaborate and time-consuming research it was finally concluded that the pollutant which was being discharged into Minamata Bay was contained in the waste water from a factory of the Chisso Corporation that was producing acetaldehyde. And in another case, that of the so-called *Itai-itai* disease in Toyama Prefecture on the northern coast of Honshū, the real cause was identified, again after many years of controversy, as the cadmium contained in waste water discarded by the Kamioka Mine of Mitsui Kinzoku Corporation. The contaminated water had been allowed to flow into irrigation canals, contaminating the ripe rice, so that those who ate the grain over long periods found their bones had grown fragile and were easily broken; the malady is accompanied by great pain, hence the name *Itai-itai*, which literally means "ouch-ouch".

Unfortunately, in both rural and urban areas of Japan there have recently been many cases of such disasters due to deterioration of the natural environment caused by man. In order to work toward control of such man-made disruption of nature, it is now a matter of urgent necessity to make clear why this happens so often in Japan, and in this particular period.

To these questions, one of the answers which is almost self-evident is that the contamination of nature is, so to speak, a by-product of Japan's rapid industrialization and economic growth. After the almost complete destruction of manufacturing industry in World War II, reconstruction was slow at first, but, stimulated by the war in Korea, redevelopment began in the 1950s and has been accelerating since about 1959. During the period of 1959-63, for example, the industrial index rose every year by more than 20 percent, and within six years it had trebled. The rate of growth surpassed the most optimistic forecasts and resulted in making Japan, within a very short period, the third greatest industrial nation in the world, following only the United States and the Soviet Union. In a brief span of a little over fifteen years, Japan has changed from a semi-rural nation to an urban-industrial society almost comparable to the highly advanced industrial nations of the Western world. Keeping pace with the increasing national productivity, the standard of living has also experienced a quick advance. The average per capita income is still considerably lower than in highly industrialized countries such as the United States and Canada, but Japan's ranking is rising and is now almost equal to that of the United Kingdom.

Such a rapid transformation has inevitably brought about many discordancies in all aspects of Japan's society. Metaphorically speaking, pollution and disrupt-

tion of the natural environment are the price the Japanese must pay for such growth. This is an interpretation which is often expressed by politicians in power when they are accused of delay in taking measures to control pollution, and to some extent this has had a persuasive effect on many. The high speed of economic growth and consequent rapid change in all aspects of society were also responsible for the frequent occurrence of disasters which often took a toll of human lives before the victims were aware of the possibility of harm from pollution. What is important, then, is to begin countermeasures as soon as the possible source of damage from pollution is suspected, rather than, as is often the case, wasting time in argument about the responsibility.

There may be some truth in the argument that contamination is another side of growth, making it more than a mere attempt at self-protection. Even so, it is clear that one should not accept such a fatalistic viewpoint. Such arguments are merely superficial explanations for the frequent occurrence of damage from the deterioration of the environment, or are a cloak under which the guilty attempt to hide their reluctance to invest large amounts in an effort to curb pollution. The real cause which allowed the spread of pollution to the extent of today must be looked for elsewhere, in factors which are rooted much deeper in the very nature of the society.

On the side of the government, it may be the authoritative structure of the society, and on the side of the people, the disposition of the nation to follow laws regardless of individual interest. Or it may be the strongly materialistic nature of the Japanese, who have placed supreme priority on material attainment. Perhaps all of these factors and many others have worked together to bring about the present situation. Some attempts to analyze these points will be made in the following pages. In argument, it is easy to ascribe all the responsibility to the Government and big business, and to assert one's own innocence, but after all it does not free the individual from responsibility, since the government and society are the product of the nation.

### **The Acceptance of Hazards as a Natural Phenomenon**

In many such cases of damage caused by man's destruction of the environment, say by polluted water or by poisonous chemicals in food, there is usually a gap in time before the victims realize the true cause of their misfortune. Very often their first reaction is to view their misfortune as a kind of natural phenomenon. Repeated occurrences of some particular physical disorder are easily believed, at the beginning, to be some kind of local disease, and its causes are often attributed to something in nature, the climate for example, or sometimes even the quality of

local water. *Fūdo\*-byō*, or local disease, is a traditional term identifying such a disease. That a change of drinking water may cause physical disorders has been known since ancient times, and the word *Mizuatari* has traditionally been used to designate disorders of this sort. A common expression, literally meaning "poisoning by water", it happens also to be an ominous indication of the actual cause of harm from polluted water which has become such a public menace in the present. As in other parts of the world, there once were various local diseases in all parts of Japan. Many of these have been studied scientifically, and some, such as malaria and certain parasites, are now almost under control. However, since the memory of such local diseases still lingers in people's minds, it is not hard to understand that one is apt to diagnose an unaccountable physical disorder as a kind of *Fūdo-byō*.

However, if a malady continues to appear, and especially when the distribution shows a clear correlation with some probable origin, ultimately the people come to suspect that there must be some cause other than a natural phenomenon. In the case of *Itai-itai* disease in Toyama Prefecture, for example, the appearance of such a strange new disease shocked the public from the beginning. It was some time, however, before it was noticed that the affliction almost always appeared in the drainage area of a particular river, to which the only logical conclusion was that the disease was caused by pollution of the river water. But a suspicion is merely a suspicion, and it was still a long time before the source of the pollution was identified and the responsibility assigned to the Kamioka Refinery of the Mitsui Kinzoku Corporation.

As is true in most other countries, it is not easy for individuals to cooperate under such circumstances, to make an effort toward investigation of the causes, and to identify those who are really responsible. In early stages, the newspapers often play an important role in disseminating information, in stimulating scholars to investigate the causes, and eventually in forming public opinion. Thus, often a little too late, the victims of the pollution will demand compensation, as individuals or as groups. Disputes and negotiations will follow between the sufferers and those who are accused of the responsibility. Usually, sooner or later those who suffer the damage must establish an organization and choose persons to represent their interests, since virtually always it becomes necessary eventually to appeal to the courts for a solution. It is at this point, especially, that a peculiar characteristic of Japanese society often appears to affect the outcome, a characteristic that

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\* *Fūdo* is an East Asian concept of environment. It is a traditional and prescientific term, meaning not only the totality of nature — the climate, landforms, and so forth — but also human factors — tradition, people's disposition, etc.

may be instrumental in delaying a solution and, accordingly, in spreading the damage to an extent unknown in other countries.

### Reaction of the Society

By tradition, the Japanese prefer not to settle disputes by means of lawsuits, but instead, seek a solution by negotiation. As damage by pollution is usually difficult to prove to begin with, it is natural for those who are accused or suspected of being responsible to be reluctant to admit their responsibility. There has been a tendency, indeed, for the accused often to take advantage of the victims' unwillingness to take legal measures by trying to negotiate with individuals rather than with a group as a whole. Such a tendency as a technique is not unique to Japanese society, but it is perhaps more pronounced there than in many other societies. Thus time is often wasted at this stage, after which in the final analysis most cases are sent to court. Here again it takes a long time even to gather testimony. Meanwhile, a strong and emotional antagonism usually builds up. Again, this antagonism is not a phenomenon unique to Japan. Lawsuits take time everywhere, and usually neither side is satisfied with the results.

That the Japanese do not like to argue or to resort to the law is, in my opinion, one of the most singular characteristics of their society, and in it may lie some clue to an understanding of the problem of *Kōgai*. This dislike is a very widely held popular attitude, and what interests me, from my experience in the United States, is to note that this attitude is also maintained among Japanese-Americans in this country. Regarding this point, I will cite a sharp remark made by an American author in discussing the case of the wartime relocation camps for Americans of Japanese ancestry. " . . . at each stage [of incarceration] the officials were encouraged to go forward not only by the anti-Japanese clamor but — more significantly — by the absence of meaningful resistance."<sup>1</sup> This attitude, which may be hard for people of other cultural backgrounds to understand, is to the present writer, who shares their background, a perfectly natural and understandable reaction.

In general, Japanese try to avoid being plaintiffs in court, and seek to end disputes by negotiation or by some other mild means. When situations become impossible to solve, however, or when it is so believed, those who otherwise are patient and law-abiding may tend to change suddenly and adopt more violent measures. Throughout the history of Japan one finds many examples of this, and it is interesting to speculate on whether this characteristic is the other side of their ordinary tendency toward obedience to laws, or whether there is no logical relation between the two tendencies. It is already widely known that criminal rates and rates of juvenile delinquency are very low in Japan, and also that here

in the United States these rates among Americans of Japanese ancestry are the lowest of all ethnic groups by a large margin.<sup>2</sup>

Perhaps it is the province of the sociologist to analyze such socio-psychology, but one might look for an explanation in the long tradition of administration in feudal Japan, which placed an emphasis on ruling without allowing the people to be informed about politics. To the rulers, the people were in existence to depend on them, and not to be informed (*yorashimu beku, shirashimu bekarazu*). The effects of such a traditional attitude must have lingered on in Japanese political thought in many ways even after the Meiji Restoration of 1868. For example, Yaichi Haga, a well-known scholar of the Meiji Era, in his discussion about the characteristics of the Japanese, took for granted the public aversion to argumentation (*kotoage senu*), and considered this one of their most noticeable characteristics. One century since the modernization of Japan began has, perhaps, not been sufficient time to free common people from the mold into which they have been cast, as argumentativeness, even today, is considered a vice. This is, to be sure, a convenient attitude for the administrators and politicians, who often have derived advantage from it. Concerning matters of civil rights, for example, decisions are usually slow in coming, and almost always the meaning is made ambiguous. Such practice must surely have helped to keep the nation in a state of political apathy.

Another interpretation which may explain this characteristic is that it is a manifestation of general moral concepts, drawn particularly from Buddhism which preached perseverance as a high virtue, or from the doctrines of Confucianism which taught a hierarchic social order based on loyalty and filial piety on one side and authority on the other. Patience and perseverance, however, do not last forever, but at some point tend to turn to utter malignance and to seek violent outlets, making a solution very difficult. And here appears another characteristic of this society: the tendency to judge matters of civil rights on the basis of morals and honor. In this society, therefore, pollution is a matter of shame, and the persons who are in charge of the responsible institutions stand to be disgraced in public. Again, this kind of confusion of justice with morals and honor is not unique to this culture, for it is a common attribute of human nature. What characterizes Japan, however, is the relative conspicuousness of this tendency.

I often recall a scene which I watched on Japanese television: a news broadcast of the meeting of Minamata victims with officers of the Chisso Corporation. The first thing the victims and their relatives demanded, with loud hisses, was that the president and main officers of the company crawl on their knees with their foreheads to the floor and apologize. One may see that this is another typical expression of the feelings of the people of this society. An emotional and sometimes hysterical reaction such as this is a peculiar aspect of the mass psychology.

and, in my opinion, one which may delay a solution and allow time for the accumulation of more harm, as in pollution of the environment, to the extent that more lives may be lost.

### **Some Examples of Urban Pollution**

The harm from pollution is more multifaceted than has been imagined, and its appearance has been so recent that we know practically nothing about causes, much less about how we should begin to handle them. Some cases may be solved by technical means, while others may require legal measures, or both. We are still in the learning stage, and there is no general rule applicable to all problems. In the following, some examples from past experience will be described, mainly taken from Tōkyō, although almost all the cities of Japan — some six hundred, with Tōkyō, having a population of nearly nine million at the top — are nowadays experiencing serious problems of environmental pollution.

#### **Air Pollution**

Air pollution is perhaps the most visible problem, but until recently it had not attracted much concern because it has not been associated with violent harm. Its correlation with health, for instance, with death rates, or the occurrence of respiratory diseases, has not been studied scientifically. In recent years, however, in large cities like Tōkyō and Ōsaka, various troubles have occurred. Large numbers of school children often suffer headaches and smarting eyes from the occurrence of so-called photochemical smog, which culminated in the now notorious "Incident of July 18, 1970", in which a large number of students at school and pedestrians on the streets of downtown Tōkyō suffered smarting eyes to the extent that they were transported to hospitals in ambulances.<sup>3</sup>

In 1965, the Tōkyō Metropolitan Government initiated scientific observation of the sulphur dioxide concentration in urban Tōkyō. Data were collected at about two dozen stations, and the results obtained were mapped, indicating a zonal distribution of the concentration on the ground surface which showed maxima in industrial areas. However, research in West Germany, based on data observed at more than a thousand stations in the Ruhr-Rhine Province, an area somewhat larger than the Tōkyō metropolitan area, has indicated that the ground distribution of sulphur dioxide does not, as was presumed, form zones in accordance with the distribution of factories, the logical sources of air pollution. These data showed instead, small, widely scattered islands of high concentration, some of which were far from the sources. Thus, plans for countermeasures based on an erroneous assumption of the zonal distribution had to be fundamentally revised. On the other hand, such errors are to be expected before an adequate amount of knowledge



is accumulated concerning a newly appearing phenomenon.

The Yokkaichi air pollution case is another example of much more destructive and acute damage brought about by contamination of the air as a result of chemical and petrochemical industries. The small city of Yokkaichi in Mie Prefecture on the west coast of Ise Bay has sustained very rapid growth since the late 1950s. Factories which were designed to contribute to the finances of the city also brought contamination. The concentration of air pollution by sulphur dioxide, dust, and so forth, reached the highest level in 1964 and 1965, and so many residents suffered from respiratory diseases that the cases were finally sent to court. Suits for compensation received court judgments in 1972, and these created a new precedent by ordering all companies (in this case, six) of a petrochemical complex to pay some 88 million yen (about \$290,000) to twelve victims.<sup>4</sup>

Thanks to the development of scientific research, some aspects of the nature of air pollution have been clarified, and in some cases workable measures have even been presented.<sup>5</sup> For example, the existence of open spaces, even when small, has been shown to be very helpful in reducing pollution. It has also been confirmed that trees are helpful in screening the pollutant. The reduction of contaminants at their sources is largely a matter of technical improvement. However, concerning measures to control air pollution, even when the need is established for more open spaces, parks, green belts, and so on, or for the use of fuel with lower sulphur content, there is still a long way to go. The establishing of countermeasures involves the problem of expense, and the solutions need supervision by the administration; thus the responsibility is passed on to local and central governments. Nowhere in the world, furthermore, are governments so efficient as to please all citizens.

### **Water Pollution**

Water pollution, both on land and in the sea, is no less serious a problem than air pollution. Not only does it destroy natural life and scenic quality, but it also often affects primary industries such as agriculture and fishery, and is frequently a menace to the sources of drinking water as well. There are many precedents for industrial pollution of rivers and lakes in the advanced countries of Western Europe and North America. Some countries made an early start in seeking remedies, and in some cases have achieved some success. For example, after efforts to control water pollution, particularly on the Canadian side, the happy news was heard some years ago that fish were returning to Lake Ontario, which for a while was a "lake of death".

Tōkyō Bay once was a rich fishing ground for coastal varieties, and the shallow beaches along the bay were once used as fields for aquiculture producing clams and

laver, an edible seaweed. The dried seaweed of Tōkyō Bay was noted for its flavor, and since the Edo period (1600–1868) many fishermen have made a living combining aquiculture with coastal fishery. Industrial pollution of the seawater began in the interval between the World Wars, but disappeared in the postwar years when the coastal industrial zone was reduced to ashes. Soon, however, it resumed its seizure of the fishing grounds, and coastal fishing gradually declined, experiencing a final blow in 1955. The decline in coastal fishery and aquiculture became chronic in the 1960s, and among the sources of pollution, the sewage from Tōkyō was considered to be mainly responsible. During these periods, the Tōkyō Metropolitan Government was working on a large-scale project of reclamation of more than 2,200 hectares of land by filling in shallows to build an industrial and port area, with an estimated budget of some 106 billion yen in 1965.<sup>6</sup> And, in 1962, the Metropolitan Government paid 33 billion yen (about \$92 million) to some four thousand fishermen to compensate for their loss of fishing grounds. This was a rather special case since the Metropolitan Government was in control of a large amount of money which was to be obtained from the sale of the land when reclaimed. Also it should be noted that the compensation was for the loss of fishing grounds and not for pollution.

The pollution of river water is also occurring in all parts of Japan, especially as a result of the wide use of chemicals for agriculture, and aquatic life has disappeared from many rivers and ponds. Poisonous matter carelessly flushed from factories often kills large numbers of fish. In northern Japan, salmon have ceased to come up many of the larger rivers to spawn, and such rivers as once supported the living of even a small number of fishermen have long since ceased to do so. In several extreme cases, mercury compounds flushed from factories in upstream areas have caused the deaths of inhabitants who consumed the contaminated fish. This is the case in the second incidence of Minamata disease in Niigata Prefecture in the lower reaches of the Agano River, in which Shōwa Denkō Corporation was accused of responsibility, and a court order given in 1971 called for a compensation of 270 million yen to 77 plaintiffs.

### **Ground Subsidence**

It may not be appropriate to refer to the problem of land subsidence as an example of pollution, but in many respects the nature of the problem resembles that of pollution, and it may serve as another example to help us understand the complex nature of the general problem.<sup>7</sup>

The subsidence of ground in coastal lowlands has been noticed in many of Japan's large cities, especially in the Tōkyō-Yokohama, Nagoya, and Ōsaka-Kōbe areas, as well as in the city of Niigata. From a geographical viewpoint it is to

be noted that most of Japan's highly industrialized urban areas are located in alluvial lowlands which are susceptible to flood damage even without ground subsidence. Already in the 1930s, ground subsidence in large cities and in industrial areas had attracted attention, and it was argued that the extraction of groundwater was responsible. There were other arguments as well, and the controversy has raged for many years. In areas of subsidence along the coast, factories and sometimes residences have been compelled to construct surrounding walls to protect buildings from floodwater at high tide. Walls, however, are a poor means of combating the menace of invasion by water in areas where the land surface is below the high-tide level; drainage is also needed. Often the victims are compelled to abandon the land and move out, and the land thus abandoned usually sinks under the water, leaving half-drowned buildings behind.<sup>8</sup>

A survey of benchmarks has been conducted in downtown Tōkyō lowlands since 1938. The results revealed a land subsidence of 1-2 centimeters per year for the years 1938-43, but the situation remained static for the period 1944-47 when, after the area was razed by air raids in the later stages of World War II, there was little or no manufacturing industry. But with the rehabilitation of industry, subsidence has resumed, and this has accelerated year after year. Thus, the correlation of subsidence and industrial activity was perfectly clear, and it was confirmed beyond any doubt that ground subsidence is the result of the pumping of groundwater for industrial use, which ultimately causes compaction of the Pleistocene formations about one hundred meters below the surface. Based on the results of scientific research, the Underground Water Control Law of 1962 has been amended several times, and in 1966, general control over groundwater for industrial use was effected. Following this, the rate of depression dropped to about one-third that of the peak period, but in the latter half of 1967 subsidence began again to increase.<sup>9</sup>

Ground subsidence in Niigata City offers another example of damage, in this case by the extraction of natural gas which is pumped up with groundwater. Subsidence occurred in the city area, too, and hence many inhabitants of the city protested against the extraction even before it was confirmed as the real cause. In the late 1950s, the rate of subsidence reached such an extent that the central government was obliged to issue an unusual request to cease pumping in areas around the city of Niigata.

The cases described above are only a few of the diversified examples of environmental deterioration, and there are many other kinds such as noise and vibration, garbage disposal, noxious odors, and so on. However, since it is not the aim of this paper to give a complete list of all kinds of pollution, the above examples seem sufficient to point out the multisidedness of the pollution problem.

It may also be self-evident that hazards appear most frequently, and in greatest strength, in large cities. Some of the occurrences appear suddenly, while others accumulate slowly and it takes years before the general public is aware of the damage and danger. And, also, it usually takes a long time to verify the real causes of the pollution and its impacts, and this process necessitates elaborate research which is often beyond the reach of individual citizens because of the expense and the equipment needed. As was previously mentioned, the citizens of Japan are generally slow to initiate protest, and their movements tend to be emotional rather than practical. They usually wait for the central or local government to solve the problem. As is true everywhere, however, governments are slow to start measures on their own initiative, and particularly in this society it is imperative that there be someone to start the protest. Such are the circumstances that wait the appearance of politicians, and set the stage for newspapers to open anti-pollution campaigns.

### **Pollution and Politics**

The tradition of democracy is still short in the history of Japanese politics, the rules and customs of elections are not well established, and democratic operation of the government may largely be a matter for the future. Under these political circumstances, such a problem as the pollution of the environment by man offers an ideal issue for the candidates of opposition political parties to use in taking the offensive against the party in power. Therefore, it is logical that the Socialist Party has hitherto been more successful in taking the initiative in the controversy regarding antipollution legislation.

Throughout the postwar period, the Liberal-Democratic Party has been in power except for a short interruption by the Socialist Katayama regime in 1947-48. Thus, the party representing the conservative wing of the nation has almost always maintained the majority in elections, although there has been a steady rise in more radical thought represented by increasing votes for the Socialist and other Parties. In recent years, it has become more and more conspicuous that Japanese political thought is divided in two, that is to say, into conservative rural and more radical urban factions, with the former still maintaining a majority, though its advantage is declining. As a result of recent elections, most of the mayoralities of Japan's large cities and the governorships of prefectures containing large cities, including those of Tōkyō, Ōsaka, and Kyōtō, are passing into the hands of members of political parties of the more radical quarters. In recent years, the Tōkyō Metropolitan Government has been fairly active in pursuing many anti-pollution policies, and this may be partly because Tōkyō is where many problems of pollution

are accumulated, but it may also be partly because the governorship belongs to the Socialist Party. In the Diet (the Japanese Congress), and at times of elections, the party in power is always accused of delaying antipollution measures because of its close contact with big business.

In response to adverse public opinion, the Government has taken a series of measures leading toward antipollution policies. To mention some of these, the Basic Law of Pollution Control was enacted in 1967, and the Pollution Offenses Punishment Law was put in force in 1970. Finally, the Environmental Protection Agency was established in 1971 as a bureau attached to the Prime Minister's Office.

In the meantime, the citizens' awareness of the problem of pollution has gradually been raised. Now it is the belief of the majority of the nation, not without a kind of guilt complex, that this is Japan's shame, and that the nation has hitherto been very backward in its efforts at control. There is little doubt that the recent trend of the central government in trying to take more steps for these purposes has come about in response to the shifting balance of votes in successive elections, and also from the increasing awareness of the importance of this problem among the citizens. Hence, one may be able to evaluate such trends in electoral tactics as a proof of the advancement of democracy in Japan. In this regard, the advent of the "Protest Movement" may be meaningful,<sup>10</sup> and also the press comments largely along the same line. These might have been created under influence from outside at the beginning, but more and more people are taking part in this movement on their own initiative. The general sentiment of the Japanese may still be not argumentative, however, and the reluctance of most to take matters to court remains a drawback to such progress. Even so, it is clear that the issue of the control of pollution is working as a springboard to brainwash the nation, and this may eventually change the Japanese into an argumentative and protesting people. One thing, however, should be kept in mind: the pollution of the environment is a problem of such seriousness as to affect the fate of the entire nation, and at all costs use of this problem as a tool in a political power struggle must be avoided.

### Summary

Pollution of the environment is a new thing in human experience, although its causes have been accumulating since the beginning of history. So far, we have not been well acquainted with this uninvited visitor, and we are still in a learning stage. Therefore it is too early to give any conclusion. It is necessary that we bring our past experiences together and discuss how to find our way toward control of pollution. The following are really no conclusions, but an incomplete

summary of our situation concerning pollution.

1. Pollution is not merely a physical phenomenon but is a facet of complex interrelations between nature and man.

2. Analyses of pollution as physical phenomena are indispensable, but one should not be satisfied with technical details.

3. Nothing is more needed today than cooperation among different fields of science, both physical and social, toward the single aim of pollution control.

4. In view of the multisided nature of pollution, international exchange of information is especially needed. The establishment and/or strengthening of institutions for this purpose should be recommended.

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