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Environmental Clean-Up and Cost Bearing

— the Methodological Problems —

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This paper analyzes the method by which environmental clean-up and cost-bearing are compared and assessed. Social expenses incurred by environmental pollution damage are : compensation for damage, mitigation of damage, restoration and reclamation, prevention, and transaction costs and administrative costs. Principles of paying are : the Pigovian principle, OECD's Polluter Pays Principle, the principle of paying capability, benefit principle, and the principle of the responsible party. The cost bearing rules are : the Japanese Polluter Pays (Bearing) Principle, the US CERCLA, the soil protection acts of Holland and Germany, and Joint compensation system.

1. Introduction

This paper aims to analyze the method by which environmental clean-up and cost-bearing are compared and assessed. One useful tool for the economic analysis of environmental problems is the theory of social cost. Yet, as I have pointed out in my book *Economics of the Environment and Technology* (Aoki Shoten Publishers, 1980), the traditional theory of social cost is flawed by theoretical confusion. The categories of social loss and social cost are not the same and should not be confused : while social loss is the loss of something's value to us, a real term category, social cost falls within the category of value terms.

The meaning of social cost includes the notion of irreversible loss, an absolute loss, and this is difficult to calculate as a value term.¹ The category of social cost developed by William Kapp included both social loss itself, the first definition, and the prevention cost of social loss, the second definition. Since the second definition of prevention cost is not a social loss, Prof. Shun'ich Teranishi paid attention to the positive aspects of William Kapp's theory and proposed that the category of social expenses should be distinguished from the category of social cost as a means to make polluters pay and bear the cost both of prevention and compensation.²

An account of real environmental disturbances and damages from the standpoint of economic theory requires a three level analysis: (A), an analysis of the real term value, value in use; (B), a categorical analysis of the value term; and, (C), an analysis of the real expense of money.

There are many levels of environmental damage. The first is the result of

pollution at the regional level, as manifested in outbreaks of the Minamata disease, the Itai-Itai disease, and the pollution of the air by a combination of petrochemicals at Yokkaichi. This kind of environmental damage includes not only damage to agricultural and fishery products but also damage to human health. Since pollution of the air and the water can easily cross national boundaries and can cause transboundary pollution, this type of damage becomes one constituent element in the catalogue of global environmental problems.

The second type of environmental damage is that brought about by the progressive degradation of wetlands and forests, or that leads to the weakening of biodiversity and the natural ecosystem.

The third is a lack of sunshine, of access to landscapes, and the loss of natural amenities.

The overall problem that faces the global environment involves these three forms of environmental deprivation, as well as depletion of the ozone layer, disturbances to the global commons, and climatic change.³

On the level of the problems caused by regional pollution, application of the methodology based upon (A) the theory of social loss, the real nature of the damage, the compensation awarded for the damage, restoration and reclamation of polluted land, prevention of further damage, would be an analysis in terms of real value, value in use. An analysis based on (B), the theory of social loss from the standpoint of the theory of social cost, would evaluate damage in terms of trading value.

According to the degree of cost category (A), compensation and restoration work would be retrogressive and the cost would be negative, while (B), would be forward-looking, the prevention of future damage, and the cost would be positive. Should the polluters find it difficult to bear the cost in terms of (A), the polluter would appeal for public funds, while in terms of (B), the polluters will try to internalize the expenses of prevention by combining them with rationalizing investment intended to reduce waste, and would, in part, take advantage of subsidies and tax privileges. It is an important feature of the situation that the negative cost and the positive cost should be closely related, since the incentives to pay the positive expenses designed to prevent future damage will depend on the setting of rules about how to allocate "negative cost."

In the third place, it is necessary to analyze the expenses related to environmental damage on the basis of the theories of social loss and social cost.

2. Social Expenses Incurred by Environmental Pollution Damage

Social expenses incurred as a result of damage caused by environmental

pollution are basically intended to pay compensation for damage to the environment and to pay for preventive measures against further damage as well as for the restoration and reclamation of land damaged by pollution; it will include the costs for negotiation and any lawsuits entered into.

2.1 Compensation for Damage

Compensation for damage covers both damage to human health and life and damage to property. The concrete matters that are covered by compensation for damage to health include direct compensation, cost of care, medical costs, and compensation for loss of revenue as a result of damage to agricultural or fishery products. In the case of agricultural soil pollution, compensation must be paid to those who have to cease planting because their land is poisoned. If a system to certify the existence of a pollution-related disease is set up, then the victims can be identified and the realities of the damage they have suffered can be made clear. This system might generate problems, however, since it might overlook patients who are not officially registered and thus reduce the actual extent of the damage that has been caused.

2.2 Mitigation of Damage

The mitigation of damages refers to the expenses paid out to mitigate or reduce the extent of real damage, as, for example, provision of equipment near airports to reduce the noise level that is damaging to the health of local residents.

2.3 Restoration and Reclamation

Restoration and reclamation include the removal of cadmium from polluted soil, the removal of sludge contaminated by mercury, and the cleanup of contaminated soil by means of a chlorinated organic solvent. Should it be the case that damage to the environment is irreversible, measures to provide for alternative means of compensation are necessary. The task will involve not only the technical restoration of the contaminated area, but also its social restoration. Related issues will focus of "how clean is clean," and how much the polluters should bear the costs of the restoration.

2.4 Prevention

To prevent further pollution, it will be necessary to provide expenses to pay for any machinery required to obviate pollution at the source. The machinery has been developed from "end of pipe technology," such as equipment designed to desulfurize fluid gas and apparatus to ensure that the processes of production are themselves cleaner. Since it is possible both to conserve energy

and material and make a profit, the expenses for prevention cannot therefore be counted as a social loss.

2.5 Transaction Costs and Administrative Costs

The transaction cost, namely the cost of negotiation and any ensuing law-suits bearing on the costs for cleanup, as in the case of the US Superfund system, nearly exceeds the cost of the cleanup itself. It is also necessary to provide funds for administering the subsequent monitoring activities. The cost depends upon the system of cost allocation and the issue of "how to solve social conflicts."

The structure that provides for the generating of these particular expenses falls within the domain of the wider social system, and "in order to reveal their origin, the study of social costs must always be an institutional analysis."⁴

3. Principles of Paying

3.1 The Pigovian Principle

The Pigovian Tax is designed to tax the difference between the social cost and the private cost, or the difference between marginal private net product and the marginal social net product for the internalization of social cost, and it is not clear if this would include the expenses that we have listed 1-5 above.

A recent interpretation of the Pigovian Tax states that, where the cost curve of social marginal emission reduction and the cost curve of social marginal damage meet at the crossing point, each marginal emission that reduces cost is equalized,⁵ and will include part of (1) damage compensation (4) part of the expenses for prevention, which entails that this level cannot guarantee the prevention of absolute loss. Since the Pigovian Tax aims to modify the price beforehand, it does not include expenses for restoration and reclamation.⁶

Coase's theorem has some bearing on the Pigovian Principle. Coase's theorem states that "the delimitation of rights is an essential prelude to market transactions; but the ultimate result (which maximizes the value of production) is independent of legal decision."⁷

It therefore turns out that the minimization of social cost will be achieved independently of anyone's liability, if the liability rule is invoked.

We must pay careful attention to the preconditions of Coase's theorem. Coase took Pigov's theory as a premise and set out to question it. Coase's main concern is not something's real value in use but its trading value, and for him the object of economics is the maximization of social value: "the question to be

decided is: is the value of the fish lost greater than the value of the product while the contamination of the stream makes possible," and "It is all a question of weighing up the gains that would accrue from eliminating these harmful effects against the gains that accrue from allowing them to continue."⁸ Coase's understanding is that since the missing value can be compensated for by the acquired value, the irreversible loss in real value is lost sight of from the very beginning.

In the second place, Coase's theorem is suitable for application only if certain conditions are satisfied: namely, that the allocation of right is defined clearly, and that the negotiations proceed without trouble, that is with zero transaction costs. In the real world, this condition is not fulfilled.

Once the transaction cost is taken into account, then the decision about the distribution of resources depends on a rightful allocation. This is the latter part of Coase's theorem. Coase's theorem therefore focuses both on compensation in value and the transaction cost.

3.2 OECD's Polluter Pays Principle

The OECD's Polluter Principle is a well-known principle of payment for causing pollution. It states:

"The Polluter-Pays Principle means that the polluter should be charged with the cost of whatever pollution prevention and control measures are determined by the public authorities, whether preventive measures, restoration, or a combination of both. If a country decides that, above and beyond the costs of controlling pollution, the polluters should compensate the polluted for the damage which would result from residual pollution, this measure is not contrary to the Polluters-Pay Principle, but the Principle does not make this additional measure obligatory: in other words, the Polluter-Pays Principle is not in itself a principle intended to internalize fully the costs of pollution."⁹

OECD's PPP is designated as a principle to ensure the rational allocation of resources and the correction of distortions in international trade, to assume charge of pollution control at the optimal pollution level, and, in exceptional cases to compensate for subsequent damage; but it does apply the principle to the general relief of damaged parties or to environmental restoration. Therefore, although the PPP does aim at a certain level of prevention in very general terms, it does make exceptions for compensation and restoration. W. Beckman interpreted the PPP as implying that "the marginal damage to the victims cannot exceed how much it would cost them to avoid the damage, otherwise they would already have avoided it."¹⁰ In fact, because savings were made in the expenses for prevention, huge damage has resulted.

It is important to our understanding of the PPP that though it first of all

indicates that the original polluters must pay, it does not concern itself with the possibility that payment may be shifted from the polluter to the consumer, or that the polluter may take measures to internalize the cost. We should not therefore over-estimate the power or effectiveness of the PPP.

3.3 The Principle of Paying Capability

The principle of paying capability has to be in place since the responsible party may, in an emergency, be incapable of paying, as, for example, in the case of Japanese aid in the dismantling of old soviet nuclear submarines. If a such a case drags out for a long time, however, it will contradict the policy of social justice and there will be no incentives for the responsible party to reduce pollution.

3.4 Benefit Principle

The benefit principle is a best fit for expenses incurred as "positive expenses for the future." That is to say, the beneficiaries of environmental conservation must combine to pay the expenses of positive environmental conservation.

3.5 The Principle of the Responsible Party

The principle of the potential responsible party is designed to operate in cases of insolvency or where the polluter is unknown and must be sought for, as is the practice with the US Superfund System. This principle will, therefore, if the priority between the interested parties is not clarified, lead to lawsuits, will increase transaction costs, and will reduce economic efficiency. To avoid this, both Holland and Germany have passed legislation to clarify the ordering and priority of the interested party. At the same time, if a wide definition is given to the extent of the responsibility of the potential responsible party, there will be greater incentive to reduce pollution and greater encouragement to carry out intensive investigation (thus increasing the transaction investigation costs).

4. The Cost Bearing Rule

Who finally has to bear the cost? Different social systems have different means of responding to environmental damage. We can refer to three of them: 1, the Japanese polluter pays (bearing) principle, 2, the US Superfund System, 3, the Dutch and German soil protection act. In addition, there is the principle of joint compensation and help from the public purse. The criteria for assessing the cost-bearing rule are: 1, how so far it reduces pollution and improves the environment, 2, how it accords with social justice and fairness, 3, how

much it serves to bolster long term economic efficiency.

4.1 The Japanese Polluter Pays (Bearing) Principle

While OECD's Polluter-Pays Principle is not in itself a principle intended to internalize fully the costs of pollution, the Japanese Polluter Pays (Bearing) Principle has extended the interpretation of the OECD's Principle to take on the character of liability law, and includes the cost of environmental restoration to the cost of accumulated pollution and damage relief.

The 1975 Japanese *White Paper on the Environment*, edited by the Environment Agency remarks (chapter 3) that "The cost for environmental conservation includes the cost of pollution control, the cost of environment restoration, the cost of damage relief, the cost of avoiding pollution and the administrative cost. While the OECD's PPP is mainly aimed to prevent the distortion of international trade and the cost of pollution control, the Japanese PPP includes the costs for environment restoration and damage relief."¹¹

The Japanese PPP is incorporated into the 1973 "Pollution Related Health Damage Compensation Law" and the 1970 "Law Concerning the Entrepreneur's Bearing of the Cost of Public Pollution Control Work." Consequently, the Japanese PPP includes, 1, damage compensation, 2, damage mitigation, 3, restoration and reclamation, 4, prevention. At the same time, 5, the administrative cost, which includes the cost of monitoring, must be borne by the Environment Agency and Local Government Authorities. Although the extent of the designation of the Japanese PPP is apparently rather wide, neither the "Pollution Related Health Damage Compensation Law," nor the "Law Concerning the Entrepreneur's Bearing of the Cost of Public Pollution Control Work" actually applies the principle strictly. There are no formal regulations and there is no law dealing with soil contamination other than that stipulated for contaminated agricultural land.

4.2 The US CERCLA

Although it lays down no regulations for restoring environmentally damaged land, the US 1980 "Comprehensive Environmental Response, Compensation and Liability Act" (CERCLA) does designate liability for the cleanup of hazardous substances, and in cases where the cleanup is carried out by the EPA the costs are paid out of the superfund. Moreover, the responsibility is retroactive, and joint and strict liability, present and past-owners' liability, and the lender's liability.

Since this law focuses mainly on the responsibility for the cleanup and for the allocation of costs, there have been many lawsuits between potential responsible parties and the EPA, with the result that the costs of transaction are

increased and the cleanup is delayed. On the other hand, since companies know that they will be asked to spend large sums of money for compensation and cleanup, they have become more cautious and take more steps to prevent pollution in the first place.

4.3 The Soil Protection Acts of Holland and Germany

The 1994 Dutch "Soil Protection Act"¹² aims to reduce the threat to the functional properties of the soil by designating the disposal of waste to prevent soil contamination and by empowering the state to recover the costs of remediation from the polluter or the owner. The owner or long-leaseholder of a property is not responsible in cases where the owner, a, has had no sustainable legal relationship with the polluter or polluters during the period in which the pollution occurred; b, has had no direct or indirect involvement in the cause of the contamination, and, c, was not aware, or in all fairness could not have been aware, of the contamination at the moment of acquiring the title of the property. The aim of the Dutch system is therefore to investigate and restore the environment on the premise of preventing contamination.

The German "Soil Protection Act" of 1998 is in line with the Dutch model.¹³

4.4 Joint Compensation System

The joint compensation system has been recommended in a Green Paper produced by the EC. In cases where the responsible party is not specified or the extent of the pollution is not clear, civil liability is not an effective tool. The joint compensation system is an application of the PPP, if it is supported by an industrial group that has the capability of causing environmental damage.

The joint bearing is the principle that liaises between private bearing and public bearing. The International Oil Pollution Compensation Fund is a sort of joint compensation venture, and as the Fund already exists, it is possible to respond to emergencies and provide immediate cleanup, and in cases where the individual cannot pay to provide compensation. Problems remain, however: who has the right to authorise use of the fund, who has to manage it, how clean is clean, and (because of cost dispersion) an increasing lack of incentive. The question of fund raising was re-examined at the time of the revision of the Japanese "Waste Disposal Act" to determine the restoration of an illegally used dumping site.

At that time, meetings of the Ministry of Health and Welfare Living Environment Commission debated the issue of cost bearing with some heat. In the end, the revised act included the new item that "businesses are required to fund at the centre for promoting appropriate treatment." The Japanese Fed-

eration of Economic Organization (Keidanren) asserts, against this item, that where business is carrying out appropriate treatment it should not bear the cost of restorations. And when an alternative of cost bearing by businesses without certification of appropriate treatment was proposed, business saw that this would impose on them the costs of certification and strongly opposed the proposal. It seems that business feared that commitment to voluntary funding would involve them in heavy expenses when the cleanup was of a serious nature.

Under the system of the US Superfund, RCRA, even the cleanup is paid for by the fund, while the polluter is merely reprimanded for introducing a "moral hazard." Yet, since the cleanup out of public funds weakens incentives to institute good environmental management, such a course of action itself tends to induce "moral hazard." Similarly, the use of the safety net of public funding to solve bad bank loans does not necessarily lead to the healthy management of a bank.

The use of public funds to manage environmental conservation is based on notions of community and cooperativeness. As today's environmental infrastructure grows wider and wider, it becomes more and more necessary for it to examine itself. The environmental infrastructure is constructed as a public business devoted to such environmental duties of reclamation as cleanup. The Law concerning the Entrepreneur's Bearing of the Cost of Public Pollution Control Work uses such work as a reason to reduce the polluter's bearing with phrases like "functions other than pollution control."

5. Conclusion

Finally, we have to address the responsibility of the state for environmental damage, and its consequent liability. If the state itself, or an enterprise in public ownership, then the state is the direct polluter and is clearly responsible.

In cases such as the outbreak of Minamata disease, the state can be held liable, for though it is not the direct polluter, it has admitted the occurrence of pollution, while ignoring the plight of the victims, at times even treating them as offenders. How should we theorize or construct the responsibility of the state? In purely juristic terms, the main problem are the relevant clauses and the enforcement of the act dealing with water pollution. It might be possible to make a quasi-application of the PPP to include the state's responsibility and to theorize the state's support for the Chisso company, the company directly responsible for the pollution. Or it might be possible to include the state and the local government among those parties who are potentially responsible. This might apply to the case of Teshima Island, where illegal waste was dumped

with the connivance of the local authorities.

At any rate, the problem is huge and its solution is very difficult. Although I do not defend any easy reliance on the financial support of the state, the responsibility of the state must be pursued, for if it is not, then the state's administration and standards of environmental control will become very loose.

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- 9 OECD, (1975), *The Polluter Pays Principle*, p. 6.
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The background of United States introduction of P.P.P. seems to have been problems of "the pollution dumping."
- 11 Prof. Akihiro Amano criticized Japanese Polluter Pays (Bearing) Principle as "a backward legal principle" compared with OECD's PPP. *Chikyu Ondan-ka no Keizaigaku* (Economics of Global Warming, Nippon Keizai Shinbun, 1997, p. 31-33).

I agree with Prof. Amano that subsidy to a polluter is against the OECD's PPP, but the clean-up of accumulated pollution and compensation have become the common principle in Europe and U. S. as having preventative effects.

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