

**ENVIRONMENTAL POLICY IN JAPAN
WITH SPECIAL REFERENCE TO
WATER RESOURCES**

*Dissertation submitted to the Jawaharlal Nehru University
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MASTER OF PHILOSOPHY

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CERTIFICATE

This is to certify that the dissertation titled "ENVIRONMENTAL POLICY IN JAPAN WITH SPECIAL REFERENCE TO WATER RESOURCES" which is being submitted by Mr. Nilesh Mathur in partial fulfilment of the requirements for the award of degree of Master of Philosophy, carried out by him under my guidance and supervision, is his original work and to the best of my knowledge this dissertation has not been submitted for any other degree of this university or any other university.

We recommend that this dissertation be placed before the examiners for evaluation.

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PREFACE

Japan is a small country with relatively limited resources. Its people are nature loving people with distinctly equivocal attitude to pollution and environmental protection. It is a leader in development of pollution control technology and one of the world's major polluters. Also, it has the world's strictest environmental quality standards, but also has some of the world's most damaged areas. This state of affairs has been the result of gradual transformation of Japan from a predominantly agricultural country into one of the biggest centres of industrial production. The genesis of the increased environmental problem predates second world war. However the growth of major manufacturing industries after the second world war brought about the modernisation of the Japanese Archipelago and its attendant problem of concentration of people and industries in the cities resulting in extensive pollution.

Chapter one "Historical Background" outlines the problem and traces its historicity. It also deals with various protest movements which arose as a result of increasing awareness of the magnitude of environmental damage. Public outcry against pollution compelled the government to embark on pollution control measures. A chronology of events that shaped the present environmental policy has been surveyed.

Chapter two "Environmental Policy in Japan" deals with formulation of policy, the policy itself and its implementation. Policy formulation has been studied against the backdrop of factors such as interest group interaction, enormity of the problems and its management strategy. The environmental policy as a complex set of regulations, standards and practices has been studied in detail. Policy implementation which requires an understanding of mechanism of policy implementation and problems associated has been dealt with. Expenditure outlays being an inherent part of successful policy implementation has also been delineated.

Chapter three "Policy for Prevention of Water Resource Contamination" makes an elaborate study of problem of water pollution in Japan and measure to counter it.

Chapter four "Water Resource Pollution in Japan : Case Study of Minamata and Lake Biwa" has been divided into two parts. The first part is a case study of Minamata a water borne disease. The case study reflects the extensive loss caused by water pollution as well as the reaction of the government, the industry and the public in combating the disease. The second part is an elaborate study on lake Biwa water resource for an in depth understanding of government policy on water resources - the primary focus of my study.

CHAPTER 1
HISTORICAL BACKGROUND

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HISTORICAL BACKGROUND

The present state of Japan's environmental problem and its effort towards checking environmental destruction by making strict¹ environmental pollution control law (like environmental Basic law of 1993) has evolved gradually. Environmental destruction has been caused due to Japan's over emphasis on development without giving adequate attention to environmental damage. The adverse impact of Environmental pollution on the health and life of living being as represented by a Minamata, itai-itai disease and Yokkaichi asthma has become a cause of great concern. These problems were so serious that they engendered a new word "kogai" (destruction of public domain) which is now commonly used. Japan today, is recognised world-wide as the nation with most serious environmental problem.

As already stated² Japan's environmental destruction is not a recent phenomenon.

During the feudal Tokugawa period Japan became acutely aware of western imperialism and its effects on countries

1. Japan Times, Japan, Nov.13, 1993.

2. Jun, Ui. Industries pollution in Japan, Tokyo, May 1994, pp.7-10.

surrounding it. Japan was forced to open its door to foreign trade in the mid of 19th century due to internal pressure and external circumstances after three hundred years of isolation. These circumstances also led to Meiji restoration in 1888. The Meiji government's policy was focussed almost solely in the direction of rapid industrialisation to save the country from colonizing pressures of the west. consequently from this time onwards, while rapid industrialisation and economic growth was given extra ordinary importance environmental damage caused by it was completely overlooked.

In the early period of modernization, the power of industry was quite limited. Though damage to environment had been noticed, these problems were attempted to be solved by changing the location of factories or producingunits. But in cases where site relocation was impossible like in mining cases, the damage to environment became extensive, pervasive and could be clearly felt. The most striking of these is the case of Ashio copper mine which started at the beginning of nineteenth century and till date the problem has not been solved. The impact of Ashio copper mine poisoning on the residents of the area

could be seen from these lines which were published in³
MAINICHI SHIMBUN on February 25, 1973.

"Not a few workers are still lying in their beds, completely deprived of their normal human functions and unable to see the last days of the mine for themselves. Down stream on the water rase river, local residents continue to suffer form copper poisoning brought to them by the continuous flow of river. The mine shaft has been sealed up but the mines history and identity, as the birth place of pollution in Japan can never be burried in the darkness of the shaft."

The victims of the Ashio copper mine were oppressed on the basis of so called national security restrictions. There were powerfully organised protest movements under great statesmen and nationalist like Tanaka Shozo, but it could not with stand government power. Though the movement was not successful, it helped in spreading the protest to other parts of Japan which could be seen in the fact Bessih and Hitachi mines developed later on accepted to some extent the demand made by their victims.⁴

After the first world war, during the era of Taisho democracy the pollution victims were in a better position to negotiate and pollution control technology was used with

3. N. Huddle, and M. Reich, Island of Dreams: Environmental Crisis in Japan, Japan, 1975.

4. Jun, Ui, *ibid*, p.8.

some degree of success, as seen in Gifu prefecture in relation to the Aradkawa pollution case.

⁵ During world war-II period industries worked to the optimum. The nation was totally involved in the war. All demands for environmental protection were suppressed. The discharge of untreated factory waste, and the destruction of land, the dropping of atom bombs on Hiroshima and Nagasaki caused unprecedented environmental damage.

In the period immediately after the war industrial activity was on a low key but with the Korean wars of 50's Japan's economy started picking up and its Industrial activity started picking momentum once again. This time economic development was given top priority leaving aside environmental concern. This lead to environmental damage which could not be felt in the early part but slowly started showing its sign (in the early 1960s) through various pollution related disease. Disease like Yokkaichi asthma, and painful bone diseases like Minamata, itai-itai made life difficult for people living in that area.

This led to various ⁶ citizen protest movements. The government tried to suppress these movements in the early

5. Ibid.

6. Jun, Ui, "Against pollution", 'A Citizen forum: 11 year Japan Quarterly', vol.32, Tokyo, 1985, p.242.

stage, but as diseases affected a larger number of people these protests started gaining momentum and the government could no longer ignore it. In the 70's the government of Japan took measures in the direction of environmental protection. Environment agency was established and strict environment protection laws were passed-pollute pays principle, enactment of fourteen environment related laws in Dec 1970 (69 in Diet session), nature conservation law (1972), the pollution and health damage compensation law (1973)⁷ etc. made Japan's environment related laws one of the strictest in the world. Government also made attempts to reduce environmental damage by adopting other measures. Thus some progress was made in the direction of environmental protection. But by 80's the industries again started applying pressure on the government to give priority to development in and they were successful in there effort.

A chronological survey of the events that has shaped the present environmental policy would help in understanding the problem of environmental pollution in Japan.

Japan began to rebuild its industrial structure after the Korean war. Environmental destruction began to raise

7. Katsuya, "Making environmental protection pay", Japan Echo. Vol.17, No.1, Spring 90, pp.76-80.

its ugly head and local movements against this destruction increased.

The citizen movement for the first time got some success in 1964 when planned construction of petrol chemical complex Mishima Namatu area was stopped. The movement gained further strength in 1965 when the second Minamata disease (mercury poisoning of human population) was discovered. Independent victims movement against the polluter was established, which formed a network with other such movement. In the initial years of 1960's significant development in the direction of reducing environmental damage took place in Japan. The victim's movements, which was created in response to the "Big form" pollution case took their struggle to the court, where the court gave them compensation. In 1971, in a special session of "National Diet" environment agency was created which has been continuously working towards making environment clear and healthy. The United Nation Conference on human environment was held in Stockholm in 1972 during which, Japan's environmental problem was discussed at length. All the nations of the World showed great concern for the serious damage which Japan's environment was facing. This gave a further boost to Japan's environment protection programmes.

However oil shock of 1973 gave Japanese economy a serious set back and Japan's growth rate reduced significantly. The environmental problem, then took a back seat, as Japan once again directed all its energy towards tackling economic problems. The Japanese business community which had been subdued somewhat by the anti-pollution movement regained the support of the government. Litigations in the court began to turn against the victim, The claim of the outbreak of third Minamata disease by the people was referred by the government. In 1975, a debate on the causes of itai-itai disease was subjected to external control pressures and in 1978 Minamata disease patients were forcefully removed from demonstration sites. The Japanese promise to create environmental assessment laws at the Stockholm conference, never materialised.

Also, improvement in the quality of life and natural environment in the 90's has lagged behind. Grave concern for Japan's environment was expressed in earth summit in Rio de Jenerio. Japan's government has also felt the need of improving its environment.

Japan being the most developed country in the region economically and technologically, should contribute towards saving environmental damage in this region, by transfer of environment friendly technology and giving monetary

assistance towards solving environmental damage. Japan can also be an example and warning for other developing countries in the region.

In my study an attempt is made to understand Japan's environmental policy and how it is being implemented. The focus of the study is water resources due to these reasons.

- (i) Japanese society is a water related culture (Mira).
- (ii) Water pollution has caused great havoc in Japan.
- (iii) Japan has made tremendous effort in the direction of improvement of its water quality. Study of water resources would help understand its environmental policy quite well.
- (iv) Last but not the least water resources is one of the most important component of environment, extremely important for survival.

CHAPTER II

ENVIRONMENTAL POLICY IN

JAPAN

CHAPTER II

ENVIRONMENTAL POLICY IN JAPAN

ENVIRONMENT POLICY

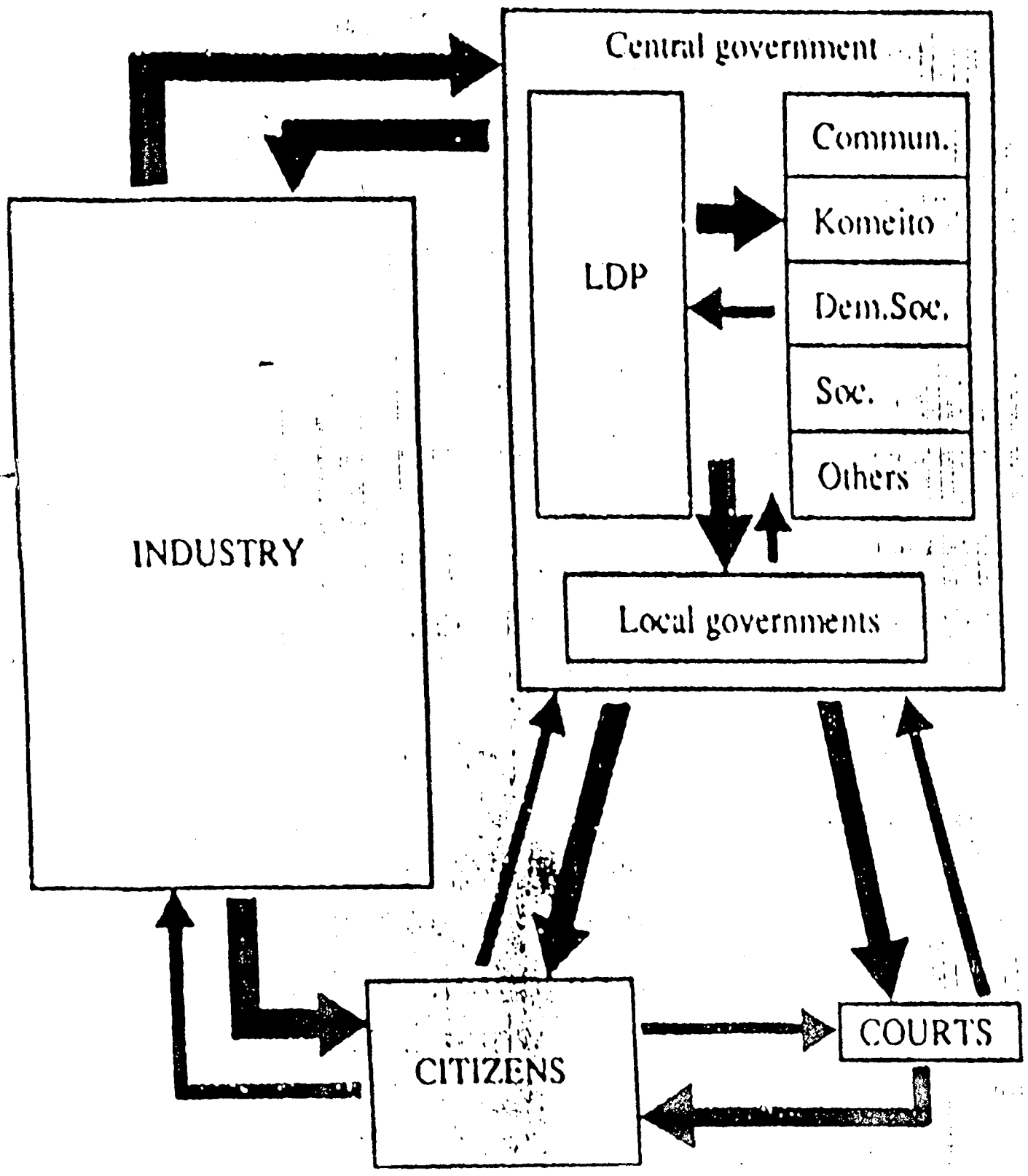
Japan's environment policy has evolved with the increasing awareness of the problems which deteriorating environment can cause to the human health and life on this planet. The rapid economic development took place in Japan after the second world war, when Japan used all its energy and resources towards growth, with plans like income doubling plans. With development came environmental destruction the effect of which could be seen in a number of disease like Minamata, itai - itai etc and destruction of nature due to Eutrophication, floods, loss of marine life etc. Environment policy thus gained importance. The creation of environment agency in 1971 clearly shows the importance environment has gained.

Understanding of environmental policy requires an understanding of the problem and it's management. Against this background environmental policy is formulated which is a complex set of regulations, standards and practices.

The main interest groups involved in environmental policy making process in Japan are the legislature, the

Fig 2.1

INTEREST GROUP INTERACTION



executive, the judiciary, industry, citizen groups, media academic groups, and Non-governmental organisations.

The interaction of these interest groups play an important role in the formation of environmental policy. The influence these interest groups have on the formation of environmental policy depends on their relative strength and various other factors. The centre of the policy - making process is the national administration which is controlled by LDP dominated Diet (Parliament). The national executive co-operates closely with Japan's industrial interest to ensure the continued development of nations economy. The central governments environment agency, local governments, courts, citizen groups and academic community also play an important role, but they have their limitations which can be seen as we proceed. (See Fig. 2.1)

The chief legislative organ, the Diet in Japan is composed of the upper and lower house. The Prime Minister, elected for two years chooses a twenty member cabinet the members of which acts as directors of ministries. Japan's political parties include the liberal democrat, the socialist, democratic socialist, Komeito, communist and a few minor parties. The LDP has traditionally equated the good of society with economic growth and as such its interest has been closely linked to those of Industry. The

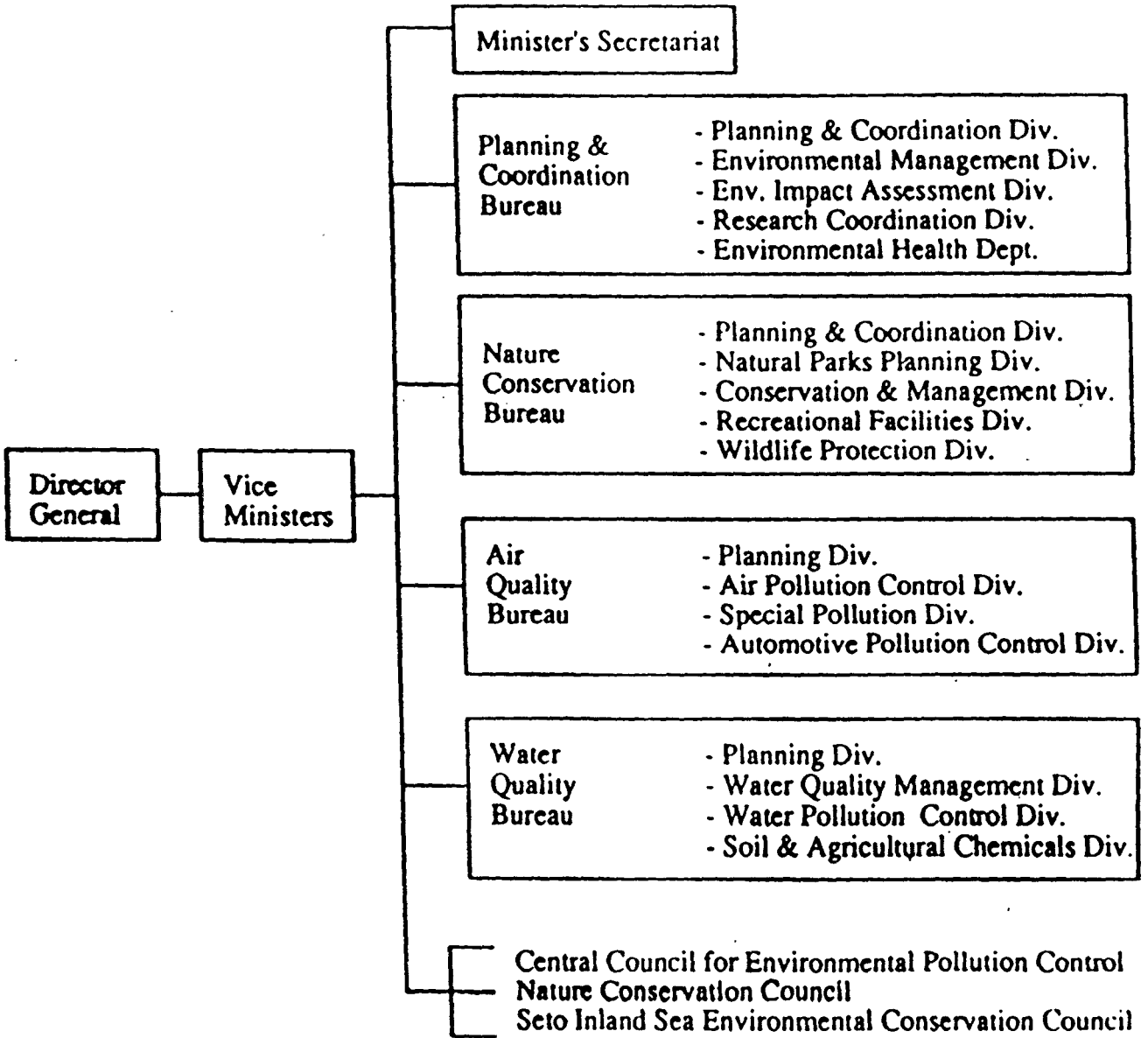
opposition parties and groups such as Anti-nuclear, greens, earth clue, Environment party and life party have urged the government to take steps to protect the environment. But these parties are divided by deep ideological difference which makes coalition difficult.¹

The executive branch which is headed by the Prime Minister consists of twelve ministries and a few other agencies like the environment agency is responsible for looking into the environmental matters. Before 1971 the Ministry of Trade and Industry (MITI), Ministry of Transport (MOT), Ministry of construction (MOC) and Ministry of Finance (MOF) looked to into the problem of environment. But even today these ministries have considerable influence in the formation of policy relating to environment. As these ministries are more interested in the economic development of the nation their attitude towards environment agency is not always helpful, which has a negative effect on the working of the agency. This has considerable impact on

1. The Socialist party formed in 1995, is support by labour union. The democratic socialist developed in 1960 as a right wing branch of the Socialist. The Komeito began in 1970 as the political wing of Soka Gokkai, a Buddhist Organization. The communist Formed in 1922 are strongly ideologically oriented with firm grass root support and organization and rely on funding from Union dues and newspaper sals.

Fig 2.2

ORGANIZATION OF ENVIRONMENT AGENCY



policy formulation even today. It is important to understand the organization of environment agency.

ORGANIZATION OF ENVIRONMENT AGENCY (See Fig. 2.2)

Local Government

There are forty seven prefectures in Japan of which Tokyo has special standing as a metropolis (to), Hokkaido as a circuit (do), and Osaka and Kyoto as municipal prefectures (fu), the remaining forty three are prefectures (ken). The prefectures in turn are divided into municipalities Japan contains about 600 villages (pop < 30,000), 2000 towns (Population < 50,000) and 650 cities. In addition ten 'designated cities' with more than one million inhabitants have been granted most of the powers of Prefectures. Governors and Municipal Mayors are elected in a manner similar to the Diet members.

Although local governments are subordinate to the central government in other areas, they have been autonomous and active in environmental field, and have generally proceeded and set an example for national government in terms of environmental policy. Their action is not directly influenced by pro-economic lobby. However, despite their leadership in many environmental issues local governments are still strongly influenced by national policy.

The local governments become an important interest group as they are directly in contact with the local people who are affected by environmental damage.

CITIZEN GROUPS

Citizen group can be divided into three main types

- (a) Traditional pressure groups like, Medical association, National house wives association and labour federation have only a limited interest in environment issues per se but represent a useful resource base for specific issues like recycling or food contamination.
- (b) Conservation groups are concerned with wild life protection, preservation of scenic beauty and other traditional conservationist goals eg. wild bird society of Japan (7,000 members).²
- (c) Ad hoc militant groups can be divided into injury compensations and anti development groups.

In the past, these, citizen environmental groups have played a significant role, but even these groups have their limitations. At times violent behavior by these groups e.g. anti development group in 1967 during building of New Tokyo

2. J. Stewart Smith, In the Shadow of Fujisan, (Middlesex, England), 1987.

International airport has been criticized by people and government.³

THE JUDICIARY

The judiciary has played an important role in environmental decision. Though in the early period judiciary ruled only on specific issues avoiding constitutional concept,⁴ in the 60's the courts took a number of cases in their hand and played a significant role. eg. (Big four pollution case) The organisation of judicial branch in Japan can be shown like this Supreme court - High court - (a) District court (b) Family court.

THE MEDIA AND ACADEMIC COMMUNITY

The media and academic community has the potential to become an important interest group. The way any matter is projected by television and Newspapers greatly influences the public opinion. Published research works are also an important source of information. These groups have played an important role in spreading environmental awareness. At

3. Japan Times, Japan, 13 December 1989.

4. A.Morishima, 'Japanese environmental policy and law' in Kato, I et al. (eds.), Environmental Law and Policy in the Pacific Basin Area, Tokyo, 1981, pp.82-83.

times however, they have blown environmental problem up to disturbing proportion, causing increasing public concern.⁵

NON-GOVERNMENTAL ORGANISATIONS

The non-governmental organisations have recently become a very important interest group. These organisations are playing a significant role in protecting the environment. At the earth summit of June 1992, the role of NGO's was thoroughly discussed and it was felt they could play a very important role in this area. These organisations have been encouraged the world over. A number of NGO's are also operating in Japan. But NGO's really need the support of government and the people to work effectively.

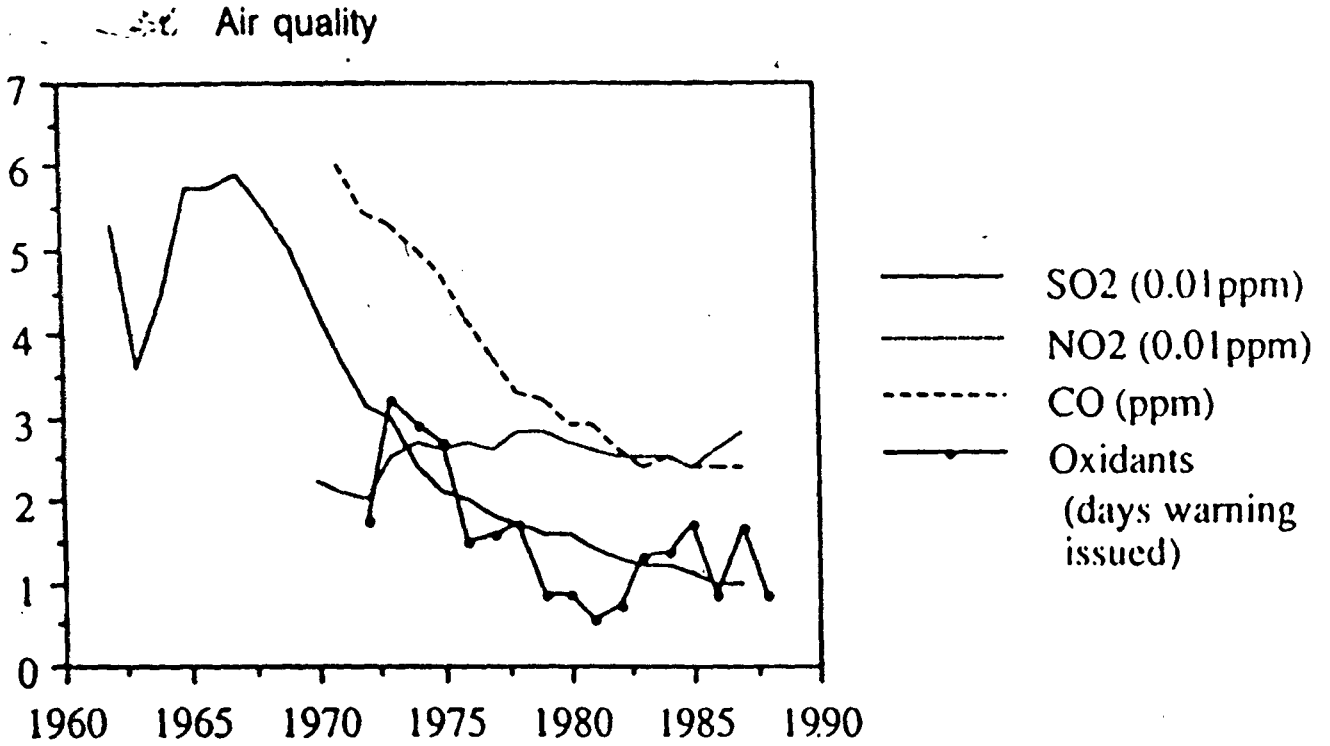
Japan is a land with few natural resources and a very high density of population, (as two-thirds of the country is inhabitable due to steep mountains). Thus it depends heavily on industrialization for its economic growth. Industrialization took place in the small habitable region and so the pollution problems were intense in these areas. The highly ambitious plan of the Prime-Minister Hayato Ikeda, "the income doubling plan of 1960⁶ though showed

5. K. Van Wolferen, 'The Engima of Japanese Power - People and Politics in a Stateless Nations', London, 1989. pp.99-103.

6. T. Uchino, 'Japan's Post War Economy', Kodansha International, Tokyo, 1978, pp.70-92.

Fig: 2.3

AIR POLLUTION



Source: Environment Agency, various publications.

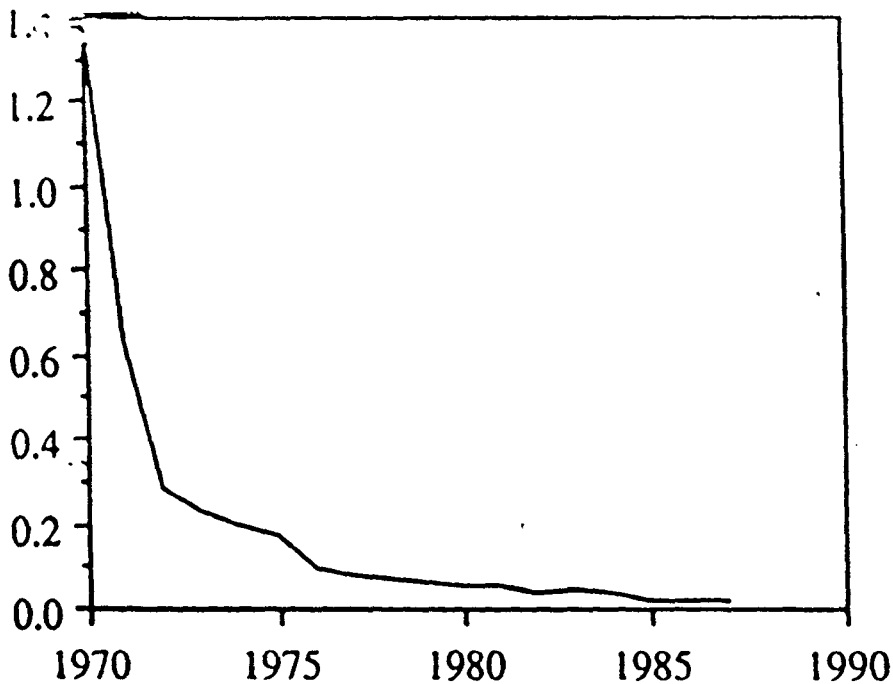
remarkable growth of Japan's GNP, could not care for the environment, which became a real threat for the people. Though Japan experienced high growth in major sectors like energy, steel, automobiles, ships, Petrochemicals and chemicals, transport infrastructure, it led to serious environmental problems. The areas of environmental problem in Japan are air pollution, water pollution, waste disposals, noise and vibrations, ground subsidence and more recently radio active waste has become an important problem.

AIR POLLUTION (See Fig. 2.3)

The problem of air pollution grew rapidly in the 1960's as a result of industrial emission, home heating and increased automobile use. Air pollution control law was passed in 1962 to check this pollution (June 1968/1970/1971/1972). Other relevant laws like electric power, Industry Law, Gas industry law, mine safety law (July 1964), Road transportation law and road traffic law were also passed. In the early years these laws were applied only in a limited region but with increase in the incidence of lung diseases air pollution laws were made more strict. This led to falling down of pollution level in the 60's. But with growing emphasis on economic development, increase in air-pollution was once again noticed in the 80's. The diagram above clearly shows the quantity of various gases

Fig 2.4

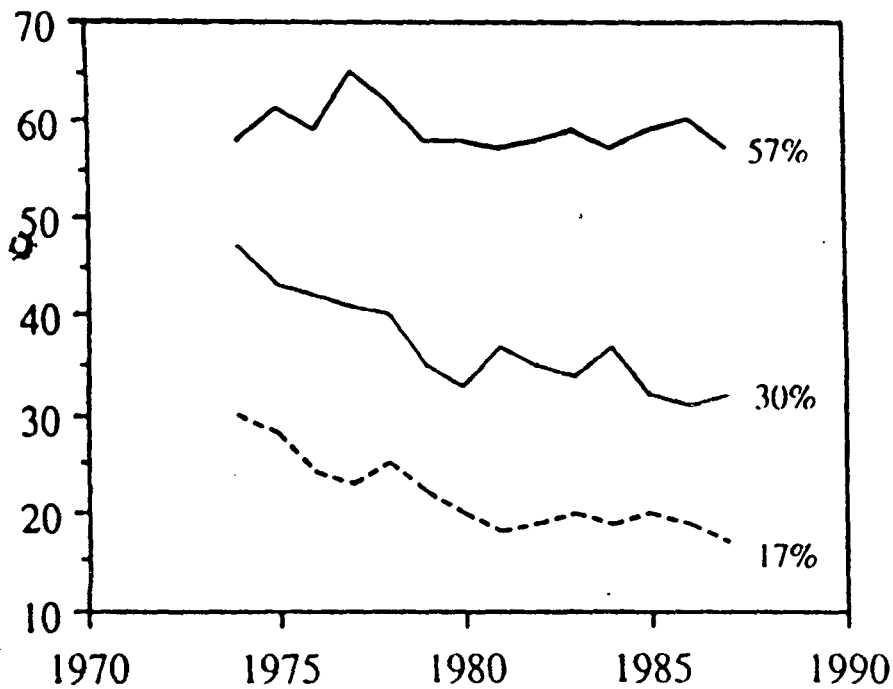
Water quality relating to human health (% non-compliance)



1971	0.63	1981	0.03
1972	0.28	1982	0.05
1973	0.23	1983	0.04
1974	0.20	1984	0.03
1975	0.17	1985	0.02
1976	0.09	1986	0.02
1977	0.08	1987	0.02
1978	0.07		
1979	0.06		
1980	0.05		

Source: Environment Agency, various publications.

Water quality relating to environment (% non-compliance)



— lakes, reserv. (115)
 - - - rivers (2,360)
 . . . coastal water (586)

Source: Environment Agency, various publications.

(SO₂, NO₂, CO) and suspended particulate matter in the atmosphere.

WATER POLLUTION (See Fig. 2.4)

Water Quality relating to human health

(% of non-compliance)

The diagram above shows the problem of water pollution which rose sharply in Japan due to rapid industrialization and urbanization, insufficient waste water treatment facilities, increasing non-point source pollution from agriculture and dumping of nuclear waste in the sea of Japan. A number of laws were passed to protect the water quality. Though there was a significant improvement in the water quality relating to human health but water quality relating to environment is still poor (as clearly seen in the diagram above). The problem of water pollution will be dealt in detail in the next chapter.

WASTE DISPOSAL

The disposal of domestic and Industrial waste⁷ became a pressing issue in 1960's as a result of dramatically

7. The waste disposal and Public Cleaning law of 1971 (Which replaced the public cleaning law of 1954) distinguishes between general and industrial waste municipalities are responsible for collecting and disposing of general waste (domestic and some industrial) but industrial waste are to be disposed of by discharges.

increasing volume of wastes. With rising incomes, people generated more and different types of waste. Between 1966 to 1975, the volume of domestic wastes rose from less than 18 million to almost 32 million tons/year, since then the volume has continued to increase, although less rapidly to 38 million tons in 1985 and since then there is a further decline in the amount of industrial waste. A number of waste treatment facilities were established in Japan, though the increasing cost of waste treatment⁸ has slowed this process.

More than thirty composing plants were built between 1956 and 1966 but at best they treated 3 percent of all wastes and most were closed within fifteen years due to economic reasons. But still the number of such installations kept on increasing and the volume of waste produced increased but not at the rate at which it increased in the early years. The volume of industrial waste rose about eight fold between 1955 and 1970 and stood at 292 million tons/year in 1980.⁹

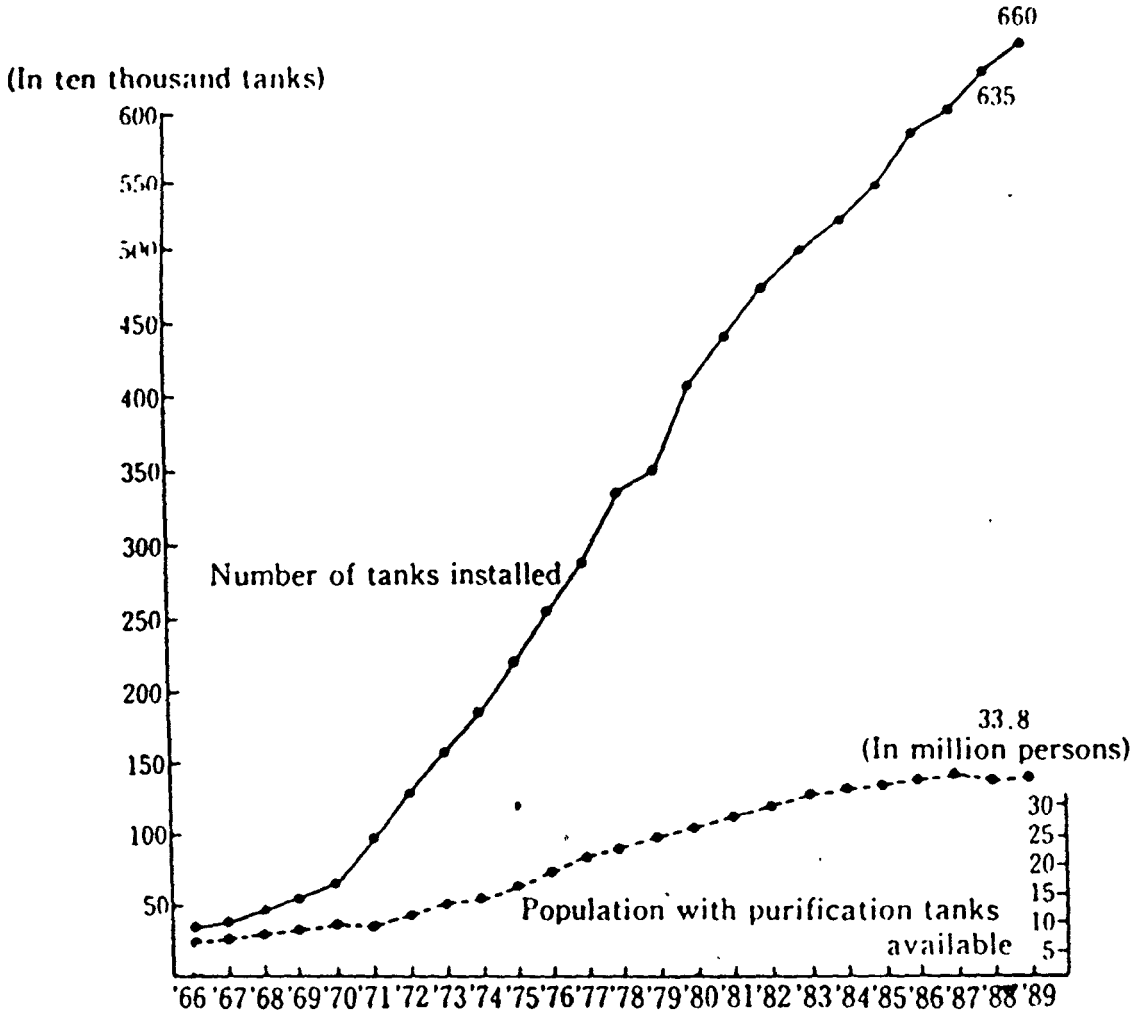
8. The cost per unit of disposing of domestic waste more than doubled every ten years and the total cost of domestic waste disposal rose hundred fold between 1960 and 1980.

M.Hiraoka, 'Solid Waste Management', presented to the international course for graduate research students in the field of Civil Engg., Kyoto, March 1986, p.11.

9. Of this, 30 Percent was sludge, 21 percent slag. 17 percent line stock encravings and 10 percent demolition wastes. Environment Agency 'Management and Coordination Bureau', concerning the environmental impact assessment for the Trans.-Tokyo Bay Highway, Tokyo, 1987, p.170.

Fig 2.5

Number of Human Waste Purification Tanks Installed



60 Percent of it was recycled and more than about 100 m tons/yr. of industrial waste are still disposed of in about 10,000 facilities. About 90 percent of these are facilities for waste treatment, 10% are storage sites for non-hazardous waste and a small number are hazardous waste disposal site.

NUMBER OF HUMAN WASTE PURIFICATION TANK ESTABLISHED

(See Fig. 2.5

A number of waste disposal measures like revision of law concerning waste disposal and public cleaning, formulation of seventh waste disposal facility development programme of November 1991, general waste measure of 1991, combined treatment of septic tanks, Industrial waste counter measures, enactment of the law for promotion of utilization of recyclable resources, development of cross-Jurisdictional disposal facilities were taken. All these have helped in solving the problem of waste disposal to a great extent. But still lot more efforts are required. Recently Radio active waste has become a big problem and requires a lot of attention.

NOISE AND VIBRATION

Noise and vibration is caused from traffic, airplanes, constructions and factory operations. Many of the problems of noise pollution is created due to existence of factory and other business in close proximity to residential areas which has been allowed by the weak system of land use planning.¹⁰

A number of measure against noise and vibration was passed in Japan. They were environmental quality standard associated with noise (25th May 1971), controls under noise regulation law, neighbourhood noise, controls under vibration regulation law and measures against infrasound.¹¹

These laws have tried to reduce the problems caused due to noise and vibration. However, a lot of planning and money is required to solve these problems. Its implementation requires a lot of sacrifice and change in style of life and attitude of people.

GROUND SUBSIDENCE

Subsidence in Japan has occurred due to excessive ground water pumping.

10. Tokyo Metropolitan Government, Tokyo, 1971, pp.150-9.

11. Quality of Environment in Japan, Environment Agency, 1972-73, Tokyo, pp.490-510.



Area of ground subsidence across the nation (Tendency of each year.)

(from quality of environment in Japan 1992)

Subsidence damages buildings, farmland and harbours and increases the hazards of flooding.

A number of counter measures like control on ground water withdrawal, surveys, substitute water measures, damage rehabilitation projects have been taken in Japan.¹²

ENVIRONMENTAL MANAGEMENT

Environmental problems is controlled by environmental management. The kind of economic development and land use planning affect the type and extent of development which takes place in a particular area, the spatial distribution population and activities in that area, and thus the areas environmental quality. Thus, land use and planning becomes an important component of environmental management.

LAND USE AND PLANNING

Japan's planning system is highly developed, complicated and difficult to summarize. To understand the effectiveness of this system we must first look into the problems of land use and planning. The rapid increase in urban population has been a great cause of worry. This

12. Ibid., pp.539-91.

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increase of population leads to a number of problems e.g., lack of infrastructure facilities green areas, sports and cultural amenities etc. Since 1950's much of Japan's rural population has moved into cities. in 1950 only 37 percent of Japanese people were living in areas officially designated as cities (shi), this proportion increased to 63 percent in 1960 and 72 percent in 1970, and 76 percent in 1980.¹³

The proportion of population living in densely inhabited districts which correspond to actual built up urban areas rather to administrative divisions, rose from 44 percent in 1960 to 54 percent in 1970 and 60 percent in 1980. Thus urban areas and roads have steadily grown while agricultural forest and moor land areas have shrunk.

- Population of greater metropolitan areas
- Infrastructure provisions
- Population changes in metropolitan areas

This is a real threat to environment and quality of life in these places. Thus a very effective planning is required to solve this problem. Effective or Bad planning of land will undoubtedly indicate the kind of environmental policy a country has.

13. S.Yamaguchi, "Japan: Towards a New Metropolitan Cities", August 1984, p.476.

Japan's planning system is highly centralized, and policy and plan making is often a struggle between ministries with conflicting policy interest and directions. The Economic Planning Agency (EPA) and physical and National Land Agency (NLA) are responsible for drawing up plans for national development. These plans outline the policy EPA and physical aspects of development which are derived through negotiations with other administrative bodies. The resulting plan do not involve a budget commitment, the NLA and EPA must coordinate this Separately with the ministry agency charged with carrying out the prepared plan.

Twenty-two ministries and agencies form the basis of executive power in Japan of these eight are responsible for spatial policies. the MOC, MOT, MITI, MAFF, NLA, EA and Okinawa and Hokkaido development agencies the MOC is most influential body concerned with city planning, plan approval, land readjustment, urban redevelopment, housing roads, urban parks, sewage system and other urban facilities.¹⁴ The MOT responsibilities cover harbour, airport and railway development. Transport and land use planning interest closely and at times there is intense

14. B.B. Simon, 'Land Use Planning in Japan', The Planner, March 1989, Japan, pp.13-16.

rivalry between MOC and MOT.¹⁵ MITI controls industrial development and related location decisions. The MAFF is concerned with forest, marine and agricultural resources. In addition to its national planning role, the NLA is responsible for planning Japan's three metropolitan area (NCR, Kinki, Chubu), and five of its non-metropolitan regions (Hokuiku, Chugoku, Shikoku, Kyushu, Tohoku). The EA is concerned with national parks and the development of regional environment management plans (REMP's). The Okinawa and Hokkaido development agencies deal with the development of these respective areas.

At the local level a two tier government system, prefectural and municipal operates. The ten designated cities have financial resources to carry out public works without central government support. However local autonomy is otherwise often undermined by central government financial resources.

SUMMARY OF PLANNING SYSTEM (See Fig. 2.6)

ENVIRONMENTAL POLICY

Having understood the interest groups involved environmental problem and Japan's planning system, understanding of Japan's policy planning and the implementation would be easier.

15. Ibid.

Environmental basic law, the most powerful Japanese environmental measure ever to be enacted was passed by the DIET in November 1993. which will set the foundation for future environmental policy. Undoubtedly passing of this law is a major step in the direction of environmental protection, but a discussion of this bill will be done later, as the implementation of these laws will take place slowly, and its impact could only be understood with time.

INSTITUTIONS INVOLVED IN MAKING ENVIRONMENTAL POLICY

Environmental policy in Japan's is not the concern of one ministry or agency. Though in 1971 environmental agency was created to transform the decentralized and ad hoc nature of environmental concern into a more formal and centralized procedure and institution. The EA has no jurisdiction over aircraft noise, discharge of hazardous substances, generation, storage and disposal of radio-active waste, pollution control in specified factories, special government financial measures for pollution control, settlement of pollution disputes has only advisory role in regulation of agricultural, chemical, waste disposal and sewage and marine pollution.¹⁶

16. M.Reich, 'Environmental Policy and Japanese Society: Part 1 Successes and Failures', International Journal for Environmental Studies, Japan, Vol.20, 1983, pp.191-93.

ENVIRONMENTAL LAWS (See Appendices - B)

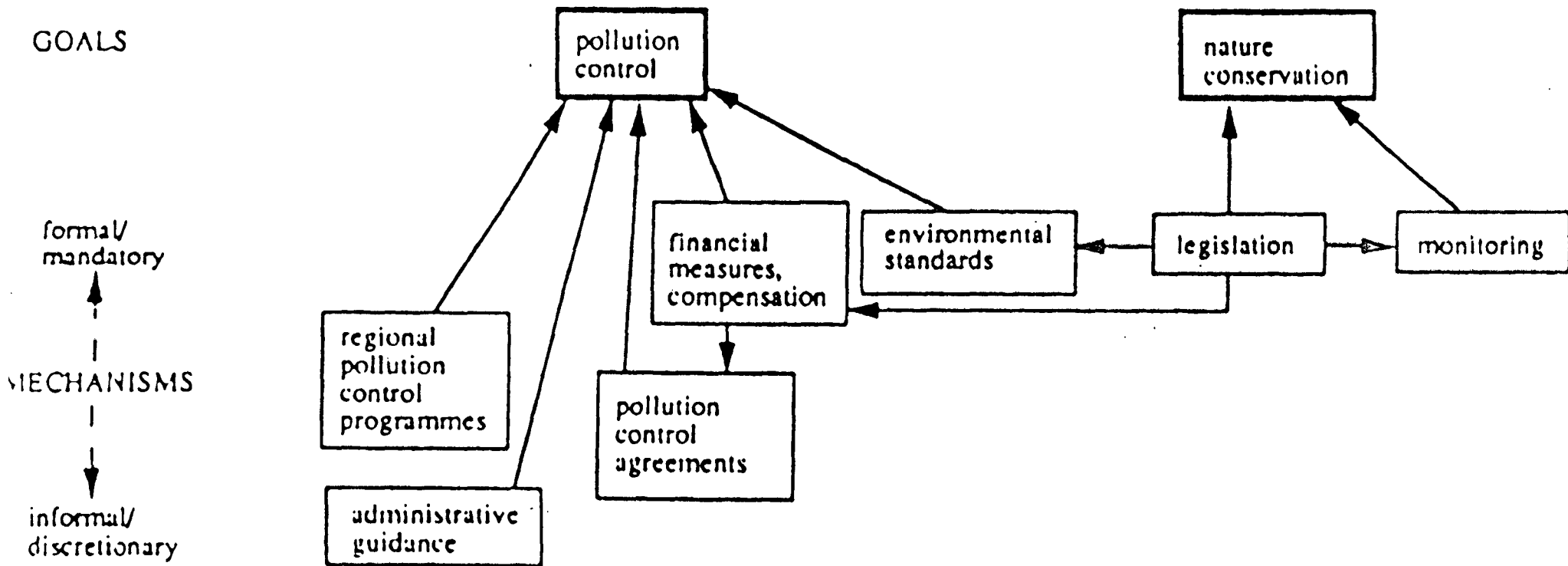
Environmental law is an indicator of the environmental policy of a country Japan's environmental law is based on basic law for environmental pollution control(1967). As mentioned earlier after the earth summit of June 1992 Japanese Diet passed its basic environmental law in Nov 1993, which has gone even further in its effort to preserve environmental quality. Looking at these laws one can say Japan has instituted one of the world's most comprehensive environmental legislative system.¹⁷

The environmental laws can be divided into national and local environmental laws. The local environmental laws have played very important role in Japan. In a number of cases the local laws of Japan have been much stricter than the national laws and have been followed by national government to improve their standard. For example the Tokyo Metropolitan government was a forerunner in enacting such ordinances as regulation (1947), noise (1954). smoke and soot (1955) and environmental pollution law of 1969 was special in the sense that it aimed to prevent all pollution that could disrupt the quality of life of Tokyo citizen, and

17. H.Imura, Asian Survey, Vol.XXXIV, No.4, The Regents of the University of California, California, April 1994, pp.355-56.

Fig: 2.7

MECHANISM FOR POLICY IMPLEMENTATION



was unique in the sense that it stressed environmental issues over the need for economic growth.¹⁸

MECHANISM FOR POLICY IMPLEMENTATION (See Fig. 2.7)

Environmental policies main emphasis in Japan is on control of pollution through the application of strict environmental standard and the use of advanced pollution control technology. The implementation of this system is supported by legislative enforcement and administrative guidance. Anticipatory policies such as nature conservation EIA and REMP are relatively underdeveloped.

ENVIRONMENTAL STANDARDS

There are two kinds of standards in Japan. Emission standards and environmental quality standards (EQS). The former are legally finding limits on the concentration of pollutants in the effluent from the given source.¹⁹ Emission standards are set both by the central government EA and local authorities EQS is set by EA in consultation with other ministries.²⁰ EQS pertains to water quality, air quality permissive level of noise and offensive orders in

18. Julian Gresser, K.Fujikura and A.Morishima, Environmental Law in Japan, Cambridge: Massachusetts, 1981, p.154.

19. Julian Guesser, et al., 1981, p.246-47.

20. Ibid., p.257.

exceptionally polluted areas. Total amount of emissions are also controlled.

REGIONAL POLLUTION CONTROL PROGRAMMES

This programme is to facilitate the attainment of EQS in extremely polluted areas. Under article 19 of basic law establishment of RPCP is required. In this programme the local authorities are required to establish comprehensive measures for environmental pollution control. It is financed by the national and local government.

POLLUTION CONTROL AGREEMENTS

This is an agreement between the local authorities and Industries regarding mutually acceptable level of noise, odour, air and water pollution. Though in the early periods these agreements were not stringent slowly the local authorities mandated strict emission standard, use of low Sulphur fuel and advanced pollution prevention technologies. Some agreements also specify strong enforcement measures like liability for damage, fines, cancellation of contract or even interruption of municipal water supplies.²¹

COMPENSATION SYSTEM

The compensation system has till recently been an important part of environmental policy in Japan. This system was meant to cover the loss incurred to the pollution

21. Julian Gresser, et al., 1981, pp.249, 349.

related victims and its family. The first national system was set up in December 1969 by the law for special measures for the relief of pollution related health damage. The creation of EA gave a boost to this system. The big four pollution trials recognized the plaintiff's claim for both consolation money and compensation for loss of income. After this the pollution related health damage compensation law was enacted in October 1973.²²

Compensation was paid for two types of pollution related disease.

1) areas in which statistically significant correlation of pollution and particular disease (eg. chronic, bronchitis, asthma) has been identified.

(2) In which disease have been related to specific pollutant (eg. cadmium or mercury poisoning). The procedure for receiving compensation was getting a certificate from the local authorities. Once the victims are certified they were entitled to compensation for medical cost, disability payments and in case of death, condolence payments.²³

22. T. Tsukatuni, T. 'Current Prospects for the Japanese Compensation of Pollution Related Health Damage, Discussion Paper, Kyoto Institute of Economic Research, Kyoto, Sept. 1987, no.237, pp.1-3.

23. H. Weidner, 'Japan: The Success and Limitation of Technocratic Environmental Policy. Policy and Politics, Vol.8 (1), 1986, pp.53-56.

NATURE CONSERVATION

The nature conservation act of 1972, gave EA responsibility for planning and promoting basic policies for nature conservation and for coordinating the conservation related activities of other agencies. Article 5 of the law also requires the EA to under take surveys of the natural environment (the national green census). These surveys cover such items as flora and fauna, habitat and growth of important plant communities and areas of natural scenic beauty.

In order to conserve the natural environment the EA can designate conservation areas. The prefectural authorities also have power to designate natural conservation area in March 1989, 501 such area covering, 72, 092 has existed.²⁴

ADMINISTRATIVE GUIDANCE

Administrative guidance in Japan is used for the enforcement of pollution control policies. This is done by various method like loans, grants, subsidies, tax incentive and license approval.²⁵

ENVIRONMENTAL MONITORING

Environmental monitoring is done in Japan through the control and use of information. It helps to monitor changes

24. Environmental quality in Japan, et al., 1987, pp.203-212.

25. Ibid., p.283.

in environmental quality, provides a basis for communication between the decision makers and the public evaluate the effectiveness of environmental policies and identify the need for new policies.

IMPLEMENTATION

Any policy in itself does not serve any purpose. An effective implementation of the policy alone can solve the problem .

A look at Japan's environment protection related laws and remission standards will make anyone believe that solving environmental damage would be quite easy for this country, but it is not so. Japan has been successful to a reasonable extent, in solving pollution problems in some areas but a number other areas require a lot more attention. The main reason for this problem is the difficulty which arises in implementation of these policies. Most of the problem arise due to high priority given to economic development and not to environmental protection.

A number of problem hinders the implementation of environmental policy in Japan. These problems start right from the point of interest groups interaction where the process starts and can be seen till the end point where the policy is executed.

The interest groups interaction are conditioned by several factors. In Japan there is a strong link between government and industry, both of which see economic growth as their primary goal. Secondly LDP has dominated Japanese politics for a very long time. The relatively weak power base of citizen, the environmental agencies lack of influence and the unwillingness of court to check the power of administration and industry have reinforced the status quo. Fourthly environmental awareness varies between different groups and affects their approaches to environmental problems. Though the local authorities have been more close to the problem and have taken a lead in promoting environmental concern, but even they cannot go against the national policy as a significant percent (around 40%) of their project is financed by the national government.²⁶

Effective implementation of a policy requires proper planning. In Japan planning system is highly centralized and plan making is often a struggle between ministries with conflicting policy interest and directions. This creates problems for environmental agency on a number of policy matters. As these ministries are quite powerful compared to

26. T. Kiyooki, Public Administration in Japan, Tokyo, 1987, p.99.

the environmental agency, environmental management becomes difficult in Japan. So we can see that in Japan EA's attempt to overcome jurisdictional rivalries and promote an integrated environmental policy have been continually hampered by conflicting vested interests. Planning at local level also suffers due to financial control by the centre. Some other problems associated with policy making in Japan till eighties have been.²⁷

- (1) Lack of awareness of ecological issues with potentially serious implications for nature conservation (as it only attaches significance to known pollution causes which affect human health and living environment).
- (2) Environmental laws emphasize remedial pollution abatement measures rather than anticipatory or preventive measure.
- (3) Public participation in policymaking is extremely limited, it is generally restricted to letters of complaint, opinion, surveys and public hearing.

Implementation of environmental standard faces a number of problems²⁸

27. K. Kihara, 'Japan's Environmental Policies: The Last Ten Years', Japan Quarterly, 1981, pp.501-508.

28. D.R.Kelley, K.R.Stunkel, and R.R.Wescatt, 'The Economic Superpowers and the Environment: The U.S., the Soviet Union and Japan', San Francisco, 1976, pp.396-407.

- (1) There is no provision to control the total amount of pollution discharged except in already severely polluted areas.
- (2) Only the concentration of pollutants at outlet is considered which allows a factory to emit the original amount of pollutants while conforming with the standards by simply diluting its waste water. Ambient standards do little to reduce the impact of large quantities of pollutants annually settling in the eco-system.
- (3) The concept of environmental capacity has not been applied.

The regional pollution control programme suffers from the problem of its over-dependence on central government support which has resulted in programmatic uniformity and subservience to industrial interest. Though short term measures have taken long range issues like land use and urban design has been neglected. There is too much emphasis on attainment of a limited number of environmental quality standards to the detriment of wider environmental concern.²⁹

Pollution control agreement suffers from the problem of legal validity, scholars believe that local authorities do

29. Julian Gresser, et al., 1981, p.262

not have the legal power to impose fines or other penalties by contract.³⁰

Although Japan's compensation system represented a positive step towards integration of environmental and social cost into economic development in 1986, the future of compensation in cases where statistically significant correlation of pollution and particular disease (eg. chronic bronchitis asthma) has been become blurred. It was decided that no new patients should be identified. The law was amended in 1987 and it became effective in March 1988.³¹

Japan has implemented a wide range of measures to ensure the conservation of natural environment and many parts of national parks are being extensively developed. But native conservation areas are threatened with logging, conversion of primary forest to plantation, rural revitalization, river management projects and shoreline conversion only five of national parks are recognised by the international union for the conservation of nature as national parks using criteria established by United Nations list of national parks and equivalent areas seven more are

30. Ibid, p.249.

31. T.Tsuktani, 'Compensation System for Environmental Damage and Other Economic Incentive in Japan', Discussion Paper No.275, Kyoto Institute of Economic Research, Kyoto, 1989, pp.1-3.

recognised by the IUCN as scientific/Nature reserves. These areas combined cover only 59,335 has roughly 0.015 percent of Japan's total area.³²

Administrative guidance suffers from the problem of flexibility as there is no serious threat of persecution. Even when industry commit a serious breach under a pollution control law, the government responds by negotiating, exhorting and giving constructive suggestions but seldom by seriously threatening to prosecute.³³

Environmental impact assessment has yet not been enforced in Japan. Environmental monitoring can be highly effective if EIA is introduced.³⁴

One of the most important factor responsible for implementation of a policy is the creation of finance for a project. The level of funding allocated for pollution control and environmental conservation reflects its relative importance in terms of national priorities. In 1962, only 0.2 percent of Japan's GNP was allocated for pollution

32. M. Suzuki, 'Biological Diversity and The Conservation of Natural Habitats - The Role of Japan, Breifing Paper for International Peoples Forum on Japan and Global Environment, 8-10 Sept. 1989, Tokyo, pp.26-8.

33. Quality of Environment in Japan, et al., 1987, p.283.

34. B.F.D. Barrett, 'Environmental Impact Assessment and Environmental Policy in Japan', Kyoto, January 1989.

Fig: 2.8

National government environment-related expenditure (¥1bn)

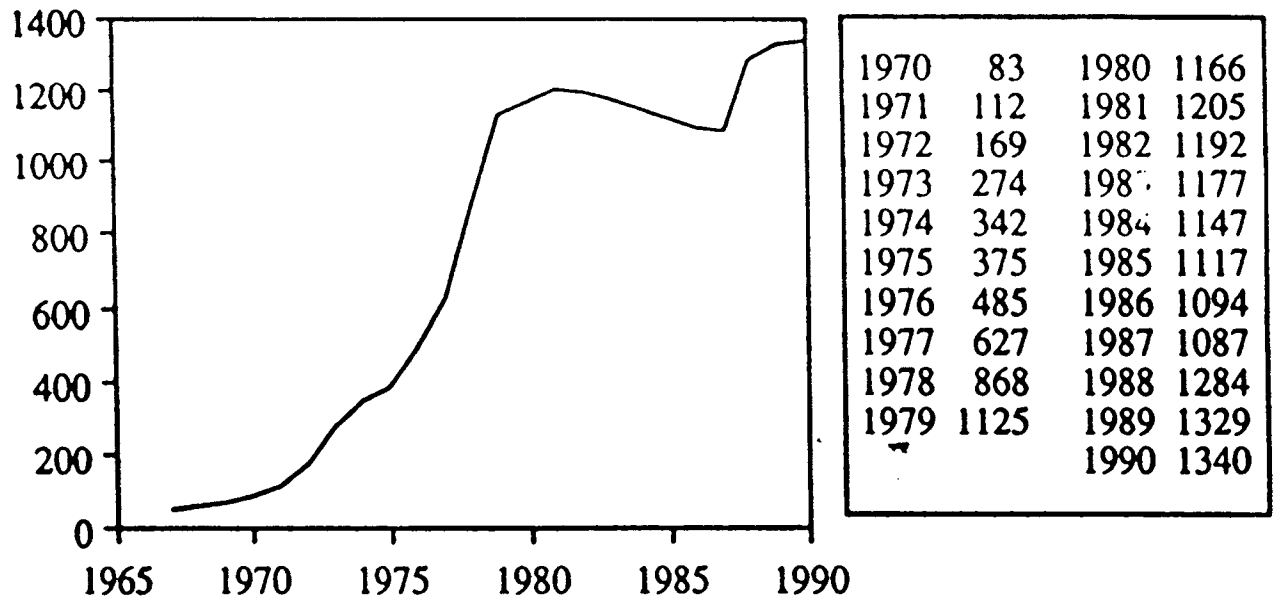


Fig 2.9

Expenditure by ministry/agency (1988)

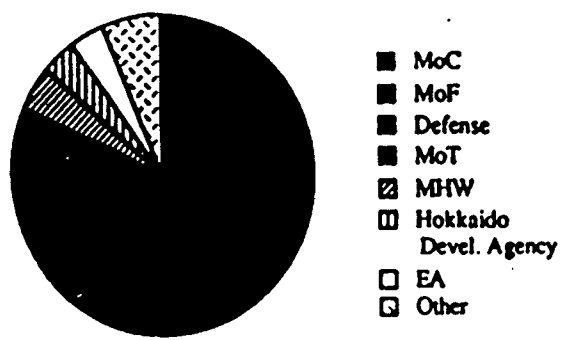
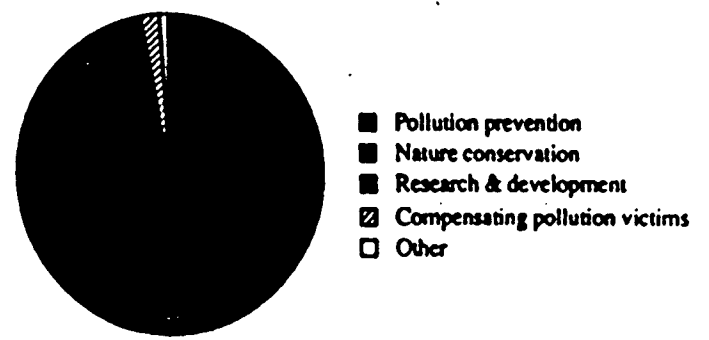


Fig: 2.10

Expenditure by subject (1988)



Source: Environment Agency, various publications.

Fig : 2.11

Environment Agency budget (¥1bn)

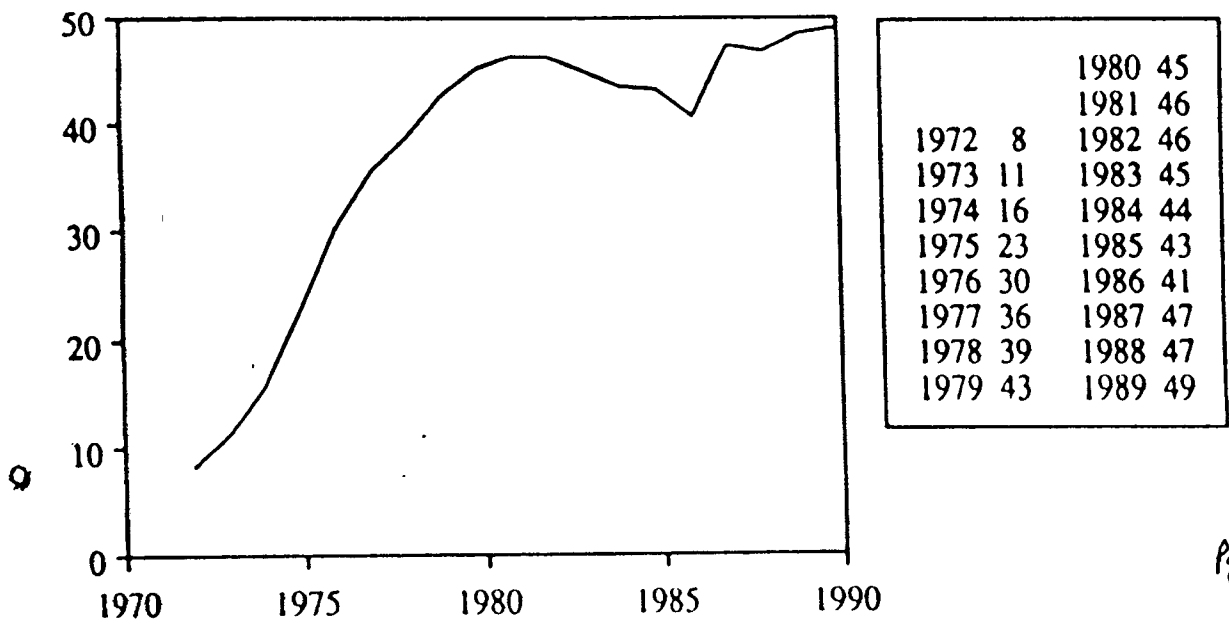
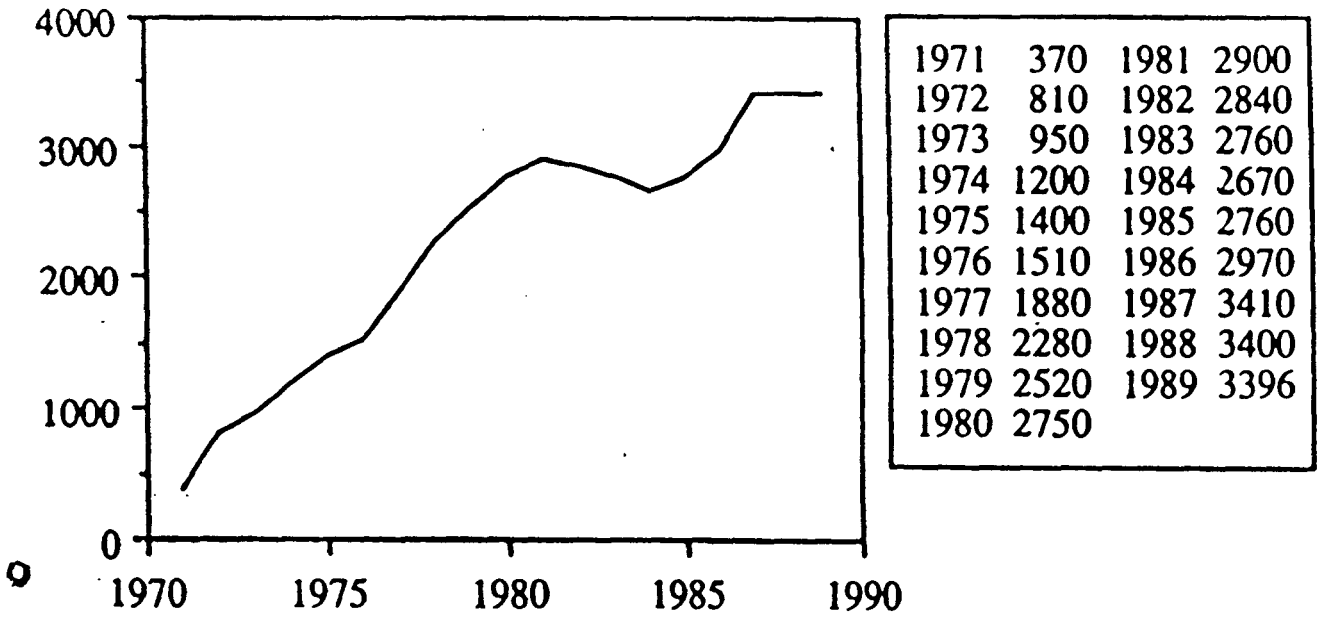


Fig: 2.12

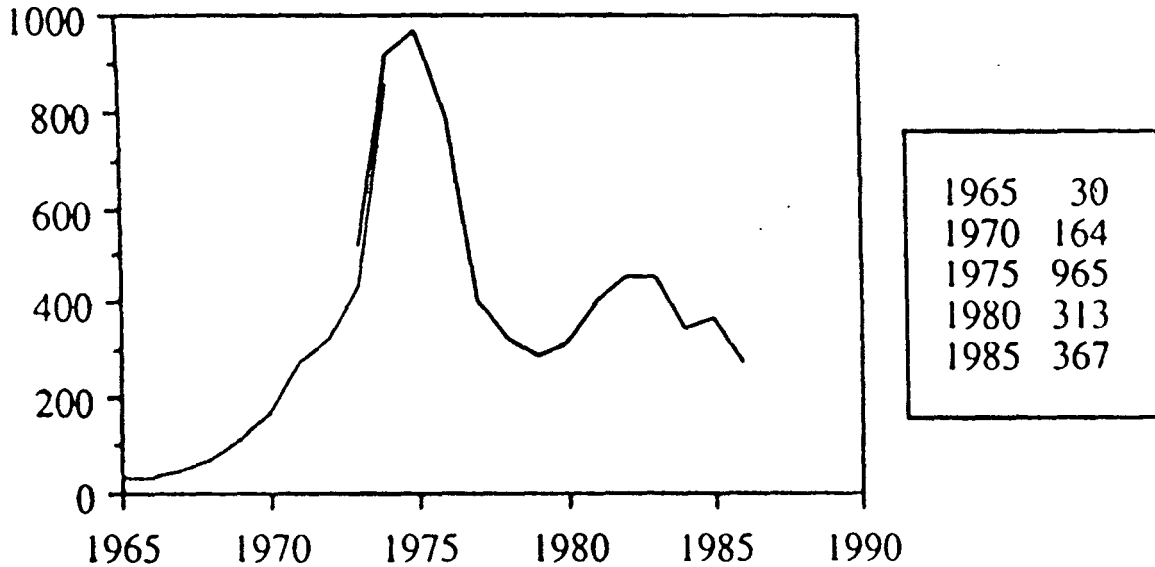
Local authority environment-related expenditure (¥1bn)



Source: Environment Agency, various publications.

Fig: 2.13

Industry environment-related expenditure (¥1bn)



control.³⁵ In 1988 anti-pollution spending represented about 1.9 percent of ¥ 336.5 trillion yen GNP. Comprising the following spending Ministries ¥ 1.3t, associated institutions ¥ 1.4t, local authorities ¥ 34 t, industry ¥ 0.3 t.³⁶ (See Fig. 2.8 to 2.13)

- (1) National government environment related/(1970-90) expenditure (1965-1990) - Fig 2.8
- (2) expenditure by ministry/agency - Fig: 2.9
- (3) expenditure by subject - Fig: 2.10
- (4) environment agency budget - Fig: 2.11
- (5) Local authority environment related expenditure Fig: 2.12
- (6) Industry environment related expenditure. - Fig: 2.13

The diagrams above shows that government spending for environmental matter rose by about 25 percent annually in 1970's, from ¥ 836 in 1970 to ¥ 1.2 trillion (2.4 percent of national budget) in 1990. But when the areas for which the budget was allocated is seen we find that about 85 percent of this budget is allocated to pollution prevention project: of which about 70 percent is for sewage development and rest for noise abatement around airport. About 10 percent is for

35. M.Hashimoto, 'Development of Environmental Policy and its Institutional Mechanism of Administration and Finance on Environmental Management for Local and Regional Development', UN Environment Programme, 9-13 June 1985, Nagoya, p.43.

36. Ibid., p.44.

CHAPTER III

**POLICY FOR PREVENTION OF
WATER RESOURCE
CONTAMINATION**

nature conservation and the rest is to promote research and development, compensate pollution victims, monitor and enforce environmental offenses and establish standards.³⁷

At the local level, expenditure by local authority rose rapidly in the 1970's from ¥ 0.4 trillion in 1971 to almost ¥ 2.8 trillion. By 1988 it had risen to ¥ 3.4 trillion approximately 6% of the local authority expenditure.

Private firms spent almost ¥ 5 million on pollution control and about ¥ 4 trillion in 1980's. Since 1975, industry expenditure has gone down.³⁸

From the expenditure it can be inferred that a large amount of this money was spent on pollution prevention measures. The other areas like nature conservation, research and development and compensation of victims however, have received comparatively less amount. The spending on nature conservation and Research and development is very important to avoid crisis.

Industries have also spent considerable amount in pollution prevention. But their expenditures has shown a diminishing trend since 1975. Japan has adopted the

37. M.Hashimoto, pp.45-47.

38. T.K.Corwin, 'Economics of Pollution Control in Japan', Environmental Science and Technology, Vol.14, No.2, 1980, pp.154-157.

polluter pays principle which specifies that the pollution control cost's should be borne by the polluter and thus by consumer through increased price, rather than by government/tax payers.

CHAPTER III

POLICY FOR PREVENTION OF WATER RESOURCE CONTAMINATION

WATER RESOURCE

Water is one of the essential resources for human life. Its quality as well as quantity must be maintained at the level dictated by its intended purpose - whether for drinking and daily life, industry, irrigation or a variety of other application.

Japan is blessed with water of naturally good quality except for high turbidity in river water during flood seasons. Sample of water quality are recorded in Table 1, which show that in general water is clear and soft. Unfortunately the outstanding advances made by industry, and the improvement in the standard of living, together with the tendency of both population and industry to gather in the major cities, have caused increases in industrial effluents and household waste. Consequently, water quality in public water areas has degraded rapidly since 1955.

In certain areas serious contamination problems have arisen, and have had serious social consequences. The accumulation of cadmium in the human body inflicts damage to bones and kidneys. A well known example of the damage caused by cadmium is itai-itai disease, which occurred in

the basin of Jintsu river in Tuyama prefecture. Mercury often results in nervous or brain disorder when it accumulates in human body. Minamata disease, which broke out in the coastal areas of Yatsuhira, Kumamoto prefecture, and in the basin of the Agano river, Nigata prefecture caused by methyl mercury which has a very high degree of toxicity.

Much progress has been made, however, in overcoming such critical condition, thanks to strict regulation, the development of treatment facilities and conservation planning, and water pollution problems have now entered a new phase. But problems are not completely over. With the process of industrialisation continuing unchecked the problem of water quality should be looked into anew. The effort of the government and people united is very much required to solve the problem. A number of areas require special attention.

OVER VIEW OF JAPAN WATER RESOURCES

Surrounded on all sides by ocean, run through with rapid flowing rivers, clothed with marshes, and swamps of all sizes, Japan is nothing if not rich in water resources. Japan consists of four main islands comprising a total land area of about 380,000 km². The island extends over 2000 km in length from north east to south west, while there width is only about 300 km at the maximum. The mountains which

cover 75% of total land area, generally have steep slopes; their heights exceed 3000 m in the central region.

Japan is located at the north eastern end of monsoon area, which includes Korea, south eastern China, India and south east Asian region. The climate is generally hot and humid although sharp contrast exist between the pacific ocean side and the sea of Japan side due to separation by rather high mountain ranges. There are four distinct seasons. The heavy snow fall during winter season and heavy rainfall during rainy and typhoon season provide water to Japan. Japan has an annual precipitation of about 1800 mm. The main water resources of Japan are rivers, lakes, underground water and sea.¹

PROBLEM OF CONTAMINATION OF WATER RESOURCES

The contamination of water resources became a source of anxiety for Japanese people and the government. The seriousness of the situation was realized for the first time when it resulted in the out break of disease like Minamata and itai-itai. Since then the government took various initiative in the shape of water pollution control laws, and subsidizing the water control measures etc.

1. Yutaka Takahasi, Overview of Rivers and Water Resources in Japan, International Journal of Water Resource Development Butterworth, March 1988, pp.2-5.

Table - 1

Quality of raw water, 1982-83.

	Ara river (Tokyo)	Shinano river (Niigata)	Yodo river (Osaka)	Groundwater (Kumamoto)
Turbidity (range)	3-930	4-1 000	4-550	0-0
(mean)	28.0	34.1	13.1	0
pH value (range)	7.6-6.8	7.5-7.0	7.7-6.7	6.9-6.8
(mean)	7.2	7.1	7.2	6.9
Alkalinity (mg/l)	41	22	33	53
Nitrite and nitrate nitrogen (mg/l as N)	2.06	0.81	0.77	1.36
Ammonia nitrogen (mg/l as N)	0.32	0.11	0.71	-
Chlorine ion (mg/l)	0.032	12.0	12.6	10.4
Organic substances (KMnO ₄ consum mg/l)	7.6	8.1	9.4	0.3
Hardness (mg/l as CaCO ₃)	71	33	39	68
Iron (mg/l)	0.87	0.05	0.96	<0.01
Manganese (mg/l)	0.10	0.04	0.07	<0.01

Table 2. Environmental quality standards (maximum mg/l) relating to the protection of human health.

	Cadmium	Cyanide	Organic phosphorus	Lead	Chromium (hexavalent)	Arsenic	Total mercury	Alkyl mercury	PCBs
Standard value	0.01	ND	ND	0.1	0.05	0.05	0.0005	ND	ND

ND: Not detectable.

Table - 3.

Examples of environmental quality standards relating to the living environment (rivers).

Category	Purpose of utilization	pH	Biochemical oxygen demand (BOD)	Standard value		Number of coliform groups
				Suspended solids (SS)	Dissolved oxygen (DO)	
AA	Water supply, class 1, conservation of natural environment, and uses listed in A-E	6.5-8.5	1 mg/l or less	25 mg/l or less	7.5 mg/l or more	50 MPN/100 ml or less
A	Water supply, class 2, fishery, class 1, bathing, and uses listed in B-E	6.5-8.5	2 mg/l or less	25 mg/l or less	7.5 mg/l or more	1 000 MPN/100 ml or less
B	Water supply, class 3, fishery, class 2, and uses listed in C-E	6.5-8.5	3 mg/l or less	25 mg/l or less	5 mg/l or more	5 000 MPN/100 ml or less
C	Fishery, class 3, industrial water, class 1, and uses listed in D and E	6.5-8.5	5 mg/l or less	50 mg/l or less	5 mg/l or more	-
D	Industrial water, class 2, agricultural water, and uses listed in E	6.0-8.5	8 mg/l or less	100 mg/l or less	2 mg/l or more	-
E	Industrial water, class 3, and conservation of environment	6.0-8.5	10 mg/l or less	Floating matter as garbage shall not be observed	2 mg/l or more	-

Notes:

Conservation of the natural environment:

Water supply, class 1:

Water supply, class 2:

Water supply, class 3:

Fishery, class 1:

Fishery, class 2:

Fishery, class 3:

Industrial water, class 1:

Industrial water, class 2:

Industrial water, class 3:

Conservation of environment:

Conservation of scenic spots and other natural resources.

Water supplied after undergoing simple purification processes such as filtration.

Water supplied after undergoing a normal purification process.

Water supplied after undergoing a sophisticated purification including pretreatment.

For aquatic life, inhabiting oligosaprobic water and those of fishery, classes 2 and 3.

For aquatic life, such as the salmon family and sweetfish inhabiting oligosaprobic water, and those of fishery, class 3.

For aquatic life such as carp and crustaceans inhabiting eutrophic water.

Water supplied after undergoing a normal purification process such as sedimentation.

Water supplied after undergoing a sophisticated purification process using chemicals.

Water supplied after undergoing special purification processes.

To the extent at which no unpleasantness is caused to people in their daily lives (including strolling along the beach).

Table:

Rates of Hazardous Substances Exceeding
Environmental Quality Standards

Item	FY	Number of survey samples (A)	Number of Samples exceeding environ- mental quality standards (B)	Rate (%) (B)/(A)
Cadmium	1971	15,944	114	0.72
	1990	25,485	11	0.04
Cyanogen	1971	12,453	142	0.14
	1990	22,755	1	0.00
Organic acid	1971	5,116	11	0.22
	1990	7,183	0	0
Lead	1971	14,515	202	1.39
	1990	25,493	3	0.01
Chrome (sexivalent)	1971	11,532	15	0.13
	1990	22,414	1	0.01
Arsenic	1971	11,530	48	0.42
	1990	23,275	3	0.01
alkyl mercury	1971	5,624	0	0
	1990	6,399	0	0

Fig 43(c)

To understand the policy of the government regarding water resources and its impact we have to compare water quality when the government started taking measures to prevent water pollution with the present water quality. Water quality can be seen in two areas:

(a) Water quality relating to human health;

(b) Water quality relating to environment. (See Fig.

(a) As can be seen in the diagram, the percentage of non-compliance with the environment quality standard in water quality relating to human health since the establishment of environment agency in 1971 has continuously gone down and today it is very low. As regard pollutants toxic to human health, the rate of samples which exceed environmental quality standards is exceedingly low (Table 1.2)

(b) As regards the water quality associated with conservation of the human living environment, the rate of achieving environmental quality standard was only 73.1% of 3,103 water bodies (including 2,389 rivers, (Table 3) 129 lakes and reservoirs and 585 sea regions) suggesting that about one fourth of all water bodies (Table 4) did not satisfy environmental quality standard. By type of water body, rivers accounted for 77.6% lakes and reservoirs 44.2% and sea regions 77.6%, and the

achievement rate was low.² Particularly for enclosed water areas such as lakes and reservoirs bays, island seas and so on and medium small rivers in cities. (See Table: 3)

The comparison shows that there is a significant improvement in the quality of water (especially in the case water quality relating to human health). Though water quality relating to environment has also improved but it is not satisfactory and more effort is required. The importance of giving priority to further improving the water quality can be realized by seeing into the extensive damage caused by water pollution in Japan.

DAMAGE BY WATER POLLUTION

Pollution of Drinking Water

The drinking water, which is so essential for life gets polluted which has ill effect on the health of the people. In the fiscal year 1990, drinking water was affected by accidents in which the water source was affected at 73 places. Offensive growth of algal affected in 98 water utilities (with an affected total population of about 21,600,000). The purification process is expensive and it poses heavy burden on the water works.

2. Quality of Environment in Japan, Environment Agency, 1992, pp.497-98.

Pollution of industrial use water

Surface river and stream water (of which about half is from industrial use water supplies) which accounts for 70% of all industrial water is affected by the pollution of river water. Also in the qualitative treatment of water, there are cases in which problems in treating water arises due to the generation of sludge by river pollutants.

Damage to Agriculture

The flow of polluted urban water in agricultural water has given rise to problems in terms of agricultural production, the living environment of rural communities and so on. The damage caused by polluted urban water is the greatest accounting for 84.4% of total area of affected farm land.

Damage to Fisheries

The damage caused by water pollution to fisheries take on the following patterns:

- (a) The deterioration of fishing grounds and damage to fishing in conjunction with the sedimentation of the floatage on the water surface and throw away.
- (b) Extinction of aquatic organism, growth importance etc. due to oil pollution, the generation of red tides etc.

- (c) Instability of hauled fish or drops in fish price due to the bio-accumulation, absorption etc., of heavy metal, PCB's and other toxic pollutant.
- (d) Staining erosion etc., of fishing vessels and gear by oil pollution and so forth.

An out line of the idiopathic damage to fisheries due to water pollution, etc., in fiscal 1990 is given below:³

Number of cases occurred	295 (285 in fiscal 1989).
Damage by oil pollution on sea surface	48 (71 in fiscal 1989)
Damage by red tides	42 (22 in fiscal 1989)
Damage in value	¥ 3,321,600,000
Damage by oil pollution	1,250,000,000 (¥ 1,973,000,000 in fiscal 1989)
Damage by oil pollution	¥ 1,250,000,000 (¥ 737,000,000 in fiscal 1989)
Damage by red tides	1,650,000,000 (¥ 819,000,000 in fiscal 1989)

Other Damage

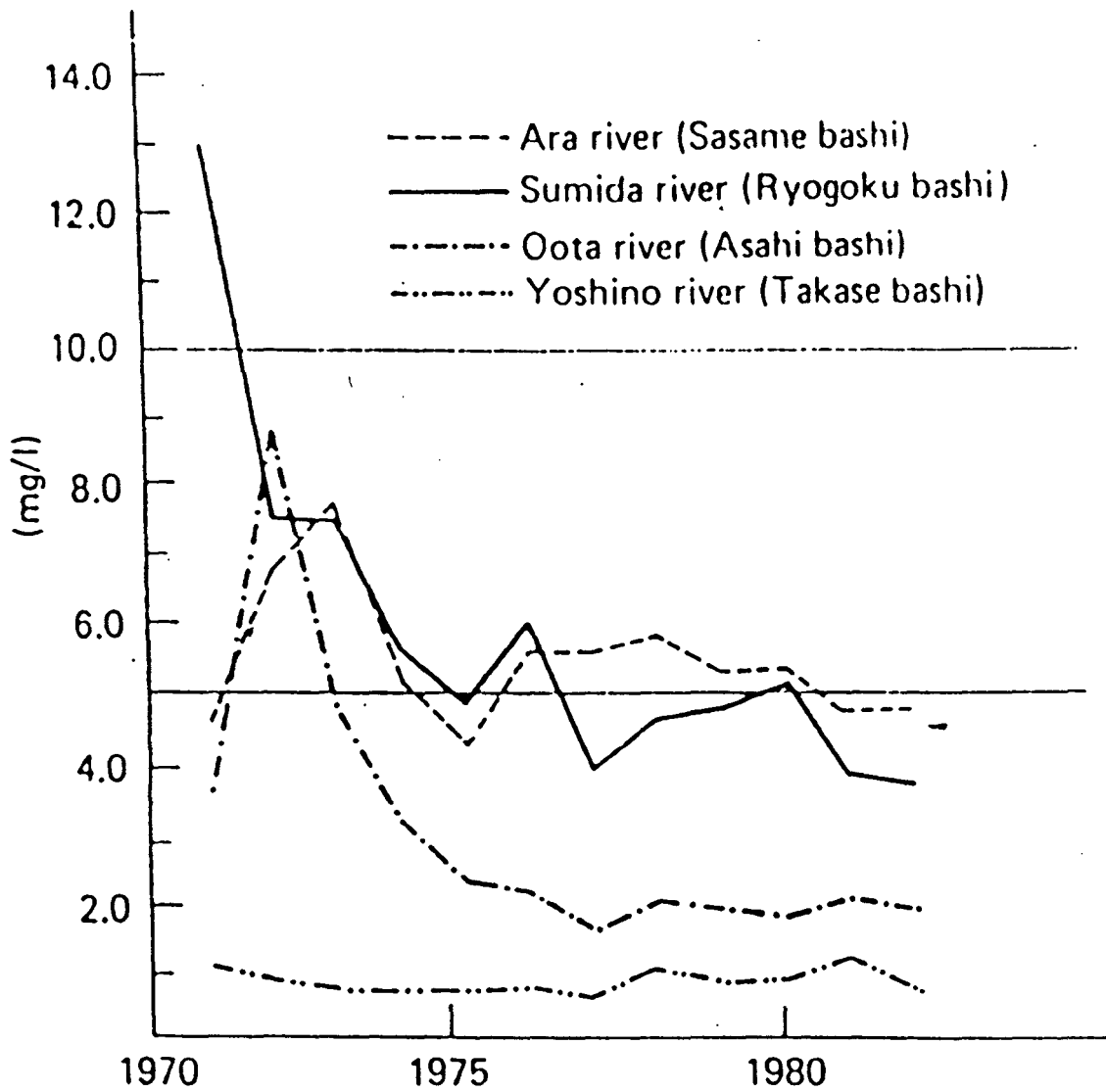
According to water survey conducted by environment agency on bathing beaches and so forth (in fiscal 1991) none of the 415 sampled bathing beaches was found to require improvement, the first time ever since the environment agency started survey.⁴

3. Ibid., p.505.

4. Ibid., pp.501-505.

Fig 3.1

CHANGE IN AVERAGE LEVEL OF BOD IN RIVERS



WATER QUALITY STANDARD

In order to promote the control of water pollution, law relating to water pollution control were enacted in 1958, and efficient standards and regulations were established for designated areas. These were later amended and the water pollution control law as a basic law laying down comprehensive measures for controlling surface water pollution was adopted.

There are two category of standards: the protection of human health and the conservation of living environment. The environmental quality standards relating to the protection of human health is uniformly applicable to all public water. The standard for nine substances is in table (pg.41). The standard relating to living environment vary according to type of water areas, such as rivers, lake and marine areas, and use such as drinking water supply, industrial water, agricultural, irrigation and swimming pools. The value of several indicators, such as BOD (Bio Chemical Oxygen demand) and COD (Chemical Oxygen demand) are given in the

Fig 3.1

These standards are enforced by the environment agency of the central government where water bodies span prefectural boundaries, otherwise relevant governor of

prefectural oversee them. In Japan, target dates are set to achieve the required standard.

Counter measures against water pollution

In order to prevent the pollution of water and to attain the required environmental quality standard various measures have been taken in accordance with the water pollution control law. (See Appendices

Effluent control and effluent standard

The first step towards water pollution control law was effluent control on waste discharge into public water and factories. This subject was first addressed in water pollution laws enacted in 1958; the more recent water pollution control law has required severer effluent control over a broader range of activities.

The law lays down uniform national effluent standard for specified facilities from which effluents are discharged into public water. The government has specified uniform effluent standard for 23 items, as follows: Cadmium (0.1 mg/1 or less), Cyanide (1), Organic Phosphorous (0.5), Arsenic (0.5), total Mercury (0.005), alcy1 Mercury (should be undetectable), PCB (0.003), pH (5.8-9.0), BOD (160, average 120), COD (160 average 170), SS (200 average 150), normal hexane extracts (mineral oil 5, animal and vegetable

fats 30), Phenols (5), Copper (3), Zinc (5), Iron 10, Manganese (10), Chrome (2), Fluorine (15) and members of Coliform groups (3000/ml). In addition prefectural governor may issue ordinance for stricter effluent standards where natural standards are insufficient to attain appropriate environmental quality standards.⁵

Industrial plants and work shops including public sewerage systems must meet there effluent standards at the point of disposal by means of waste treatment if they discharge effluent into public water in response industries have developed and promoted waste treatment technology.

Prefectural governors have an obligation to ensure the monitoring of water for public use and to prepare water quality measurement plans according to the stipulations of the law.

Development of sewerage systems and night soil facilities

Sewerage system have the function of discharging urban waste into rivers or coastal waters after proper treatment. They therefore play an important role from the view point of both the improvement of the living environment and the preservation of water quality.

5. Yasuhiko Kobayash, Water Quality and Pollution Control, International Journal of Water Resource Development, Buttersworth, Vol.4, No.1, March 1988, pp.40-42.

Till early 50' s and 60's night soil was used as fertilizer in Japan. In addition, a system in which the night soil is hygienically collected and treated was often established and this also had some influence in delaying the development of public sewerage system. In 1985 about 36% of the total population enjoyed proper sewerage service which rose to about 45% in 1991. Government has endeavoured to develop sewerage system in urban areas and to adopt advanced treatment method for closed water areas. They are also trying to promote advanced method of night soil treatment and develop community scale sewerage system according to local condition.

Control of total amount of pollutants

Although recently water quality in Japan has generally been improving, it is still difficult to satisfy quality standards concerning the living environment in closed water areas. A closed area of water mostly surrounded by land such as lakes and reservoir, inland seas and bays cutting deep inland, pollutants are liable to collect there since the water in them does not mix with outside water.

Basic guidelines for reducing total chemical oxygen demand loads were introduced in Tokyo, Nagoya and Seto areas in 1979, and the prefectures concerned established master plans for reducing the total pollutant loads after 1980.

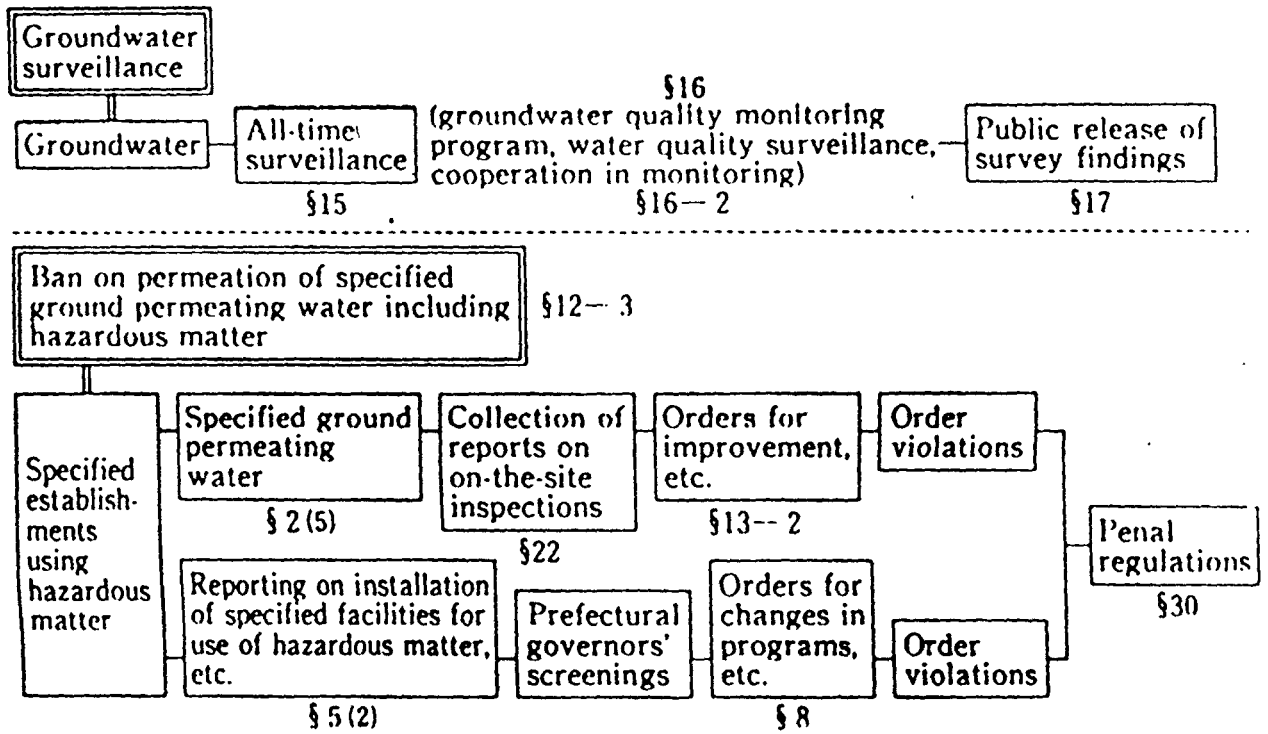
Table 5

GENERAL STATE OF GROUND WATER POLLUTION (1991)

	Substance	Number of municipalities surveyed	Number of wells surveyed	Number of wells exceeding environmental quality Standards	Excess rate (%)
hazardous substances	Lead	1,177	3,299	1	0.03
	Hexivalent chrome	1,199	3,361	1	0.03
	Arsenic	1,154	3,219	5	0.2
	Total mercury	1,148	3,229	4	0.1
	Trichloroethylene	1,519	5,817	44	0.8
	Tetrachloroethylene	1,519	5,817	79	1.4
tentative guidance items	1,1,1-Trichloroethane	1,133	4,514	1	0.02
	Tetrachloroethane	664	2,116	1	0.05

Fig 3.2.

SYSTEMS OF CONTROLS, ETC., UNDER THE
 REVISED WATER POLLUTION CONTROL LAW
 (Related to Groundwater)



Control are eutrophication it is necessary to reduce the level of nutrient salts. Research and investigations have been conducted into the necessary measures, environmental standards for nitrogen and phosphate in lakes and reservoirs were established in 1983 and effluent control was enforced in accordance with the law in 1984.

Preventing ground water contamination see Table 5. & Fig 3.2.

Ground water was widely used in the past due to its low cost, good quality, stable quantity and temperature. Due to excessive quantities of water pulled up the ground water level began to lower, causing water in the coastal areas to become salty and caused land subsidence.

In addition to these problems, a ground water contamination survey conducted by environment agency in 1982, disclosed that organic solvents such as trichloroethylene (TCE), tetrachloroethylene (PCE), and 1,1,1 trichloroethylene (MC) contaminated some ground water in municipal areas. Guidelines have been laid to control pollution resulting from the Penetration of Water Containing TCE (Urethane 0.03 mg/l), PCE (less than 0.01 mg/c) and MC (0.3 mg/l) and also targets have been set for discharging effluents: TCE (0.3 mg/l or less), PCE (0.1 mg/l or less) and MC (3 mg/l or less). Under the water pollution control law, it was decided to start performing constant surveil-

lance on ground water in fiscal 1989 and the quality of ground water is monitored. Water pollution control law was revised which came into force on Oct. 1, 1989. Measures like ban on the underground intrusion of water containing hazardous substance.

In addition, the environment agency established, Provisional environmental quality standards on carbon tetrachloride (April 1989). As regards dichloroethylene the agency has called on prefectures and administrative ordinance designated cities, to strive to understand the actual conditions of ground water pollution.

Special measures for lakes and reservoirs

Lakes and reservoirs are closed waters, and they are significantly polluted. The strengthening of restriction is beginning to show considerable effects on river and sea water, but there has been insufficient progress with lakes and reservoirs. Lakes and reservoirs have long retention time and tend to become stagnant, so besides the effects of pollutant inflow, internal production activity also contributes greatly to natural pollution. In 1984 the special measure law for conservation of lake and reservoir water quality was established.

For lake Biwa, and three other lakes and reservoirs, control were strengthened in October 1991 to implement

measures for reduction in the discharge of nitrogen and phosphorous, and the second lake and reservoir water conservation program was formulated in March 1992.⁶

Marine pollution prevention measure

(a) Ports and harbour and surrounding seas

The ports, harbours and surrounding areas are polluted by effluents from factories, business establishment and households. In ports and harbour along Tokyo Bay, Ise Bay, the Seto Inland sea etc. the generation of red tides etc. are a cause of the problem.

(b) Seas around Japan

The sea around Japan has been polluted by dumping of sludge and other pollutants containing heavy metals (like mercury and cadmium), waste oil and pollutants afloat on the sea surface (like plastic). Measures like (i) control on ships by

- Control on discharge and incineration of oil hazardous liquid and waste.
- Inspection for assurance of compliance with technical standards on the structure and facilities of ship.
- Issue of certificates for marine pollution prevention.

(ii) Rating of liquid matter is not yet rated.

(iii) Guidance on marine pollution prevention.

6. Ibid., pp.42-44.

(iv) Development of waste oil treatment facilities have been taken.⁷

Then we see that Japan has taken a number of measures towards improving its water quality. As a result of these measures the water quality has improved considerably. But this is not satisfactory. Though the quality of water associated, with human health has improved considerably, a lot of effort is required towards improving the quality of water associated with conservation of human living environment. The problems which come in the way of implemental of water quality protection measures are similar to the problems we have seen in the environmental policy implementation. In order to over come these hurdles Japan should strictly pursue these policies in the future:

(i) Pollution loads carried by effluents from plants and workshops should be more stringently restricted.

(ii) Pollution prevention facilities such as sewerage system should be improved and extended.

(iii) Household effluent treatment should be promoted.

Pollution caused by small and uncontrollable pollution sources are gaining in importance and it is becoming necessary to face the challenge directly. In areas

7. Quality of Environment in Japan, et al., 1992, pp.522-26.

where a public sewerage system is not established, the pollution load of night soil has been decreased by means of septic tanks and public night soil treatment facilities, but almost every where waste from kitchen and laundries is discharged directly into the environment without any treatment at all. Although this problem should be fundamentally solved by the development of sewerage system, it will take considerable time for these system to spread nationwide; therefore the immediate problem remains and is becoming acute.

- (iv) Direct purification measures should be undertaken for rivers, lakes and reservoirs, for example low grade dredging, the introduction of water from other rivers etc.
- (v) Land utilization plans must consider the environment, especially in urban areas.
- (vi) Further measures to prevent chemical contamination must be legislated.

SUMMARY AND CONCLUSION

Japan has been suffering from water pollution since the mid-1950's, and considerable improvements have been made through the regulation of effluents, setting environmental quality standards, control over the total amount of

pollutant control over the total amount of pollutants allowed, and the development of treatment facilities. There remains many areas, however, in which water problems are becoming more complex and acute. Eutrophication in closed water areas, insufficient improvement in lake and reservoir water and ground water contamination by chemicals are the major problems that Japan faces today.

To solve these problems and to bequeath better water to the future generations, governments, the private sector and the public at large must now fulfill their responsibilities to conserve the environment. In particular, governments bear a crucial responsibility for presenting comprehensive and well planned environmental measure with a long term perspective.

CHAPTER IV

WATER RESOURCE POLLUTION IN
JAPAN : CASE STUDY OF
MINAMATA AND LAKE BIWA

CHAPTER IV

WATER RESOURCE POLLUTION IN JAPAN : CASE STUDY OF MINAMATA AND LAKE BIWA

MINAMATA

..... I had never been sick before. Before this started, my hands, my legs every part of me was good and strong. Now I feel as if my body is gradually drifting away from this world. I have no grip. I can hold nothing in my hands or arms, not even my husband's hand, not even my own dear son. I might be able to endure that, but I can't even hold a bowl of rice - the chief food in my life- or my chopsticks. When I walk I don't feel as if I am walking with both feet on ground. I feel as if I'm on my own, a long way from the earth. I feel so alone¹.....

MICHIKO ISHIMURE

Kukai Jodo Waga Mina Mata Byo
(Suffering Sea, Pure land :
Our Minamata disease).

The above said lines by a patient suffering from Minamata disease clearly reflect what harm we can do to ourselves if we do not care for environment.

1. Norie, Huddle, and Micheal Reich, "Islands of Dreams: Environmental Crisis in Japan", 1975, p.102.

The disease which first spread in Minamata a small city on the western coast of 'Kyushu' was due to water pollution. The case study of Minamata disease in our work will serve as an important example to show

- (1) The extensive loss which water pollution caused in Japan.
- (2) The reaction of the government on the outbreak of the disease, and its handling of the problem which reflects its attitude towards environmental problems.
- (3) The reaction of the industry would show their attitude.
- (4) The reaction of the public, in important in understanding their attitude and social set up.

Though Japan has come a long way from the days of Minamata disease, certain problems and attitude of the interest groups continue to exist. In the words of Ui, Jun "The orientation assumed and the reaction exhibited by the business sector, governmental administration, the scientific community and public opinion were all typical of the Japanese socio - economic situation in relation to pollution issues".²

Nippon Chisso was a chemical industry established in Minamata city in the year 1908. It produced Nitrogen lime

2. Jun, Ui, 'Industrial Pollution in Japan', Tokyo, May 1994, p.103.

fertilizers and industrial chemicals including explosives. The industrial activity increased rapidly in the post war period due to the post war rehabilitation effort.³

Increased industrial activity due to post war rehabilitation effort resulted in increase in the quantity of effluents released into the bay. Few pollution cases were discovered in 1926 and 1943, for which fishermen were compensated, but deterioration of coastal waters continued and by 1949-50 sea breams, Shrimp, Sardines and octopus had completely disappeared from the Minamata bay.

Though the local people suspected industrial waste to be the cause, the factory management denied the responsibility of polluting the bay, claiming that the allegation lacked scientific basis.

This attitude of disclaiming responsibility by industries can be seen in most of the pollution cases of the time, clearly indicating the careless attitude of industry towards environmental problems of the time. In his book on 'Minamata' disease Dr. Masazumi Harada, assistant professor at the Kumamoto medical school and a researcher in electro-

3. Minamata case is one among the four big pollution cases in Japan.
In 1908 Nippon was called Japan Fertilizer company. Harada, Masatgime, Minamata (Minamata Disease), Tokyo : I wanami Sholen, 1972. also refer N.Huddle, M.Reich and Stislun, 1975 p.105.

nencephalography and neuropsychiatric defects associated with the intake of toxic materials, criticised the industry response. In his words "The facts as perceived by the fishermen based as they were on their direct experience, were indeed very scientific".

Damage to fisheries affected the income of the fishermen which, however, was nothing when compared to the diseases i.e disease of the Dancing cats,⁴ strange disease⁵ which came to be known as Minamata disease. The symptoms of the disease were found in human beings in the 1950's and discovered by Dr. Hamime Husokawa.⁶ The suffering of the human being can be understood by the statement of the patient in the beginning of this chapter. Moreover the rumour in the early years of 50's of contagious nature of disease isolated the patients from the society and added to their problems. Suspecting this disease to be contagious the area was quarantined. Later Minamata disease victims and their

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4. Dancing cat called because the impact of the disease could be seen in cats as they walked with a strange rolling gait.
 5. Strange disease - as symptoms of this kind were not seen before.
 6. Dr. Hajime Husokawa was the director of Minamata Chisso hospital at that time.

families formed the Mutual assistance society⁷ to negotiate with Nippon Chisso for compensation. Further, the suspension of fishing in the bay in 1957 resulted in financial loss to fisherman.

However, the industry was not ready to accept responsibility. It rejected the mercury theory.⁸ The subcommittee on Minamata disease food poisoning was formed in 1959, which on the basis of the pathological, clinical and experimental data concluded that the causative agent involved in Minamata disease was organic mercury. In 1959, when request for compensation was rejected on the ground that the cause of the disease is still not known the fishermen and their families demonstrated in front of the factory gate demanding compensation for economic loss (100 m yen), the company agreed to pay a solarium⁹ of \$ 206,000 to the pollution victims and \$ 98,000 to the fishermen. Though fishermen were not happy with the decision, they accepted it

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7. There society cropped up due to the problems faced by the local fishermen who realised that industry is not ready to accept the responsibility
 8. Mc Alpine's report which indicated organic mercury as the cause of the disease led the researchers under Prof. Tadoo Takeuchi (head of Kumomoto's dept. of pathology) to say that the organic mercury was the likely cause.
 9. By paying solatium the company did not take the responsibility of the disease rather it was a kind of sympathy gesture. In compensation the responsibility lies on the person paying the money.

and signed the agreement (through 'Mutual Assistance Society'). This reflects the attitude of Japanese citizens, industry and set up of the society. The Japanese people and the society generally believes in consensus rather than conflict. The attitude of the industry was that of covering up the whole issue and they did not care for the damage they were causing to the environment.¹⁰

Not until 1960 did the central government officially recognise the disease's causative agent to be organic mercury or its source in the Minamata environment to be the Chisso plant. Awaiting a scientific consensus on these two points, the government insisted upon categorizing Minamata disease as an isolated phenomena that had to be settled privately by the 1959 solarium agreement. Though the scholars debated, it was not widely published.¹¹ The major problem faced by Minamata disease researchers was to explain how the inorganic mercury used by Chisso in its industrial plants was transformed into organic mercury which was found

10. Though it also reflects the state in which the fishermen had fallen due to financial loss and physical to them and their family.

11. The rapid absorption of mercury and other contaminants into the food chain would tend to discredit the reliability of measuring water samples to determine the PPM of various contaminants and using this as a pollution level indicator.

in local fish, shell fish and affected victims. The disaster caused by water contamination due to industrial activity would have never attracted national and international attention of this magnitude if outbreak of the disease did not reoccur. In 1964, Nigata Prefecture along the Agano river near Nigata city experienced the second outbreak of this disease. The ministry of health and welfare immediately took steps by setting up a commission to inquire into the matter. The commission discovered that the mercury poisoning was due to the industrial waste of Showa Denko corporation.¹² The medical schools interim report cited Showa Denko's acetaldehyde process and its mercury wastes as the most likely cause of the disease.¹³

The ministry of international trade and industry opposed the report. An attempt was made to suppress the report. The ministry of health and welfare discontinued funding the Nigata Medical School research team.

The central government was not alone in its protracted refusal to recognize the causal relationship between

12. Showa Denko corporation was located upstream of Niigata city. Ui, Jun took great interest in investigating the cause of the disease and locating the pollseter.

13. Here we see how the ministers tried to suppress the matter. In the name of development environmental concern, even importance of human life was put in the background.

Chisso's effluents and the debilitating disease. Minamata citizens also waited for 15 years after the outbreak of the disease before organizing a group to assist the victims. Even after 1968 most of the city inhabitants and local political parties remained aloof. In addition, Chisso's labour union followed the company line until 1968, and at times was overtly antagonistic towards the fishermen. There were disagreements among the victims on how to negotiate with the government, which led to factionalism. By March 1973 the 397 officially designated victims of the new pollution disease in Minamata were split into, six distinct factions, while support groups were bitterly divided along political lines.¹⁴

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14. Factionalism among the victims was exacerbated by support groups active in Minamata. The association to indict Minamata disease, formed in 1969, after the victims had decided to start legal proceedings, initiated a variety of research, publications and protest activities to assist in the struggle against Chisso's irresponsibility. Soon after its inception, prefectural political groups -labour union federations, the socialist party and the Japan communist party - organised still another council to support the litigation which was being undertaken largely by lawyers associated with JCP. The relationship between these two organisations was strained from the outset. The former is dominated by "non-sect radicals" who tend to be highly critical of what they consider to be political parties' manifestation of the victim to enhance their own popularity, while the latter denounce the association use of "extreme tactics". The citizen council for Minamata disease, counter measured a local support organization formed in 1968 tries to maintain a neutral stance between the two groups. On several occasions antagonism between these two organizations have degenerated into out right violence, and disease victims associated with one organisation or other have invariably been dragged into these conflicts.

Finally, in late 1971, designation criteria were liberalized when the court blamed the company for negligence which resulted in the legal victory of the Plaintiff.

The Court ordered the company to pay \$ 3.6m in compensation to the victims. The number of victims being certified increased and the compensation provided temporary relief to the victims. But a number of victims have not been certified. The problem of the victims continue, even their children face problem due to congenital mercury poisoning. The personal and social conflict of Minamata remains.

In May 1973, the mass media reported the third outbreak of the Minamata disease. In Ariakecho area located far from the original pollution source, people were discovered who had disease symptoms very much like the Minamata disease patient. Groups of local people from various manufacturing plants, and the entire nation was subject to a great deal of social apprehension. The problems of the patients multiplied when in 1975. Minamata disease patients' examination committee was dissolved in 1974-75. The number of victims being certified decreased. By 1975, & only 3,000 patients had applied for compensation. The economic recession which had hit Japan due to the oil shortage further compounded the problem.

The company was facing loss due to payment of huge compensation money. A plan funded through public investment, was proposed to remove several hundred tons of mercury contaminated sludge from the bay. Some local groups opposed this plan but it continued.

The problems of victims were still far from over. In the summer of 1978, a vice minister of environmental agency issued new guidelines for Minamata disease patient designation standard. According to this guideline the unless an examination found hard evidence as to the probable causes of death and the body was made available for research purpose. The establishment of National Minamata Disease Research Centre was also not of much help. All this shows lack of participation, recognition and co-operation of disease victims, and governmental action in regard to Minamata disease remained inept.

The problems continued and the citizen movement gained momentum in the late 70's. In the 1972, Stockholm conference, a coalition of supporting citizen groups helped in sending physically handicapped disease victims to the conference which had its impact on the Japanese government. A supplementary draft which contained information of outbreak of this disease was prepared, and Japanese government initially tried to conceal this information.

Groups like Scirisha¹⁵ produced high quality survey results, reports and documentary movies on Minamata disease. A parallel groups published a medical text book in 1979 - The Minamata Disease - 20 years of research and the problem today. 1976 saw the formation of an academic research group incorporating both the natural and the social science. Subsequently, a report Shiranui Kai Sogo Chusadan (General research on the Shiranuj Sea) was published. Akira Sunada a professional actor played an important role by making people aware of the disease through his plays. All these activities were sustained on a voluntary basis and not by any funding organization.

15. Scirisha was the creation of Noriaki Tsuchimoto who led Japan in production of documentary films on Minamata disease and the supporters movement Daikichi Irokawa, ed; Minamata no. Keiji" [Minamata Revelation] Shiranui-Kai Sogo Chosa Hokoku, vol. I and II [chikuma sholo, Tokyo 1983] For further details also refer Ui, Jun p.129.

CASE STUDY : LAKE BIWA

Lakes are a fundamental component of the water resource potential of Japan. There are more than 3,500 natural and man made lakes in the Japanese Island. Lake Biwa is the most important water resource in Japan. It is located in the centre of Shiga prefecture and forms the drainage basin for four mountain ranges that surround it.¹⁶ A source of drinking water for 14 million people, having a fascinating ecology, this lake has always been important for the Japanese from the religious point of view. It is the oldest lake in Japan and probably the third or fourth oldest lake in the world. This lake which has been serving the Japanese for thousands of years was polluted due to the rapid industrialization during the second world war. This was a major cause of concern and attracted national attention. The case study of lake Biwa can be very useful to understand Japan's approach towards its water resources.

The exceptional rate of economic growth since 1954 coupled with a lack of awareness of relationships between human activities and water quality led to the rapid pollution of the lake. The industrial intake of water

16. H.Chiba, "Reservoir Gods", Look Japan, Vol.41, No.471, p.6.

tripled between 1954-79. This led to increase in the amount of effluents released in the river. The problem worsened due to the lack of Sewage treatment facility and increasing amount of domestic waste especially washing powder going into the lake. With increase in the concentration of nitrogen and phosphorous, the problem of eutrophication of the lake raised its ugly head. Though the efforts of the government and especially the local people have effectively controlled river loading by a set of well coordinated activities influencing industrial location, modes of production and life style and influencing water treatment measures, land use controls and environmental education. However once established, the recycling of nutrients within the lake is still causing problems for the government and the people. Undoubtedly, anticipatory approach would have been much better than this curative approach which Japan is following. Secondly, only an integrated management of land and water can be effective in such cases.

The¹⁷ history of lake Biwa of 1.5 million years is recorded in a layer of sediment more than 800m thick, maintained by subsidence which continues at 1mm yr^{-1} . It

17. DWR, 1984 Japanese Water Resources the Present State of Development, Conservation and Utilization: Japan's Department of Water Resources, Secretariat of the Director-General, National Land agency.

has a surface area of 674 Sq. Kilometer and a maximum depth of 100 meters. The morphometry of the basin defines two parts: the Northern lake with a mean depth of 43 meter occupies 90% of the basin, the 58 square kilometer's southern lake has a mean depth of only 4 metre. The catchment area is 3227 square kilometers, less than five times the surface area of the lake but the high mean annual precipitation is 2000 millimeter, produces an average annual inflows of 5×10^9 cubic metres which has an average residence time of 5.5 years.

Until 1945, the drainage basin was characterized by primary industries, fisheries, wet paddy farming and forestry. Most of the farmland is still rice paddies. This sudden change in forestry practices due to stipulated rapid rural depopulation. Moreover, the economic development of Shiga prefecture took place very fast; the population increased from 840,000 in 1960 to 1.1 million in 1983.

Shiga Prefecture's place as an important centre of Japan's transportation system encouraged many companies, especially textile and heavy chemical industries, to set up industries in this prefecture between 1955 and 1965. The industrial output increased from a few hundred billion yen in 1955 to 2000 billion yen in 1965 and to about 4000 billion yen in 1985. However, the considerable achievement

in economic and industrial growth, and the rise in life style of the population, were not matched by concern for environmental management.¹⁸

While lake Biwa was the major water resource in Japan, the quality of the lake deteriorated rapidly as a result of changing agricultural technology, industrial growth and failure to manage domestic wastes. Though modern service water system replaced local water system, the management of water quality was disregarded. By 1981 only four percent of the households were on public sewage and less than that had septic tank although this was six times the figure of 1961. The first limited sewage treatment facility, for other cities came in operation only in 1969. For a long time many prefectures depended on non flushing toilets that had to be replaced periodically.

Eutrophication of Lake Biwa

Before 1950 Lake Biwa was oligotrophic but subsequently it has become eutropic,¹⁹ due to increase in the content of

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18. G.Satake, Lake water quality Administration in Japan: basic idea on its application. In proceedings of the Shiga conference on conservation and management of world lake environment, Otsu, Shiga Prefecture: Shiga Prefectural Government, Japan, 1984, pp.295-300.
 19. M.Sakamoto, Eutrophication and its causative agents, Phosphorus and Nitrogen in Japanese lake. Proc. Shiga conference on conservation and management of world lake environment. Japan: Shiga Prefectural Government, 1985, pp.80-85.

nitrogen and phosphorous of the lake. Between 1965 and 1975 the content of these substances increased 1.35 and 1.5 times respectively. With this the amount of Plankton in the water increased remarkably. The first algae 'bloom' occurred in 1959 and every year since 1977 there have been out breaks of fresh water tides caused by explosive development of the flagellates (uroglena Americana) which turns the lake's colour to reddish brown emitting a pungent odour.

In September 1983 a bloom of Anabaena SP. with Microcystis SP.-a typical indication of eutrophication- occurred for the first time in Lake Biwa. Phosphorous has been identified as the main limiting factor to the development of algae in the lake but trace metals such as iron and chelates, contributed to abnormal growth of U. Americana (Mizushima et al., 1981).²⁰ Over the same period the dissolved oxygen concentration of the hypolimnion has fallen from 9 mg l^{-1} to about 4 mg l^{-1} and the catch of the calm corbicula Pandai, endemic to Lake Biwa, has been reduced from nearly 6000 t.yr $^{-1}$ to only 500 t.yr $^{-1}$ C-Sandai has been the basis of an important fishery for 7000 yrs; its disappearance is the result of the accumulation of organic

20. K.Mizushima, S.Ichiki, K.Nomura, and M.Itoh, Lake Biwa by algal and heterotrophic bacterial assay. Rep. Shiga Pref. Inst-Pub. Health and Environment Science, Vol.16, 1981, pp.137-44.

mud on the once sandy substratum. Vigorous expansion of exotic submerged weeds occurred in 1961 (*Elodea nuttali*) and 1969 (*Egeria densa*)

Between 1955 and 1965 water pollution within the Lake Biwa basin was caused primarily by the increase of factory effluent discharges. These point sources were controlled by law from 1967 onwards. However, Eutrophication continued to advance through the 70's owing to the increasing volume quality of domestic effluents. Natural and agricultural inputs apparently decreased between 1965 and 1975. However phosphorous loading actually increased from 110 t.yr⁻¹ in 1960 to 370 t.yr⁻¹ in 1970 and although the area of the farmland decreased by 9%, the inflow per unit of farmland increased by 30%. Industrial discharge of phosphorous remained constant in 70's but atmospheric pollution continued and concentration of nitrogen and phosphorous in rainfall and its fall out over the Lake Biwa catchment were 1 to 2 times higher than that of lake water. Moreover, domestic contribution continued to rise to nearly 500 t.yr⁻¹ in 1980.

Water quality management

The main approach to reducing fresh water Eutrophication is to control the loading of primary nutrients from sources external to the lake. However even

if these inputs can be reduced, nutrients released from the lake sediments by bacterial metabolism and the transport of these nutrients to the productive surface layer can be sufficient to maintain phytoplankton productivity at very high levels for many years. Indeed, within Lake Biwa the nutrient load assimilated by phytoplankton and now assimilated in the bottom sediments is considerable (Ichiki and Nomura, 1982).²¹ Eutrophication prevention requires anticipatory controls and this must be concerned with integrated land and water management through out the catchment.

In Japan, the introduction of measures for environmental conservation has been stimulated and sustained by community activities. The action of²² local residents' movement and consumer organizations have played a primary role in coercing the local government to formulate regulations. Local residents movement began to develop during the late 1960's. At this time they demanded that

21. S.Ichiki, K. Nomura, 'A Study of Photosynthetic Production in Lake Biwa'. Report of Kinki Regional construction Bureau other Shiga Prefecture, Shiga Prefectural Government, Otsu, Japan, 1982.

22. K.Nitagai, Local Citizen Movements Concerning Water Environments. Proc. Shiga Conference on conservation and Management of world lake environment. Otsu, Shiga Prefecture Shiga Prefectural Government. 1994, pp.328-34.

industries be responsible for preventing the discharges of pollutants. The movement produced positive results namely the creation of environmental affairs departments in the national and prefectural governments. Subsequently, the concentration of pollutants in the factory effluents were controlled by the establishment of basic law of pollution control (1967) and the water pollution control law (1970). Within Shiga prefecture these were followed by Lake Biwa environment conservation programme of 1972 and the pollution prevention ordinance 1973.

These actions were mainly targeted at point source loading of organic pollutants. Although the regulation of industrial effluents as point sources of loading proceeded as expected, phosphorous concentration increased during the late 1970's to reach 0.035 mg l^{-1} in the Southern Lake. There was great difficulty in controlling domestic effluents as these often washed into rivers or lakes during rain storms. The continued occurrence of red tides and its associated environmental problem, added momentum to the citizen movements and demands were made for new developments in environmental administration. The residents also began to question their life style. A campaign was launched to stop the use of synthetic phosphorous detergent. In 1975

synthetic detergents were responsible for 18% of local incoming phosphorous load.²³ The Shiga citizen campaign the first of its kind involved efforts to improve public awareness on the causes of environmental degradation and of the traditional Japanese ethic linking life style and nature conservation. The impact of this campaign was tremendous with 70.6% of the house holds using crop exclusively made from recycled cooking oil.

The enactment of the ordinance for the prevention of Eutrophication of Lake Biwa, by the Shiga prefectural government in 1980 banned the use and sale of synthetic detergent containing phosphate stabilizer. It also regulated more strictly the concentration of nitrogen and phosphorous in factory effluents and imposed obligatory control on agricultural and live stock farm effluents. This reduced the concentration of nitrogen and phosphorous in the streams draining into lake Biwa by 20 percent, though population and industry continued to grow. In the Hyota river, for example, phosphorous, load fell from nearly 3000 gd^{-1} in

23. T.Yamaguchi, Environmental Conservation in Lake Biwa, Proc. Shiga conference on conservation and Management of World lake environment. Otsu, Shiga Prefecture : Shiga Prefectural Government, 1985, Japan, pp.301-5.

1980 to Just over 1000 gd^{-1} in 1982.²⁴ Furthermore, by 1983 although there was little change within the Northern lake, phosphorous level within the Southern lake fell by 30%.²⁵

But the problem of Eutrophication, remained unsolved. Once Eutrophication has taken place in a lake, recovery requires a long time. This is because Nutrient levels maintained by internal recycling and despite the lowering of the nutrient concentration means that limits on the total volume of pollutants may need to be introduced. Since the sewage system was not well developed, which led to discharge of untreated or partly treated effluents discharged into lakes and rivers. Two schemes were advanced to provide a higher level of control on discharge of domestic wastes.

- 1) The use of septic tanks was promoted since 1981; these decant clean water after the process of precipitation and sedimentation have taken place. 2) Community facility was developed which combine various biological resources to enhance the natural cleaning power of the

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24. Y.Tanaka, H.Nakanishi, T. Tsuda, and K.Matsuhita, Variation of LAS amount in rivers after Prohibition of detergent containing phosphorous. Japan. J. Limnology 44 : UN, 1970 integrated river Basin Development, New York: United Nation, 1983, pp.298-303.
K.Nomura, S.Ichicki, T.Nakamura, K.Mizushima, and K.Tanaka, Transition of standing quantities in Water column of Lake Biwa Rep. Shiga Pref. Inst. Pub. Health and Environ. Sci. Vol.18, 1983, pp.121-24.
 25. H.Chiba, "Reservoir GODS", Look Japan, et al., 1986, p.7.

rivers. After filtering and sedimentation materials were introduced to accelerate microbiological decomposition of organic substances before nitrogen and phosphorous are removed by aquatic plants such as the water hyacinth.

Furthermore, community support for environmental conservation enabled the Shiga prefectural government to implement an overall conservation measure for lake Biwa. The ABC (Access the Blue and clean) campaign involved three areas of activity.

- 1) Water quality conservation formed the core of the campaign and included improvement of facilities and techniques for treating sewage waste and domestic industrial and agricultural effluents.
- 2) Lake-Shore conservation programme involved land use controls.
- 3) The campaign included a major programme of environmental education which included, water environment education as part of the school curriculum, there programmes emphasized not only the scientific issue but also the ethics of environment conservation. These programmes are supported by water quality monitoring at a number of station on lake Biwa and the use of

satellite imagery for such quality parameters as transparency and water temperature.

This was not all, in 1982, lake Biwa Research institute was established in 1982. It was one of a final combination think tank, publicity centre, and basic research lab for all things connected to lake Biwa. In 1984, governor Takemura proposed that Shiga hold a world conference on lakes so that people with similar problems could share their experience. This effort materialized in August of that year, by a joint effort by Shiga, and National institute for Research advancement. In the conference 2,400 people from 28 countries assembled to discuss water pollution issues.

The result of this conference was the "Lake Biwa Declaration" of 1984. It said "In order to maximise the function of lakes, mans activities in drainage basis should be in harmony with nature. These include land utilization, industrial location, modes of production, life style, recreation and tourism. This was a positive step in the direction of integrated lake environment management. The lake Biwa declaration of 1984 was followed on 21st February 1986, by the inauguration of international Lake environment committee (ILCE) an international non governmental organization for the purpose of promoting rational

management of natural and man made lake and their environment consistent with sustainable development policies.

Water management, conceptually and practically requires the coordinated and harmonious integration of natural, social and economic system. This requires anticipatory policies instead of responsive attitude to environmental problem. Anticipatory approach requires an improved awareness of the sensitivity of ecosystem and ecobiomes to human intervention and an improved temporal perspective for ecological change.²⁶ Man induced changes are often slow to detect, at times changes are not anticipated, hence when the problem is discovered the cost of management are often very large. Moreover, restoration of the damaged ecosystem to its former natural state may be impossible so, conservation and water development must proceed together. What is needed is a more positive approach to environmental management by developers, supported by an informed public. Effort in this direction continues in Japan. From October 23 to 27, 1995 the cities of Tsukuba and Tsuchiura in Ibaraki prefecture held the sixth conference on the conservation and management of lakes, Kasumigaura '95. The aim of the conference was

26. G.E. Petts, Rivers as vital but endangered systems. Environment Conservation, Vol.13, 1986, pp.268, 278.

"Harmonizing human life with lakes: Towards the sustainable use of lakes and reservoir.²⁷

Lake Biwa is a good example of what grassroots environmental movements can accomplish from a relatively small start, they were able to get the Eutrophication Prevention order and move on to host an international conference.

27. H.Chiba, 1986.

**CONCLUDING
REMARKS**

CONCLUDING REMARKS

Japan today is facing pressing environmental problems, a price for rapid industrialisation and economic prosperity. [Ever since it has been torn between maintaining a healthy economy and healthy environment] Increased public awareness compelled the government to undertake policy decisions which have had a varied measure of success. The government policy instituted in 1960's has travelled a long way in the direction of Pollution prevention. However, a lot still remains to be achieved.

In the 1960's, the Government was forced to embark on an offensive against environmental destruction due to increased pressure from citizen groups, research groups as well as the media bringing the problem to the national arena. The government's concern was limited to the protection of human life and health and the abatement of damage caused by environmental pollution. The approach undertaken was a curative one, with the application of technology to mitigate the damage already done. However, substantial progress could not be achieved due to a low technological and scientific standards. Environmental sciences in Japan, sought to deal with pollution problems within the traditional, narrowly defined constructs of the

natural and social sciences rather than by grasping the fact that pollution generation and environmental destruction are too complicated to fit within such constructs. It ignored the question of understanding problem of environmental destruction by co-operative interaction with victims of pollution. Industry, a major cause for the plight of victims rejected any responsibility until such time that the causal relationship between industrial effluents and resulting human diseases had been indisputably identified.

Moreover, problems generated from a loss of environmental viability were brought to public awareness only after the damage had become overwhelming and had caused irreversible damage especially in terms of human health and life. The late 60s and 70s saw a comprehensive package of new legislation for pollution control, once again under considerable public pressure. An environment agency was established in 1971 to ensure effective implementation of the legislation. Japan's environmental policy now gradually developed to include measures for pollution control and nature conservation, financial measures to subsidize corporate investment in pollution control, a health compensation system and a nation wide environmental monitoring system. For more than two decades since 1960s
tal policy and administration was gove

Basic Law for Pollution Control and the National Environment Preservation Law enacted in 1967 and 1972. The Pollution Control Law, however, was outdated for coping with emerging global problems as climatic changes and a new basic law had to be framed in October 1992. The effects of pollution prevention laws and regulations proved to be limited unless these regulations were supported by the people themselves and the movements that they created. With this realisation the national administration set new proposals wherein it was stated that regulatory measures would no longer be sufficient for a new environmental policy and that "voluntary, economic measures" should be considered instead. This recommendation was made with a view to encouraging voluntary action by businesses and citizens and promoting economic measures such as environmental charges and taxes that would help bring about Carbon-dioxide emissions.

After a considerable progress made in confronting pollution damage, environmental concerns in the 80s took a backseat with the twin issues of public apathy and the government's desire for boosting economic growth taking precedence. This state continued until the late 80s and 90s when once again environmental problems aggravated and could no longer be ignored. Moreover, Japan had to undertake

serious efforts with environmental globalisation on the increase.

The environmental policy since the 1990's has as its declared goal pursuance of economic development coupled with activities that will reduce loads to the environment as much as possible. It also spells out the nation's responsibilities for promoting international efforts to cope with global environmental issues such as global warming, ozone layer depletion, marine pollution, and decreasing biological diversity.

Japan's "integrated environmental management" objective is to break down barriers between the various sectors of the environmental administration and to view the environment in its totality. Integrated Pollution Control (IPC) is targeted at improving the control of industrial processes in order to minimise the release of potentially harmful substances to the environment. Integrated environment management (IEM) as adopted in Japan, goes far beyond IPC and addresses the activities of the society as a whole. This clearly represents an advancement in the evolution of environment policy. However, this integrated policy has fallen short of its desired objectives. The contributory factors to this shortcoming are - over reliance on technology, non-consensus between the nature of an environmentally sound economy and

the non-existence of a blueprint for an alternative approach to decision-making. Further, different perspectives held on environment by the government, industry and environmentalists has served to procrastinate a consensus on policy.

The Basic Environmental Law was passed in November 1993 with the objective of incorporating the concept of global environmental protection into existing laws on pollution and conservation and enable the government to take broader measures towards sustainable development. The effect of this law can only be understood in course of time. The 1990's also saw the formulation of Japan's agenda 21 which discusses government's action to create a society that is kind to the environment and to contribute to solving global environmental problems.

A number of obstacles still confront implementation of Japan's environmental policy. But it is making some head way in incorporating environmental preservation into the objective of its economic policies. As we see in the case of water resource problem though Japan has successfully reduced the scale and rate of contamination but the problem still remains. Even today all Minamata patients have not been compensated. This reflects a high level of commitment and co-operation by the government and industry. However, only

the rate of environmental reduction has been reduced, the problem has not been solved. Environmental policy in Japan deals only with pollution as it affects human health and its related environment. Attempts to broaden the scope and effectiveness of environmental policy have been hindered by the inability to form a consensus at the national level.

Japan in the 1990's needs an effective environmental policy. It needs to include concepts such as environmental rights and environmental impact assessment in order to prohibit further environmental damage. More importantly it requires an approach which is anticipatory and preventive. Today, environment has become a very important issue both at the national and international level. With an increasing global role and a desire to gain reputation in the international arena Japan needs to improve its environmental quality and try to help other developing countries of the region by giving them financial aid and technology to improve their environment. The problem of environment can never be solved alone. Co-operation of all the nation is required to confront this problem which is raising its ugly head every passing day. Japan being one of the richest nation has a special responsibility, which it should not forget. Also Japan's dealing with its environmental problem will serve as an inspiration and warning for other developing nations of the region.

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Appendix A

Environmental standards

Air pollution

Main Law: Air Pollution Control Law
Related Laws: Road Transport and Motor Vehicle Law
Road Traffic Law
Mine Safety Law
Electric Power Industry Law
Gas Industry Law etc.

Air Pollution Control Law

Soot and smoke

(1) Sulphur oxides

- (a) Regulation of K-values, specified values set according to SO₂ volume emitted and stack height (with regional variations).
- (b) Fuel use regulation— area designation
 - seasonal designation
 - sulphur content in fuel
- (c) Total emission control applied to specified factories in certain areas.

(2) Soot and dust: standards differ from 0.05 to 0.07g/Nm³ according to type and size of facility.

(3) Hazardous substances: emission standards differ with type and size of facility and with local authority area.

Cadmium compounds	1.0 mg/Nm ³
Lead compounds	10–30 mg/Nm ³
Fluorine compounds	1.0–20 mg/Nm ³
Hydrogen chlorine	80–700 mg/Nm ³
Chlorine	30 mg/Nm ³

Nitrogen oxides

Gas boiler	60–150 ppm
Liquid firing boiler	130–280 ppm

Solid firing boiler	450-550 ppm
Metal heating furnace	100-200 ppm

Dust (particulate matter generated by mechanical means): standards are enforced during the construction and operation of facilities. No established emission standards.

Automobile exhaust gas: permissible levels set for carbon monoxide, hydrocarbons and nitrogen oxides according to vehicle and engine type, and year of production.

Specified substances: twenty-eight chemical substances are designated such as ammonia, hydrogen, cyanide, etc. No emission standards.

Environmental quality standards for ambient air

Sulphur dioxide (SO ₂)	Daily average of hourly value	0.04 ppm
	Hourly value	0.1 ppm
Carbon monoxide (CO)	Daily average of hourly value	10 ppm
	Average hourly values in eight consecutive hours	20 m
Suspended particulates	Daily average of hourly value	0.10 mg/m ³
	Hourly value	0.20 mg/m ³
Nitrogen dioxide	Daily average of hourly value	0.04-0.06 ppm
	Hourly value	0.06 ppm
Photochemical oxidants		

Notes: Measurement practised at places which represent the ambient condition. This excludes designated industrial areas, driveways and other areas where ordinary civil life is not carried out.

Suspended particulate matter is airborne particles of diameter <10 micrometer.

Photochemical oxidants are oxidizing substances (e.g. ozone, peroxyacetyl nitrate) produced by photochemical reactions.

Water pollution

Main Law: Water Pollution Control Law

Related Laws: Sewerage Law, River Law
 Marine Pollution Control Law
 Port Regulation Law
 Mine Safety Law
 Hazardous Substances Control Law
 Agricultural Soil Pollution Prevention Law
 Seto Inland Sea Environmental Conservation Law
 Regulations for waste treatment and disposal
 International conventions on marine pollution control and ocean dumping

Water Pollution Control Law

- (1) The law stipulates standards for effluent water discharged into public water areas.
- (2) Public water areas are defined as water areas devoted to public use, including rivers, lakes, harbours, coastal seas and water lines connected to them (sewerage treatment lines are excluded as they are covered by the Sewerage Law).
- (3) Effluent standards.
 - (a) Human health related (in mg/l):

Cadmium	0.1
Cyanide	1.0
Organic phosphorous	1.0
Lead	0.5
Hexavalent chromium	0.5
Arsenic	0.5
Total mercury	0.005
Alkyl mercury	not detectable
PCB	0.003
 - (b) Environment related (in mg/l unless otherwise specified)

pH	5.0–9.0: effluent to coast 5.8–8.6: other
BOD	160 (daily average 120)
COD	160 (daily average 120)
Susp. solids	200 (daily average 150)
n-Hexane extract	5 mineral oil 30 animal and vegetable oil
Phenols	5
Copper	3
Zinc	5
Dissolved iron	10
Dis. manganese	10
Chromium	2
Fluorine	15
Coliform bact.	3,000 MPN/100ml
- (4) Special regulations for semi-closed water areas.
 - (a) Total emission control for COD in designated areas: Seto Inland Sea, Tokyo Bay and Ise Bay.
 - (b) Reduction of discharge of phosphorous and nitrogen: Seto Inland Sea, Lake Biwa and other lakes.

Environmental quality standards for water: human health related (in mg/l unless otherwise specified)

Cadmium	0.01
Cyanide	not detectable
Organic phosphorous*	not detectable
Lead	0.1
Hexavalent chromium	0.05
Arsenic	0.05
Total mercury	0.0005**
Alkyl mercury	not detectable
PCB	not detectable

* Includes parathion, methyl and EPN.
 ** Based on the yearly average value.

Environmental quality standard for water: environment related

	pH	BOD (max.)	COD* (max.)	Suspended solids (max.)	Dissolved oxygen (min.)	Coliform bacteria** (max. MPN/100ml)
River						
AA	6.5-8.5	1	—	25	7.5	50
A	6.5-8.5	2	—	25	7.5	1,000
B	6.5-8.5	3	—	25	5	5,000
C	6.5-8.5	5	—	50	5	—
D	6.0-8.5	8	—	100	2	—
E	6.0-8.5	10	—	— ^a	2	—
Lake						
AA	6.5-8.5	—	1	1	7.5	50
A	6.5-8.5	—	3	5	7.5	1,000
B	6.5-8.5	—	5	15	5	—
C	6.0-8.5	—	8	— ^a	2	—
Sea						
A	7.8-8.3	—	2	— ^b	7.5	1,000
B	7.8-8.3	—	3	— ^b	5	—
C	7.0-8.3	—	8	— ^b	2	—

- * COD measured with potassium permanganate method.
 ** MPN/100ml: most probable number in 100ml.
^a Floating matter/garbage should not be observed.
^b n-Hexane extracts should not be detectable.

Standards for nitrogen and phosphorous concentrations in lakes (in mg/l)

Class	Nitrogen	Phosphorous
I	0.1	0.005
II	0.2	0.01
III	0.4	0.03
IV	0.6	0.05
V	1.0	0.1

Noise

Main Law: Noise Regulation Law
Related Laws: Vibration Regulation Law
Road Transport and Motor Vehicle Law
Road Traffic Law

Noise Regulation Law

- (1) Noise levels for specified factories.
- (2) Noise levels for specified construction work.
- (3) Noise levels for automobiles.
- (4) Noise levels for late evening/midnight business activities (area for regulation specified by local authority).

Environmental quality standards for noise

Category	Daytime	Morning and evening	Night
Area AA	45	40	35
A	50	45	40
B	60	55	50

AA — areas where quiet is especially needed, e.g. convalescent facilities.

A — areas used mainly for residential purposes.

B — areas used considerably for residential, but also for commercial and industrial purposes.

Different standard values are established for main roadside areas.

Appendix B

Environment-related laws

Chronology of enactment

<i>Year</i>	<i>Month</i>	
1946		Law of Special City Planning for Postwar Reconstruction.
	11	Constitution boosts local government powers.
1948	7	Agricultural Chemicals Control Law.
	7	Hot Springs Law.
1949		National Comprehensive Land Development Law.
	5	Mine Safety Law.
	8	Tokyo enacts Industrial Pollution Control Ordinance with clause for 'smooth economic development'.
1950	5	Law for the Protection of Cultural Property.
	12	Hazardous Substances Control Law.
1951	6	Forestry Law.
1952		Electric Power Sources Development Promotion Law.
1953		Public Cleansing Law.
1954		Revenue from gasoline tax earmarked for highways. Osaka Pollution Prevention Ordinance.
	1	Tokyo Noise Law.
1955	8	MITI develops first petrochemical complex at Yokkaichi.
	10	Tokyo Smoke and Soot Prevention Law. First national five-year economic plan sets 5 per cent growth rate.
1956		Minamata disease identified. Capital Region Development Law marks beginning of regional planning.
		New City, Town and Village Development Law.
	4	City Parks Law.
	6	Industrial Water Law combats ground subsidence.

<i>Year</i>	<i>Month</i>	
1957		Law of Special Measures for Taxation provides incentives to invest in pollution control equipment and relocate factories.
	6	Natural Parks Law.
1958		MHW drafts Living Environment Pollution Prevention Standards Act, but never enacted.
	4	Sewerage Law.
	12	Public Water Zone Conservation Law.
1959	3	Law for Industrial Siting Restrictions in Developed Urban Areas of the Capital Region.
		Standards for Permitting Conversion of Farmlands.
1960		National Ten-Year Income Doubling Plan.
		Law for Promotion of Water Resource Development.
		Twenty-one regions designated as 'special industrial development regions'.
		Regional development plans try to redistribute population and national income.
		Basic Law for Agriculture.
	12	Road Traffic Law.
1961		Law for Promotion of Water Resource Development.
1962		First National Comprehensive Development Plan.
		Smoke and Soot Control Law.
		New Industrial Cities Development Act.
	5	Law Concerning Regulation of Groundwater Pumping attempts to prevent subsidence.
	5	Law Concerning Preservation of Trees for the Conservation of Scenic Beauty of Cities.
1963		Mishima-Numazu's residents protest against designation as special industrial development region.
		MITI sets up Industrial Pollution Division.
		Coastal Fishery Promotion Law.
		Kinki Region Development Act.
	4	Special Law for Completion of Public Sewer Facilities.
1964		MITI/MHW carry out first large-scale EIA at Mishima-Numazu.
		Act for Promotion of the Industrial Development of Special Areas.
		MHW sets up Environment Pollution Control Division.
		Minamata disease in Niigata prefecture.
		Basic Law for Forestry.
	7	River Law.
	7	Law to Restrict Industrialization of Urban Areas in

<i>Year</i>	<i>Month</i>	
(1972)		Measures Related to Public Works'.
	6	Nature Conservation Law.
	6	Air and Water Pollution Control Laws revised for non-fault liability.
	6	Law Relating to the Regulation of Transfer of Special Birds.
1972-3		'Big Four' lawsuits decided in favour of plaintiffs.
1973		City Planning Act revised to include fiscal measures; originally inadequate for discouraging land speculation.
		MITI sets up Industrial Location and Environmental Protection Bureau.
	4	Nature Conservation Council set up.
	5	EQS for NO ₂ and oxidants.
	8	Emission standards for NO _x in stationary sources.
	8	Interim Law for Conservation of the Environment of the Seto Inland Sea.
	9	Natural Parks Law and Nature Conservation Law made more stringent.
	10	Pollution-Related Health Damage Compensation Law replaces Special Relief Law of 1969.
	10	Cabinet adopts Basic Policy on Nature Conservation.
	10	Chemical Substances Control Law.
	10	Urban Greenery Conservation Law.
	10	Factory Location Law.
	10	Port and Harbour Law and Public Water Reclamation Law amended to include EIA provisions.
	12	EQS for aircraft noise.
1974		National Land Use Planning Law.
		Reserved Agricultural Areas Act.
	6	Air Pollution Control Law strengthened to include total emission controls for SO ₂ .
	9	EQS and effluent standards for mercury strengthened.
1975	2	EQS and effluent standards for PCB.
	7	EQS for Shinkansen noise.
1976	6	Vibration Regulation Law.
1977		OECD report notes need for quality of life improvements in Japan.
		Third National Comprehensive Development Plan includes environmental protection and quality of life considerations, proposes revival of small- and mid-size towns, stresses local autonomy.

<i>Year</i>	<i>Month</i>	
(1977)		Water Pollution Control Law revised to include COD standards.
	5	EA sets up Long-Term Plan for Environmental Conservation
1978	4	Cabinet adopts Basic Plan for Conservation of the Environment of the Seto Inland Sea.
	6	Wildlife Protection and Hunting Law strengthened.
	6	Water Pollution Control Law revised to include total pollutant load control.
	7	EQS for NO ₂ revised.
1979		Law for Promotion of Alternative Energy Supply.
	6	Total emission control programme for Seto Inland Sea, Tokyo Bay and Ise Bay.
1979-81		Ordinances for prevention of eutrophication of lake water.
1980		Law of Environmental Development along Trunk Roadside Zones. District Planning Act.
1981		EQS for nitrogen and phosphorous in lakes.
	4	Draft EIA Law presented to Diet.
	6	Air Pollution Law amended to include total emission control for NO _x .
1982	12	EQS for nitrogen and phosphorus in lakes and reservoirs revised.
1983		'Technopolis Law'.
1984	7	Law Concerning Special Measures for Conservation of Lake Water Quality.
	8	Cabinet Decision on EIA. Agriculture Promotion Areas Act revised to require employment and recreation to be considered. National Land Use Plan revised to encompass urban, agricultural, forest, natural park and nature conservation areas.
1985	5	EQS for nitrogen and phosphorus set.
1987	4	Total Water Pollutant Control Programme for Tokyo Bay, Osaka Bay and Seto Inland Sea.
	6	Fourth National Comprehensive Development Plan.
	11	Pollution-Related Health Damages Compensation amended to terminate designation of class I.
1988	5	Law to Protect the Ozone Layer by Regulating Certain Substances.
	6	Provisional guidelines on tree planting for air purification.

<i>Year</i>	<i>Month</i>	
(1988)	9	Japan ratifies the Montreal Protocol on Protection of the Ozone layer.
	10	EA changes regulations controlling use of pesticides.
	12	EA changes maximum permissible levels for car exhaust gases.
1989	6	Partial changes to Air Pollution Control Law and Water Pollution Control Law.
	7	EA changes regulations on limits for nitrogen and phosphorous content of drainage water entering lakes.
	8	Partial amendment to the marine Pollution Prevention Law.
	9	Amendments to the Offensive Odours Control Law.
1990	3	Amendment to the Pollution-Related Health Damage Compensation Law increases compensation to victim's families.

Source: Industrial Pollution Control Association of Japan (1983), p. 166; Environment Agency (various years), *Quality of the Environment in Japan*; Keizai Shunjusha Co. (1972), pp. 10-19; Ministry of Foreign Affairs (1974), pp. 11-13.

Laws by topic

Topic	Area of responsibility	Relevant laws	Date enacted/ amended	Jurisdiction
[1] General pollution control measures	Planning of pollution control measures	Basic Law for Environmental Pollution Control	Aug. 1967/1970, 1971	EA
	Establishment of environmental quality standards			EA
	Formulation of environmental pollution control programmes			EA, EPA, MITI, etc
[2] Air pollution	Establishment and enforcement of standards for emissions from factories	Air Pollution Control Law	June 1968/1970, 1971, 1972	EA
		Electric Power Industry Law Gas Industry Law Mine Safety Law	July 1964	MITI MITI
		Air Pollution Control Law Road Transportation Law Road Traffic Law	As above	MoT, EA Police Agency
	Measures for the control of smoke and soot emitted from household heating systems etc.	Air Pollution Control Law	As above	EA
[3] Water pollution	Establishment and enforcement of standards for effluent from factories	Water Pollution Control Law	Dec. 1970/ 1971, 1972	EA
		Electric Power Industry Law Mine Safety Law	July 1964	MITI MITI
		Sewerage Law	April 1958/1970	EA, MoC
	Control of water pollution caused by effluent from sewerage systems			
	Control of marine pollution caused by wastes from vessels	Marine Pollution Prevention Law	Dec. 1970/1989	EA, MoT
	Water contamination control	Water Contamination Prevention Law	Dec. 1970	
	Control relating to rivers	River Law	July 1964	MoC
	Control relating to lakes	Clean Lakes Law	July 1964	EA
	Conservation of fishery resources	Fishery Resource Conservation Law		MAFF
Establishment of potable water quality standards	Water Works Law		MHW	

Topic	Area of responsibility	Relevant laws	Date enacted/ amended	Jurisdiction
	Area specific controls	Seto Inland Sea Environmental Preservation Law	Aug. 1973/1978	EA
[4] Noise and vibration	Establishment and enforcement of factory noise standards	Noise Regulation Law Electric Power Industry Law Gas Industry Law Mine Safety Law	June 1968/1970, 1971 July 1964	EA MITI
	Establishment and enforcement of standards for noise emanating from construction sites	Noise Regulation Law	As above	EA
	Establishment and enforcement of automobile noise standards	Noise Regulation Law Road Transportation Law Road Traffic Law	As above	As above
	Measures for the control of aircraft noise	Law concerning Prevention, etc., of Disturbance Caused by Aircraft Noise in the Vicinity of Public Airports Adjustment, etc., in the Environs of Defence Facilities Law	Aug. 1967	MoT Defence Agency
	Control of other kinds of noise	Minor Offence Law		Police Agency
	Control of vibration	Vibration Regulation Law	June 1976	
[5] Ground subsidence	Basic measures to prevent ground subsidence			EA
	Control of pumping of groundwater for industrial use	Industrial Water Law	June 1958/1962, 1964, 1966, 1971, 1972	MITI
	Control of pumping of groundwater for use in buildings	Law Concerning Regulation of Pumping of Ground Water for Use in Buildings	May 1962/1964, 1971	EA
	Measures to prevent subsidence of agricultural land			MAFF
[6] Offensive odours	Control of offensive odours emanating from plants, etc., processing dead animals	Law Relating to Dead Animal Processing Plants, etc.		
	Offensive odour control	Offensive Odour Control Law	June 1971/1989	EA

Topic	Area of responsibility	Relevant laws	Date enacted/ amended	Jurisdiction
[7] Soil pollution	Soil pollution control and measures for cleansing polluted soil	Agricultural Soil Pollution Prevention, etc., Law	Dec. 1970/1971	MAFF
[8] Waste disposal	Disposal of industrial and non-industrial wastes	Waste Disposal and Public Cleansing Law	Dec. 1970	MHW, MITI, EA
	Poisonous and deleterious substances control	Poisonous and Deleterious Substances Control Law	Dec. 1950/1970	MHW
[9] Agricultural chemicals	Establishment of standards and registration system for agricultural chemicals	Agricultural Chemicals Control Law	July 1948/1971	MAFF, EA
[10] Control of land utilization and construction of facilities	City planning	City Planning Law Building Standards Law	June 1968	MoC MoC
	Control of new and/or additional construction of factories	Law Concerning Restriction on Industries, etc., in Built-up Districts in the National Capital Region Law Concerning Restriction on Industries, etc., in Built-up Districts in the Kinki Region	March 1959 July 1964	Commission for the Development of the National Capital Region Commission for the Development of the Kinki Region
	Survey of conditions affecting the location of plants	Factory Location Law	Oct. 1973	MITI
	Control of reclamation	Public Water Areas Reclamation Law	April 1921/1973	MoC, MoT, MAFF, EA
	[11] Improvement of pollution control facilities and conservation of nature	Regional development planning	National Capital Region Development Law Law for the Conservation of Green Belts around the National Capital Region Kinki Region Development Law Law for the Development of Conservation Areas in the Kinki Region Chubu Region Development Law	1956 June 1966 1963 July 1967 July 1967

<i>Topic</i>	<i>Area of responsibility</i>	<i>Relevant laws</i>	<i>Date enacted/ amended</i>	<i>Jurisdiction</i>
	Development of new industrial cities and industrial development of special areas	Law for Promoting Development of Special Areas for Industrial Consolidation	1964	EPA, MAFF, MITI, MoT, MoC, MHA
		Law for Promoting the Establishment of the New Industrial Cities	1962	
		Factory Location Law	Oct. 1973	MITI
	Agricultural development	Law for Improvement of Agricultural Promotion Areas Agricultural Land Law		MAFF
	Construction of sewerage systems	Sewerage Law Law Concerning Emergency Measures for Sewerage Construction	April 1958/1970	MoC
	Construction of buffer zones	City Planning Law	1968	MoC
	City park development	City Parks Law City Green Zone Conservation Law	April 1956	MoC MoC
	Conservation of the environment under the natural parks system	Natural Parks Law	June 1957/1962, 1970, 1971, 1972	EA
	Nature conservation	Nature Conservation Law National Land Use Planning Law	June 1972 1974	EA NLA
	Forestry conservation	Forestry Law	June 1951	MAFF
	Coastal conservation	Coastal Law		MoT, MoC, MAFF
	Protection of wildlife	Law Concerning Wildlife Protection and Hunting	April 1918/1970, 1971, 1972	MAFF
	Protection of trees	Law Concerning the Protection of Trees for the Conservation of Scenic Beauty	May 1962	MoC
	Protection of cultural properties	Law Concerning Special Cultural Properties Law Concerning Special Measures	May 1950 Jan. 1966	Culture Agency PM's office, MoC

Topic	Area of responsibility	Relevant laws	Date enacted/ amended	Jurisdiction
		for Preservation of Historical Natural Features of Ancient Cities		
[12] Settlement of disputes and relief	Settlement of environmental pollution disputes	Pollution Disputes Settlement Law Mining Law Temporary Law for Compensation of Damage Caused by Coal Mines	June 1970	PM's office MITI
	Relief for patients affected by environmental pollution	Pollution-Related Health Damage Compensation Law Special Measures for the Relief of Pollution Related Patients Law	Oct. 1973/1987 Dec. 1969/1971/1990	EA EA, MITI, PM's office
[13] Cost bearing and incentive measures	Determination of entrepreneurs' share of the cost of public pollution control works	Law Concerning Entrepreneurs Bearing the Cost of Public Pollution Control Works	Dec. 1970 Dec. 1970	PM's office
	Loans from the Environmental Pollution Control Service Corporation	Pollution Control Services Corp. Law	June 1965/ 1968, 1971	MITI, MoC, MAFF
	Loans for modernization of small and medium enterprises	Law for Loans for the Modernization of Small and Medium Enterprises		
	Pollution control projects	Special Government Measures for Pollution Control Projects	May 1971	
	Special taxation measures	Corporate Tax Law Special Taxation Measures Law Local Tax Law		Min. of Finance, MHA 1957
	Subsidies for noise control measures in vicinity of public airports	Law Concerning Prevention, etc., of Disturbance Caused by Aircraft Noise in the Vicinity of Public Airports	Aug. 1967	MoT
	Subsidies for noise control measures in areas surrounding defence facilities	Law Concerning Adjustment, etc., in the Environs of Defence Facilities		Defence Agency

<i>Topic</i>	<i>Area of responsibility</i>	<i>Relevant laws</i>	<i>Date enacted/ amended</i>	<i>Jurisdiction</i>
	Subsidies for pollution control facilities of schools			Ministry of Education
[14] Punishment of crimes relating to environmental pollution	Punishment of crimes and offences relating to environmental pollution	Law for the Punishment of Environmental Pollution Crimes relating to Human Health	Dec. 1970	Ministry of Justice
	Protection of human rights			Ministry of Justice
[15] Other	Regulation of toxic substances, etc., used in factories	Labour Standards Law		Ministry of Labour
	Chemical substances	Chemical Substance Control Law	Oct. 1973/1979, 1986	MHW, MITI
	Toxic substances	Toxic Substances Law	Dec. 1950/1970	MITI
	Radioactive substances			