



行政院國家科學委員會專題研究計畫成果報告

居民參與監督下之廠商污染防制及申報行為 The Firm's Pollution Control and Reporting Behavior When the Resident Takes Part in Monitoring

計畫編號：NSC-87-2415-H-032-013

執行期限：86年8月1日至87年7月31日

主持人：胡均立 私立淡江大學產業經濟系

電子信箱(E-mail)位址：jinlihu@ms14.hinet.net

一、中文摘要

在絕大多數現存環境經濟學文獻中，居民的策略性行為多半被忽視或被假設為外生給定。不過，居民團體往往是環境損害的直接受害者，而且在環境監督與執法中扮演重要角色，進而影響廠商的污染防制與申報行為。本研究嘗試將居民團體的策略性行為納入環境管制模型中，以更進一步補充現有環境經濟學文獻並擬定更具效率的環境執法體系。

自1980年代中期以來，居民因環境問題而採取自力救濟之案例層出不窮。根據台灣大學法律系葉俊榮教授(1993)所作的研究，在1978至1990年間，我國民眾因應公害糾紛所採取的(混合)策略依頻率高低排列如下：陳情(48%)、示威遊行(25.81%)、圍廠堵場(27.42%)、調解及私下協商(17.2%)、暴力衝突(10.2%)、司法訴訟(1.08%)。台灣民眾極少利用司法訴訟解決環境爭端，原因可能是對司法體系欠缺信心、且冗長的訴訟無法及時有效地停止公害的發生。居民與廠商之間的环境爭端無法有效圓滿地解決，不僅使受害的居民必須藉助體制外的手尋求救濟、合法廠商也面對一旦發生環境爭端無法圓

滿解決的風險。而台灣公害糾紛的和解結果多半為由廠商給付賠償金或回饋金，對積極的環境保育並無貢獻，反而種下日後進一步發生糾紛的導火線。

美國亦曾經歷工業快速增長而忽視環保的階段，但在19世紀末以來通過了大量的環境立法，以規範聯邦與州政府的義務權限、並提供居民參與的管道。目前美國公民環保團體在環境保護上扮演同政府相同重要的角色，其可採取的合法行動有：自力救濟、公民訴訟、宣傳與教育、諮詢服務、環境立法遊說等。美國法律視公民訴訟為行政執行之補充，勝訴的公民環保團體還可獲判律師費用、專家鑑定費等之補償，以鼓勵民眾監督執法、促進公益。不過，公民訴訟勝訴後廠商所繳之罰鍰仍歸國庫，畢竟公民訴訟之目的在促進公益、非為私利(王曦(1995))。

美國民法允許行政機構禁止工廠經營者繼續從事危害環境的非法行為或要求期支付清潔費用(Shweiki(1996))。在美國與環境相關的公民訴訟從1970年的《清潔空氣法》陸續衍生。除了公執法以外，以環境為目的之公民訴訟讓居民團體得以藉此進行私執法。至今，絕大多數美國環境法包含公民訴訟條款(葉俊榮(1993))。

公民訴訟可以同時要求對公共污染者的禁制令與罰金。罰金收歸政府所有，並可以專款專用於環境保護用途。在某些案件中，公民訴訟的原告可以獲得訴訟費用補償以鼓勵促進公益的公民訴訟。私執法為公執法之補充並改進環境執法之有效性（Naysnerski and Tietenberg (1992a, 1992b)）。我國目前在環境執法上仍無公民訴訟制度，法律學者葉俊榮建議參考美國制度加以引進（葉俊榮 (1993)）。

Downing (1981) 率先就污染執法上，官僚體系、廠商及公民團體三者間的互動以模型分析。他假設這三者環境品質及其他變數上極大化其自身的效用。Downing 接著描述如何藉由調整政策變數（例如：行政機關預算等），以使此三者的互動下的均衡結果朝向管制者所偏好的狀態移動。不過，由於該文並未入社會福利極大化或社會成本極小化等問題，故未能從社會最適的角度，提出最適的環境執法機制設計。也無法回答執法成本應何由政府與居民團體分攤之類等問題。因此，本文就 Downing 的三人賽局架構，加入社會福利極大化或社會成本極小化的考量，以對最適的環境執法機制設計提出建議。

Naysnerski and Tietenberg (1992b) 建立了一個關於公私環境執法模型應如何建立的文字描述性架構：廠商極大化利潤、公民團體在考量訴訟成本下極大化環境改善。他們建議以成本有效性作為社會最適的標準。但是他們並未提出數學分析架構，也因此未能回答公部門與私部門應如何分攤執法成本、公部門與私部門之執法努力互為策略互補或替代等問題。

在法律經濟學文獻中，已經充分證明社會最適的侵權體系設計應能誘使加害者與受害者的雙向預防努力（Hylton (1996)）。在環境損害中，居民團體扮演受

害者的角色。同理，環境受害者應與政府一起努力促進環境執法品質，例如：舉發污染案件、抗議非法污染、提起公民訴訟等。不過，居民團體的執法努力程度可能高於、等於或低於社會最適水準，換言之，私執法可能過當或不足。因此，社會最適的環境執法誘因機制設計應同時誘發社會最適的公執法努力、私執法努力與廠商污染防治與申報行為。

大多數國家的民法均規定有限責任，亦即責任是有上限的（濱田宏一 (1977)）。由於有限責任制度，污染廠商不必負擔超過責任上限的環境損害。因此，廠商的污染防治努力在有限責任制下將低於社會最適水準。不過居民團體仍將承受高於責任上限以上的環境損害。而居民可以藉由圍廠等抗議手段將廠商所承擔成本提高至責任上限以上，因而使廠商事前的污染防治成本更接近社會最適水準。在本文中，我們證明在台灣常見的居民圍廠行為，可以改善原先在有限責任制度下，廠商污染防治努力程度的無效率。因此，就改進環境執法效率而言，居民圍廠抗爭未必是無效率的行為。

本文的結構如下：第一節為前言。第二節描述污染與執法兩者的機率結構，其中排放量為不確定的且執法為不完全的。第三節中我們建立一個包含政府、居民團體及廠商的三人賽局。政府的目標為極小化社會成本，其策略為公執法努力程度、污染稅率、罰金率、私執法成本補償比率等；居民團體的目標為極小化環境損害與私執法成本，其策略為私執法努力程度。廠商的目標為極大化利潤，其策略為產量、污染防治水準、排放申報量等。第四節中我們討論無限責任制下的最適環境執法機制。第五節中我們討論有限責任制下的最適環境執法機制。第六節為結論。

本研究的主要結論如下：

1. 政府與居民的執法努力互為策略替代，亦即給定對方增加執法努力，己方的最佳反應為減少執法努力。
2. 其他因素不變下，加入公民訴訟制度後，政府會將執法成本轉嫁給居民團體而減少自身執法努力程度。
3. 若邊際執法成本為遞增，則社會最適的環境執法制度係由政府與居民團體共同分攤執法成本。如此，台灣環境立法中應引進公民訴訟制度。
4. 在政府環境監測成本較居民為低下，政府應較居民團體負擔更多的執法成本。換言之，社會最適的環境執法體系應以公執法為主、私執法為輔。
5. 政府可藉調整訴訟成本的補償比例，以誘使居民執法成本更接近社會最適水準。
6. 居民團體參與執法對廠商污染申報量的影響為不確定，這是因為一方面廠商會提高申報量以避免受罰、另一方面又減少申報量以免被圍廠。
7. 在有限責任制下，居民可以藉由圍廠等抗議手段將廠商所承擔成本提高至責任上限以上，因而使廠商的污染防治成本更接近社會最適水準。
8. 未來我國環境立法上，應針對公民訴訟、社區知的權利等做更有效率的規範，以有效圓滿預防並解決環境爭端。環境爭端處理的制度化的前提為提供居民合法參與的管道。同時，我們也應藉由公民環保團體與社區的宣導，以教育居民利用如何合法的公害糾紛處理與訴訟程序。

關鍵詞：公民訴訟、不完全執法、私執法、圍廠、有限責任、三人賽局

二、英文摘要

In most of the existing environmental economics literature, the strategic behavior of the resident group in environmental enforcement is either neglected or assumed to be exogenously given. However, the resident group is the direct victim of environmental damage and plays an important role in monitoring the firm's pollution control and self-reporting performances. Therefore, to explicitly incorporate the resident group's strategic behavior into the environmental enforcement model can help us improve the scheme design for environmental enforcement.

Since the mid-1980s, there are many cases in which the residents in Taiwan blockaded the polluting factories. According to Yeh (1993), between 1978 and 1990 the most frequently used (mixed) strategies by residents in Taiwan are petition (48%), demonstration (25.81%), blockade the factory (27.42%), reconciliation and settlement (17.2%), violent conflict (10.2%), litigation (1.08%). It is obvious that the residents in Taiwan seldom follow the legal procedure to settle environmental disputes. The reasons may be that the people have no confidence in the judicial system or the tedious litigation cannot effectively stop the public nuisance in time. The inefficiency in the settlement between the resident group and the firm makes not only the residents resort to measures outside the legal system but also the law-obedient face the risk of unsettled environmental disputes. Many of the public nuisance disputes ended with a amnesty from the firm to the resident group.

This kind of quasi-bribery does not solve the problem but is a trigger for future rent-seeking environmental disputes.

The U.S. civil law enables an agency to prohibit plant operators from continuing illegal activities that endanger the environment, or to seek reimbursement of costs incurred for cleanup (Shweiki (1996)). In the United States, environment-related civil action was ensued from the 1970 Clean Air Act. Civil action for environment purpose allows the resident group to take part in the environmental enforcement in addition to public hearing. Till now, most of the environmental acts in the U.S. contain a clause for civil action. A civil suit can seek for injunction and penalty on public polluters. The penalties go to the government and can be earmarked for environmental protection instead of being in general revenue. In some cases, a civil suit plaintiff's attorney fee can be reimbursed in order to encourage a civil action for public interest. Private enforcement is a complement to public enforcement and improves the effectiveness of environmental (Naysnerski and Tietenberg (1992a)). The is still no civil action system in Taiwan's environmental laws and Yeh (1993) suggest that Taiwan should introduce the a similar one to the U.S.

The U.S. has also experienced the stage of a rapid industrial development with negligence of environmental protection. However, since the end of the 19th century the U.S. enacted lots of environmental laws to regulate the obligation and power of the federal and state governments. These environmental laws also provide channels for the resident to take a part in environmental

enforcement. Nowadays, the U.S. citizen groups play an important role in environmental enforcement as well as the government. The legal actions available for the citizen groups are, for example, demonstration, civil suit, propaganda and education, consulting service, lobbying. The U.S. laws take the civil action as a complement to public enforcement. A winning civil group can be rewarded with attorney fees to encourage the citizen groups to take part in enforcement that enhances the public interest. However, the penalties still go to the treasury. After all, the purpose of a civil suit is for enhancing the public rather than private interest (Wang (1995)).

Downing (1981) pioneered in analyzing the interaction among the bureaucracy, the firm, and the citizen group in the aspect of implementing pollution laws. He assumed that these actors maximize their own utility over the environmental quality and some other variables. Downing then depicted how preferred results through such a three-player interaction can be obtained by moving policy variables such as agency budget, etc. However, how enforcement effort be shared by the government and the citizen group is another interesting and important question. In regard with optimal scheme design for environmental enforcement, a social welfare maximization or social cost minimization problem must be constructed in addition to the three-player game framework proposed by Downing.

Naysnerski and Titenberg (1992b) established a descriptive framework of how a model of public and private environmental enforcement should be built up: The firm

maximizes its profit. The citizen group seeks environmental improvement, taking litigation cost into account. They suggested cost effectiveness as the criterion for social optimality. However, without an analytical framework they cannot precisely find out how the share of public and private enforcement should be determined, whether the private enforcement and public enforcement are strategic complements or substitutes, etc.

In the literature of law and economics, it is well proved that a socially optimal tort system should induce the bilateral precaution effort of the potential injurer and potential victim (Hylton (1996)). In situations of environmental damage, the citizen group plays the role as the victim. The resident group as the environmental victim can also put effort to enhance environmental enforcement, e.g., reporting the discovery of pollution to the government, protesting against the firm's pollution, etc. However, the citizen group's enforcement effort can be more, equal, or less than the social efficient level. Therefore, a socially optimal incentive scheme for the environmental enforcement should induce socially optimal levels of the government's public enforcement effort, the resident group's private enforcement effort, and the firm's pollution abatement effort.

In most of countries liability is limited, that is, there is an upper bound of liability. Due to the limited liability rule, the firm is not concerning the damage higher than the maximum liability. Therefore under the limited liability rule, the firm's precaution effort is always less than the efficient level.

However, the resident group suffers from and definitely concerns environmental damage higher than the maximum liability. And the resident group tries to let the firm bear more cost than the maximum liability by means such as factory blockade, etc. In this paper, we are going to show that such a blockade may improve inefficiency in precaution effort under the limited liability rule because the firm will increase its abatement effort to avoid the blockade cost.

This article is organized as follows. Section 1 is the introduction. Section 2 depicts the probability structures of pollution and enforcement. The emission is uncertain and the enforcement is incomplete. In Section 3 we establish a three-player game consisting of the government, the resident group, and the firm. The goal of the government is to minimize the social cost; its strategies are emission tax, penalties, public enforcement effort, etc. The resident group's goal is to minimize the environmental damage plus and private enforcement effort; its strategy is the private enforcement effort. The firm's goal is to maximize the profit. Its strategies are quantity, pollution abatement level, reported emission, etc. In section 4, the socially optimal environmental enforcement system under unlimited liability is discussed. In Section 5, the socially optimal environmental enforcement system under limited liability is discussed. Section 6 concludes this article.

The major conclusions are as follows:

1. The enforcement efforts of the government and the resident group are strategic substitutes to each other. That is, given an increase in the other's

enforcement effort, the best response of this player is to reduce his own enforcement effort.

2. Other things being equal, after the introduction of the civil suit system, the government will transfer some of its enforcement cost to the citizen group and reduces the public enforcement effort.
3. If the marginal enforcement cost is increasing, then the socially optimal environmental enforcement system should induce the government and the resident group to share the enforcement costs. If it is the case, then Taiwan should add the civil suit system into her environmental laws.
4. When the monitoring cost of the government is lower than the resident group, the government should bear more enforcement cost than the resident group. In other words, the socially optimal environmental system should mainly depend on the public enforcement while take the private enforcement as a complement.
5. The government can induce the resident group's enforcement effort to move toward the socially efficient level by adjusting the rewarded legal cost ratio.
6. The effect of the resident's participation on emission reporting is can be either way. This is because the firm will raise the reported emission to avoid penalties and also reduce reported emission to avoid a blockade.
7. Under the limited liability system, by a blockade the resident group can raise the firm's cost to more than the liability

limit, which can move the pollution abatement level toward the socially efficient level.

8. To facilitate settlement of environmental disputes, the future environmental legislation should make more efficient regulation of civil suits and the rights-to-know of the communities. The institutionalization of settling environmental disputes needs to provide legal channels for the residents to participate. Meanwhile, we should also education the residents how to use public nuisance settlement and litigation procedures through the propaganda of citizen group and the community.

Keywords : Civil Suit, Incomplete Enforcement, Private Enforcement, Blockade, Limited Liability, Three-Player Game

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