Citizens' actions for protecting the environment in developing countries: an economic analysis of the outcome with empirical cases from India

V. SANTHAKUMAR[1]

Centre for Development Studies, Prasanthnagar, Ulloor, Thiruvananthapuram – 695011, Kerala, India. E-mail: santhakumar@cds.ac.in

ABSTRACT. This paper analyses the impact of citizens' actions for protecting the environment in the context of the institutional features of developing countries. The enforcement of environmental regulation is likely to be weak in developing countries, and thus their citizens are being compelled to sue the polluters or take direct actions that are costly to the polluter. The theoretical and empirical analysis, based on 25 cases of citizens' action from the Kerala State of India, show that their impact is influenced by the institutional deficiencies of the country. Such deficiencies include the delay in resolving conflicts through court interventions and the lower cost of taking actions of civil disobedience due to poor law and order enforcement. The analysis leads to the conclusion that citizens' actions may not be very effective in controlling pollution from existing factories, and may be effective in blocking the establishment of new factories. Both these outcomes, i.e., the continued pollution in existing factories, and zero-pollution (or non-establishment) of new factories/projects, cause social losses, in the former case for the citizens and in the latter for the polluter.

1. Introduction

Citizens' actions such as filing a Public Interest Litigation (PIL) or taking actions of civil disobedience are commonly seen today in many developing countries, including India, against pollution and environmentally damaging projects, where public enforcement of environmental regulations is weak. It is therefore important to understand the economic implications of such citizens' actions in the context of developing countries. In those countries the enforcement of environmental law is poor because the general institutional structure is weak. Citizens' actions may, therefore, have

emerged in response to the unmet demand for environmental quality. This is a beneficial aspect of citizens' actions as far as environmental conservation is concerned. However, institutional deficiencies may affect the effectiveness of citizens' actions too. This can create other sources of inefficiencies in pollution control through citizens' agitation. There is preliminary evidence that when citizens protest against an industrial/developmental activity in such countries, a successful resolution to the conflict is rarely achieved. By successful resolution we mean an outcome that is socially efficient or beneficial. In a broad sense, an efficient outcome is one in which the (marginal) gains from the developmental activity is equal to the (marginal) damage to the society due to the pollution created by it. Though the achievement of such successful resolutions is difficult throughout the world, the institutional limitations of developing countries make it rarely achievable within their context. Thus it is not uncommon for the outcome to be the least beneficial, such as either the continuation of pollution without any reduction or the abandonment of the new (or proposed) development activity. Either way, there is likely to be a social loss. These losses can be additive across projects since these are separated in time and space. Thus there is a need to analyze the implications of citizens' actions in the context of developing countries, and this paper is a modest attempt in that direction.

The paper is organized as follows. Section 2 carries the discussion of relevant literature. A theoretical analysis is carried out in section 3. This is followed by the presentation of empirical evidence in section 4. The conclusions are given in the final section.

2. Review of literature

Citizens' actions considered here are part of informal regulation – the subject of analysis of a number of studies initiated by the World Bank[2] (Hettige *et al.*, 1996; Pargal and Wheeler, 1996). These studies have noted that even in countries where formal enforcement of environmental regulations is weak, there is some evidence of environmental compliance due to direct pressure from affected people. These studies have demonstrated the role of factors including citizens' pressure on the environmental performance of firms. The work reported in this paper is an attempt to develop this literature further, by working on certain issues that have not to date been analyzed. These include, the development of a theoretical approach to predict the outcome of citizens' actions, the analysis of the potential impact of those actions on the entry of firms,[3] and the influence

---

[2] A larger set of such studies are available in the form of working papers that can be downloaded from the web site namely, www.worldbank.org/nipr/work_paper/index.htm.

[3] There is one study by Mani, Pargal, and Haq (1996) which analyzed whether the stringent enforcement of environmental regulation matters in the location of new manufacturing plants in India. This all India study did not see any significant impact of environmental regulation on location decisions. However the study reported in this paper from one state of India, Kerala, gives a different empirical picture.

of the institutional characteristics of the country on the effectiveness of citizens' actions. However, this study, in comparison to the ones carried out by the researchers of the World Bank, has the limitation that the empirical analysis is not based on actual data on the levels of pollution by firms. The data analyzed here are limited primarily to cases of citizens' actions against a number of firms/projects, and the outcome of such actions merely defined as to whether and how it resulted in the resolution of the conflict between polluter (or developer) and citizens. The study also analyzes a representative sample of 239 firms in Kerala, to see which kind of firms came into existence without encountering citizens' action.

Citizens' actions, as noted by Naysnerski and Tietenberg (1992, 1992a), can also be viewed as private enforcement,[4] which has emerged to meet the unmet demand for environmental quality. Citizens' actions can therefore be a partial substitute for public enforcement. Thus analysis by Naysnerski and Tietenberg of citizen suits found that the tendency to take such action increased during periods in which there was lax public enforcement. Since laxity in public enforcement is a perennial problem[5] in developing countries, it is difficult to measure this relationship in such contexts. However there can be other determinants such as 'social capital'[6] of a region in influencing the number of citizen suits for environmental protection. Rather than focusing on the determinants of citizens' enforcement, this paper attempts to analyze whether it leads to socially optimal levels of environmental protection.

Another stream of literature, that is relevant for analyzing the outcome of citizens' actions for environmental protection, is that of bargaining over externalities. Citizens' actions can also include direct negotiation with the polluter, and blocking the production or the construction of plants (or threatening to do so) in the event of a break down in negotiation, thus trying to change the outcome of negotiation. One appropriate theoretical framework for analysis of this issue is that of Coasean bargaining (Coase, 1960). It is known that such bargaining leads to an efficient outcome only under very restrictive conditions, and, in the real world, situations characterized by positive transaction costs, a large number of victims, private or hidden information, possibility of coalition among some parties who negotiate, etc., an inefficient outcome seems much more likely.[7] Moreover property-right structures such as 'polluter is free to pollute' or 'people have a right to a clean environment', influence efficiency differently when the parties cannot cooperate and have private information (Huber and Wirl, 1998). The law and economics literature notes that, depending on the

---

[4] Other studies that consider citizens' actions as part of private enforcement include Hayes (1997).

[5] See Kuik *et al.*, (1997) and Murty (1999) for discussion of the weak enforcement of environmental regulations in India.

[6] The concept of social capital initially developed by Coleman (1990) and Putnam (1993) is recently reviewed in Dasgupta and Serageldin (2000).

[7] The literature on this issue is wide and includes Dasgupta, Hammond, and Maskin (1980), Hamilton, Sheshinski, and Slutsky (1989), Spulber (1989), Amachar and Malik (1996), and Huber and Wirl (1998).

situation, one property-right structure may be more efficient than another (Cooter and Ulen, 2000). It also shows that the actual remedy, such as the award of either an injunction or compensatory money damages, available to the bargaining parties in the court, influence the efficiency of outcomes differently. This paper makes an attempt to develop these analyses further to see the outcome of citizens' actions within the institutional constraints of the developing countries.

Yet another stream of literature is that of economic theory of regulation (Stigler, 1975; Peltzman, 1976), which is enriched by the model of pressure group competition for political influence (Becker, 1983). This has analyzed the impact of the resources spent by pressure groups through the formulation of influence functions. This framework is the starting point for the analysis of pollution control under the influence of pressure groups by Maxwell, Lyon, and Hackett (2000). Unlike the focus of these papers, the present paper is not concerned with regulation, but its enforcement. The formation of pressure groups among polluters is not considered important. Moreover, the consumption benefits of a firm for citizens is not considered, implying the operation of one firm, which is being contested by citizens, will not affect the price and availability of goods consumed by them. The potential employment benefits of local people are also neglected in the analysis here. This assumption may be valid due to the institutional environment in India where even a non-local citizen can file a public-interest petition in the court, or a section of people who do not perceive employment benefits can also take action against a firm. The free-riding possibility among citizens is also neglected, due to the assumption (which is supported by the empirical evidence) that the cost of taking action by citizens is negligible for the cases considered here.

3. Theoretical analysis

Let us consider a situation of a polluter and a group of citizens. The benefits of pollution for the polluter is $V(x)$, where x is the level of pollution and damage to the citizens is $D(x)$. The functions $V(x)$ and $D(x)$ have the following properties: $V'(x) > 0$, $V''(x) < 0$, $D'(x) > 0$, $D''(x) > 0$ and thus $V(x)$ increases only up to a level and let that be x^e. The marginal functions $D'(x)$ and $V'(x)$ are shown in figure 1.

The most socially beneficial situation is when $V'(x) = D'(x)$ corresponding to x^*. However the actual outcome depends on institutional characteristics. When the property rights structure is described by the polluter pays principle, which is very weakly enforced in many developing countries like India, then the effect will be that of 'no environmental policy' and hence the outcome would be pollution up to x^e (Huber and Wirl, 1998: 72). This can result in a social loss of $\int_{x^*}^{x^e}[D'(x) - V'(x)]dx$, where x^* is the socially optimal level of pollution. The social loss can also be algebraically described as follows

$$D(x^e) - V(x^e) - (D(x^*) - V(x^*)) = D(x^e) - D(x^*) - (V(x^e) - V(x^*)) \geqslant 0$$

This positive social loss encourages citizens to act. There are different types of citizens' actions including citizens' complaints to enforcement agencies, private tort actions (one private party suing another for compensation),
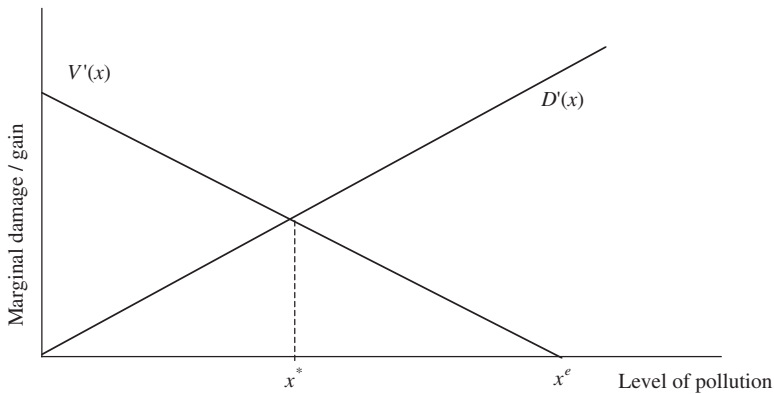
Figure 1. *Functions of marginal gain and damage*

oversight actions (asking court to direct enforcement agencies), and so on. Citizens' actions would obviously be socially beneficial if its aim were to create awareness among the victims and encourage political and administrative decision makers to frame better regulations and to have better enforcement. If the citizens' role is to alert the enforcement officials, then it enhances the probability of monitoring and enforcement, and can enhance compliance. Firms comply if their expected cost of compliance is less than the expected cost of violation. The citizens' alertness can increase the probability of monitoring, and hence, for a given level of fines, one can see a higher cost of violation and thus more compliance.[8] Similarly, if the citizens' role is to see that the polluting firm does not get away with bribing enforcement officials, this too can enhance efficiency of overall enforcement of environmental regulations.[9] However, since public enforcement is very weak in developing countries, it will not be adequate, even if enforcement officials are alerted and informed (and isolated from corruption) by the active citizens.[10] Thus it is unusual to see many cases of citizens' actions that are limited to exclusive dependence on public enforcement agencies.

If the enforcement requires citizens to approach a court, the outcome depends on the delay, on the cost of getting a decision from the courts, and also on the remedies available to the plaintiff. We consider the delay first. If a firm currently benefits by polluting up to level x^e (which is greater than the socially optimal level of pollution), then any delay in getting a court settlement works to the firm's advantage. The firm will cause a delay if the

---

[8] Compliance is optimal for the firm if $C <$ MF, where C is the cost of compliance, M is the probability of being monitored and F, fine (Russell, 2001).

[9] A simple extension of the enforcement model as in Russell (2001) shows that if there is corruption, then the condition will be $C < M (NB + (1 - N) F)$ where N is the probability of finding the monitoring official to be corrupt and B the bribe. It demonstrates that an increase in M due to citizens' actions will enhance compliance for given level of N, B, and F.

[10] Even when it is notified, the powers and resources of the pollution control board are very insufficient to take action in all such cases. For details see, Kuik *et al.* (1997).

benefit of high pollution during that period is higher than the cost of delaying. However, for a new firm planning to start its operation, any delay in settling the environmental conflict with local citizens is costly (because it can only start functioning after the decision). Thus if a court settlement in a country takes a significant time, the impact is different for the existing polluter than for a new polluter. Similarly citizens have no incentive to delay in court in the case of an existing firm, whereas they do have an incentive in the case of a new firm. Thus there is an asymmetry in terms of the incentives to cause delay. Either way delay is likely to cause social losses. The social loss due to the continuation of pollution at x^e, is $\int_{x^*}^{x^e}[D'(x) - V'(x)]dx$ and the social loss due to the non-starting of a polluting firm is $\int_0^{x^*}[V'(x) - D'(x)\,dx$.[11] The latter takes the following algebraic form

$$V(0) - D(0) - (V(x^*) - D(x^*)) = V(0) - V(x^*) - (D(0) - D(x^*)) \geqslant 0$$

The incentive to approach the court depends also on the remedy available to the court. Of course, if the cost of approaching the court is costlier, then that will also influence the decision. Let us assume that this cost is negligible. (Later on in the empirical section we show why this assumption is reasonable.) We can analyze the incentives of citizens, first with regard to an existing firm. If they do not approach the court, they will continue to suffer damage of $D(x^e)$ from the existing firm. However, they can expect to reduce it to $D(x^*)$ if the court enforces a standard to reduce pollution to x^*. However, if the court orders the polluter to compensate for ongoing damages, and, if such compensation materializes, the victim's net loss will be zero. However sometimes such payment of compensation can be costly (due to the task of identifying and assessing damages). In addition, compensation, even if paid, may not settle the problem due to the possibility of a third party (such as an NGO) taking the polluter to the court again. Thus the polluter may not be ready to pay monetary compensation. The court can also hold the polluter strictly liable, without opting for either compensation or reduction of pollution to the standard. (Instead liability can be used to encourage the conflicting parties to bargain and arrive at a socially efficient solution.) Under a situation where monetary compensation is not reliable, if the court holds a polluter liable (and does not enforce a standard), citizens can expect to reduce their damage to $D(0)$, which requires the polluter to reduce the pollution to zero. Under all these circumstances, citizens have an incentive to approach the court, since they can expect their current damage to be either reduced or completely avoided. However the delay in getting a court decision makes citizens 'unhappy'.

---

[11] If we take time of delay into account, these social losses will be $\int_0^t\int_{x^*}^{x^e}[D'(x,t) - V'(x,t)]e^{-pt}\,dx\,dt$ and $\int_0^t\int_0^{x^*}[V'(x,t) - D'(x,t)]e^{-pt}\,dx\,dt$ respectively. If there is no citizen suit, the corresponding social loss of the infinitely continued pollution of an existing firm is $\int_0^\infty\int_{x^*}^{x^e}[D'(x,t) - V'(x,t)]e^{-pt}\,dx\,dt$. However if there is considerable delay even with citizen suit and if discount rate is high, then the social loss due to existing pollution under delay will become very close to the loss due to infinitely persisting pollution.

Similarly, it can be seen that, in the case of a new firm, citizens currently enjoy the state of $D(0)$, and the establishment of a firm with pollution at the socially optimal level will increase their damage to $D(x^*)$ (or to $D(x^e)$ if the firm does not adopt pollution control), if monetary compensation is unlikely to take place. Thus citizens also have an incentive to approach the court in the case of a new firm, even if it plans to start with pollution control. In this case, enforcement of the standard by the court makes citizens 'unhappy'.

The 'unhappy' citizens may use unlawful means or take actions of civil disobedience, such as physically preventing the setting up or the operation of a factory. The effectiveness of this approach depends on many institutional factors. If the institutional and legal environment is such that the 'cost' of taking 'unlawful' action is low, then one will see more such actions. The impact of the combined effect of citizens' suits and actions of civil disobedience can be analyzed by using simple game structures, and this is attempted in the following section.

3.1. Combined effect of citizen suits and actions of civil disobedience – analysis with the help of simple game theory

Games depicted in tables 1 and 2 may seem to appropriately present the situation of a new and an existing firm respectively. We make the following assumptions for calculating the payoffs:

The public enforcement of environmental regulations is so weak and hence negligible.

If one party approaches the court, it will be settled after some time, and thus the gains or losses, through the court's decision, are discounted by α (which is less than 1) by both parties.

The court's decision is assumed here to be the enforcement of standard (which is taken to be x^* – the level of pollution at which marginal gain is equal to the marginal damage).

Citizens bear a cost of k for their actions whereas they could impose $I(k)$ on the polluter (other than that through the verdict of the court) (Thus $I(k)$ can be taken as the increased cost of operation to the polluter through the actions of civil disobedience by the citizens.)

In the payoff set $[a; b]$, (a) denotes the gain to the polluter and (b) denotes the gain to the citizens. Since citizens incur losses, their gain is denoted negative.

Table 1. *Game structure of citizens' interaction with a new firm*

Polluter	Citizens	
	Do not take action	*Take action*
Start without pollution control	$[V(x^e); -D(x^e)]$	$[\alpha V(x^*) - I(k); -(\alpha D(x^*) + k)]$
Start with pollution control	$[V(x^*); - D(x^*)]$	$[\alpha V(x^*) - I(k); -(\alpha D(x^*) + k)]$
Do not start	$[0, 0]$	$[0, -k]$

The payoffs in some cells require an explanation. When citizens take action, new firms get only the value of socially optimal pollution $V(x^*)$ after a delay. In addition the polluter has to bear the institutional cost $I(k)$ imposed by citizens' actions. The same payoff is derived by the polluter even if he plans to start with pollution control, but then encounters citizens' actions. This assumption is plausible because it is often difficult for the polluter to convince citizens that he intends to control pollution. Even if he has installed pollution control equipment, citizens frequently do not believe that it will be operated because Indian firms often do not do so in order to save on operational costs. (This problem arises due to the poor monitoring of the public enforcement agencies.) Thus it is not surprising to see citizens willing to take action even if a firm starts operation after commissioning a pollution control plant. Citizens' damage for a pollution level of x^* is $D(x^*)$ and a cost of k, if they decide to act. However, if the polluter starts without pollution and citizens do not act, the polluter's payoff is $V(x^e)$. This will become $V(x^*)$ if he chooses to have pollution control.

The socially efficient outcome in the above game is (start with pollution control; do not take action). However, this outcome need not be the equilibrium. An outcome in which firms do not start functioning and citizens take action (i.e. do not start; take action), can be the Nash equilibrium under some conditions. This is so if the worst possible outcome is less damaging to citizens when they take action (i.e., $\alpha D(x^*) + k < D(x^e)$ and if starting with or without pollution control becomes very costly for the polluter when citizens decide to act, or when $\alpha V(x^*) < I(k)$. This can happen when the court delay is long and thus α is very low, and/or when k is negligible and $I(k)$ is large.

This game can be considered as a stage game if we allow the possibility of repeated interactions between the potential polluter and citizens. If we assume for the time being that the interaction is infinitely repeated (we can evaluate the veracity of this assumption later on), then an interesting question is why these parties cannot sustain a cooperative outcome through threat strategies. This is so since sustained cooperation is a possible outcome in an infinitely repeated game, as discussed in game-theoretic literature, specifically the Folk theorem.[12] For example one can analyze, the conditions, under which it is possible to sustain an outcome of, say (start with pollution control; do not take action), with the threat of playing a strategy of (do not Start; take Action) forever afterwards. The polluter will stick to such a cooperative strategy if the following condition is satisfied, where the RHS gives the discounted payoff of a cooperative outcome, and the LHS gives the one-time gain by polluting maximally plus zero, which is the discounted payoff when the citizens play the threat strategy for ever afterwards.

---

[12] Folk theorem says that with 'continuous strategy sets and differentiable payoff functions, as long as there is some scope for improvement in payoffs around the stage game Nash equilibrium, some cooperation can be sustained' (Mas-Colell, Whinston, and Green, 1995: 420). This book's appendix A of the chapter 12 can be referred for a concise statement and proof of folk theorem. For a detailed explanation, see Fudenberg and Maskin (1986).

$$(V(x^*)/(1 - \delta) > V(x^e)$$

This is a likely situation, and hence the polluter has an incentive to abide by the cooperative strategy, and hence gives a credible commitment to cooperation. We can now consider the incentive for the citizens. They will stick to the cooperative strategy only if

$$\sum_{i=0}^{\infty} \delta^i D(x^*) < (\alpha D(x^*) + k) + \sum_{i=1}^{\infty} \delta^i k \qquad (1)$$

If k is closer to zero, and if α is low (i.e., there is significant delay for court verdict) then this situation is unlikely. Hence citizens may not have the incentive to stick to the cooperative solution and thus cannot give a credible commitment. It shows that the delay in court decisions and low cost of disobedience actions act in the same direction in not making a cooperative outcome sustainable in the case of the interaction between citizens and a new firm.

We can repeat this analysis for the interaction between an existing firm and the citizens, as represented in table 2.

Table 2. Game structure of citizens' interaction with an existing firm

	Citizens	
Polluter	Do not take action	Take action
Do not control pollution	$[V(x^e); -D(x^e)]$	$[V(x^e)(1 - \alpha) + \alpha V(x^*) - I(k);$ $- (D(x^e)\,(1 - \alpha) + \alpha D(x^*) + k)]$
Control pollution	$[V(x^*); -D(x^*)]$	$[\alpha V(x^*) - I(k); - (\alpha D(x') + k)]$

If the firm does not control pollution and citizens do not act, the firm will get $V(x^e)$ (with citizens' damage being $D(x^e)$). If citizens decide to act in this situation, the polluter's payoff will be reduced to $V(x^*)$ after some delay, and damage to $D(x^*)$. However, due to the delay in getting a court verdict, the polluter can make an additional benefit of $(1 - \alpha)\,V(x^e)$, and thus create an additional damage of $(1 - \alpha)\,D(x^e)$ to citizens. In addition, the polluter has to bear the institutional cost imposed on him by citizens' actions. On the other hand, if the firm starts with pollution control, it gets $V(x^*)$, and this determines the payoffs in the lower cells.

Here the socially efficient outcome is again (control pollution, do not take action). However this need not be the equilibrium and (do not control pollution; take action) can be the Nash equilibrium depending on the delay, and the value of α, k, and $I(k)$. Here too we can analyze the possibility of sustaining a cooperative equilibrium in repeated interactions through threat strategies, such as playing socially efficient actions until one of the player deviates, and then playing the Nash reversion strategy forever. The citizens will have an incentive to abide by that cooperative strategy, which is evident from the payoffs in table 2. However, the polluter will stick to the cooperative equilibrium only if

$$\sum_{i=0}^{\infty} \delta^i V(x^*) > V(x^e) + \sum_{i=1}^{\infty} \delta^i ((1 - \alpha)V(x^e) + \alpha V(x^*) - I(k)) \qquad (2)$$

This will become more unlikely when there is long delay or α becomes

small, and become more likely when $I(k)$ is higher. It shows that in the case of an existing firm, the delay in getting a court decision and the high cost imposed on the polluter through civil disobedience actions influence the payoffs in opposite directions, in contrary to the case of a new firm.

In summary, the socially efficient outcome does not need to be the sub-game perfect Nash equilibrium, even if the games depicted above are played indefinitely.

In addition, we may have to critically analyze whether the game between the polluter and citizens is really an infinitely repeated one, given the institutional features described above. If the parties do not consider the agreed upon solution as final, and perceive it as breaking down at any point in the future, then that is equivalent to considering interactions as finite, and hence cooperation is less likely to be sustained. Thus the sustainability of a cooperative solution can depend on the expected finality of the solution achieved through cooperation. Translating this into citizens' actions, cooperative agreements become unreliable if polluters expect someone else to bring the issue to the court, and hence they will not be interested in abiding by such cooperative agreements.

Based on the discussion so far, we can make an attempt at predicting which existing firms will control pollution once informed citizens alert them (without going to court), or which new firms will start operation in the vicinity of such informed citizens. Those new firms will be ready to adopt pollution control if citizens can give a credible commitment. This can take place if the citizens are indifferent between taking and not taking action. One possibility is for the firm to start with zero pollution. However, it is not sufficient to start with zero pollution, but citizens should perceive *ex-ante* that the firm causes zero pollution. (The other possibility is when α is small and k is more as evident from equation (1), i.e., when the courts take quicker decisions and when the cost of civil disobedience is greater, which one would expect with effective institutions.) In the case of an old firm, it is the polluter who must be indifferent between controlling and not controlling pollution. This can happen if $I(k)$ is large enough and/or the delay is small enough to make the condition given in (2) an identity. Here one institutional weakness (i.e., the delay in court decisions) works against mutual cooperation, where as the other weakness (i.e., high cost imposed by civil disobedience) encourages mutual cooperation.

We can summarize the theoretical discussion and the likely outcomes of citizens' action under the potential institutional constraints of developing countries. The institutional constraints considered here are the following: poor enforcement of environmental regulations; long delays in settling matters through court; unreliability of monetary compensation; and the possibility of using unlawful means at a low cost and thereby imposing a high cost on the other party in the conflict. Possible outcomes are as follows: poor enforcement of environmental regulations make citizens act in ways other than alerting public enforcement agencies; the delays caused by citizens approaching the courts affect new and old firms differently; existing firms, and citizens interacting with a new firm, have no incentive to work for an out-of-court settlement. Actions of civil disobedience, which are less costly for the citizens due to poor law enforcement, and the conse-

quent high cost to the polluter, can lead to a situation in which socially efficient outcomes become unlikely in the interaction between citizens and a new firm. However, the likelihood of achieving a socially efficient outcome in the interaction between citizens and an existing polluter increases with the cost to be borne by the polluter due to civil disobedience, and decreases with the delay of court decisions. Institutional weaknesses such as long delay in court decisions and the low cost of actions of civil disobedience are likely to create a situation in which new firms can establish only with near zero pollution, if citizens are vigilant to act. This outcome, too, creates social losses, like pollution at higher than optimal levels by existing firms.

We can compare these results with the potential outcomes in an ideal context where institutions are adequately functional. Existing firms would expect standard enforcement by a public authority or court, without a delay, and would therefore impose enforcement upon themselves. New firms expecting standard enforcement without a delay, try to start with pollution at an optimal level. Citizens can expect only standard enforcement and cannot expect much delay in the response of the public authority or court, and thus become content with optimal pollution. Citizens are unlikely to take physical action because the cost of those actions will be high due to proper law and order enforcement (and probably due to high opportunity cost of time).

There is a need to analyze empirical cases of citizens' actions to verify the accuracy of these theoretical insights. The following section makes an attempt in this direction by analyzing empirical evidence from India.

4. Empirical analysis: evidence from India

The theoretical analysis in the previous section requires the consideration of two types of empirical evidence. The first is to see whether the assumptions about institutions in the theoretical analysis are reasonable given the institutional structure of environmental enforcement in India. The second is needed to verify the predictions of the theoretical analysis regarding the likely outcomes of citizens' actions. Thus the literature on environmental regulation and enforcement in India and 25 cases of environmental conflict from the Kerala State of India,[13] are analyzed in the following sections to find empirical support for assumptions on institutional structure and to test the predictions of the theoretical analysis.

The state of Kerala is currently experiencing a higher number of citizen's actions than any other state in India. The cases considered here include almost all the major ones that have attracted media attention, the cases being selected on the basis of newspaper reports over a period of ten years.

---

[13] This state is known for the achievement of a relatively higher quality of life for its people, in spite of having a per-capita income, which is less than the average figure for the country. It is observed that a major factor for this achievement is the 'collaborative and adversarial public action' in the shaping of the state policies (Dreze and Zen, 1993). This public action was extended to environmental issues as early as the late 1970s, when there was a notable movement against a major hydro-electric dam namely, the Silent Valley project. For an account of this, see Guha (1988).

In addition to collection of information from newspapers and other pub-lished sources, a key actor (most probably the person who led the agitation) was interviewed, and these interview schedules were also used in the analysis. The major aspects of each case, including the pollution problem, demand and the impact of citizens' action, type of action and the nature of groups behind the agitation, are given in table 3.

The description of empirical evidence is organized as follows: empirical evidence of the institutional constraints is discussed in section 4.1. This is followed by an analysis of the outcome of citizens' actions, in comparison with the predictions of theoretical analysis in section 4.2.

4.1. Evidence on institutional features

4.1.1. Enforcement of environmental regulations

A number of environmental regulations and mechanisms came into exist-ence in India from the 1970s onwards.[14] These include the Wild Life Protection Act (1972), Water (Prevention and Control of Pollution) Act (1974), Forest (Conservation) Act (1980), Air (Prevention and Control of pollution) Act (1981), Environment (Protection) Act (1986), and a notifica-tion on Coastal Regulation Zone (1991). These were in addition to the rules and acts which were in force from as early as 1865, which already had a bearing on environmental management in the country (Ramakrishna, 1985). These rules either attempt to prescribe a standard for discharging a particular type of pollutant or prohibit (and/or restrict) specific types of activities. In addition, these rules also specify the respon-sibilities of either newly created or existing organizations, in terms of monitoring and enforcing regulations. The basic nature of these regu-lations, as noted by Murty (1999), is of 'command and control' as India has yet to start using market-based instruments. Pigouvian-type taxes are also not used, since the only tax of that kind in existence for water use, is too low and is therefore merely used for generating revenue for the Pollution Control Board. In spite of the adoption of a number of environ-mental regulations, their enforcement is seen to be very weak, as evident from the limited number of studies, which examined this issue. Monitoring by the Pollution Control Boards is 'far from complete, due to serious inadequacies of budgets and staff of the board' (Kuik *et al.*, 1997: 215). The Kuik *et al.* study, conducted in one state of India (i.e., Karnataka), also notes that, in the period 1992–1993 'among the 99 indus-tries in the highly polluting category, only 38 per cent complied with the standards'. Thus it is not surprising to see that highly polluting industries are increasing at a higher rate in places where monitoring and enforce-ment is weak, as it has happened in Karnataka. They also note that, although many industrial units have set up treatment plants, those plants are not operated throughout the year in order to save on energy costs. The less-intensively polluting processes are hardly monitored. This too can create problems if a large number of such units are left unmonitored. For

---

[14] For a recent treatment of environmental regulations in India, see Kuik *et al.* (1997) and Murty (1999).

example, a very low rate of monitoring of motor vehicles is widely prevalent in India.[15]

4.1.2. Need to approach courts and take other actions

Under circumstances of weak enforcement, it is highly likely that informed citizens take the burden of controlling pollution through various means, such as filing citizen suits or by taking direct action such as opposing the commencement of new polluting firms. The widespread use of Public Interest Litigations (or citizen suits) in India for pollution control is noted by researchers (Bowonder and Arvind, 1989; Kuik *et al.*, 1997; Murty, 1999). Apart from forcing (and helping!) the state to enforce existing environmental laws,[16] citizen suits in India have also been used to compel the state to evolve new legal measures,[17] and judiciary to provide newer interpretations.[18] The majority of environmental litigation in the country is for directing the central and state governments and their enforcement agencies to act and to implement the existing laws. For example, this was the purpose of litigation in more than 50 per cent of the cases of citizen suits listed by Sahasranaman (1997). In those cases the environmental law or zoning regulation by and large clearly specified the course of action. Citizens may have not only felt the inaction of public enforcement agencies, but also expected the state of affairs to continue unchanged even if notified by them directly instead of going through the court. The courts were also aware of the state of affairs but had a duty to perform despite circumstances, as evident from a number of observations of the Supreme Court of India, such as: "the primary effort of the court is to see that the enforcement agencies, whether it be the State or any other authority, take effective steps for the enforcement of laws'.[19]

4.1.3. Delay in getting court settlements

A major source of institutional failure in developing countries can be the absence of speedy and cost-effective conflict resolving mechanisms. It is not uncommon to see court cases taking decades to arrive at a decision or settlement. Such delays occurred in the majority of cases of citizens' actions, considered here, which sought a legal course. The time of delay

---

[15] This situation in Kranataka is evident from Kuik *et al.* (1997) and in Kerala from a citizen suit namely *M. Purushothaman* vs. *Government of India* (1993) in Kerala High Court.

[16] For example, this is the purpose in the famous case by *Vellore Citizens Forum* vs. *Union of India* (1991) where the plaintiff was asking for enforcement of pollution control laws in the case of tanneries.

[17] To a great extent, the institutionalization of coastal zone regulations in India is driven by the case of the *Indian Council for Enviro-Legal Action* vs. *Union of India and Others of 1993*.

[18] The case of *M.C. Mehta* vs *Kamal Nath and Others of 1996* has been responsible for newer judicial interpretation of the way government should protect public properties.

[19] Quoted from the judgment in *Indian Council for Enviro-Legal Action* vs. *Union of India and Others of 1996* (Sahasranaman, 1997).

varied from five to eight years,[20] and some cases are still pending before one or other level of court. When courts have attempted to resolve issues, objections have been raised or higher courts have been approached. For example, a high court[21] order was challenged in the Supreme Court of India with regards to the Wetland reclamation case mentioned in table 3. This was then referred back to the high court which gave a similar order to the first. This was then appealed against for a second time at the Supreme Court. The aggrieved party subsequently filed the case twice more at the high court. The result was a delay of more than eight years. Thus the courts were used not only for legal resolution, but also for delaying a decision. This behavior has a cascading effect, discouraging the unhappy participant in a conflict from accepting the potential settlements that could be arrived at after all other administrative and informal mechanisms have been exhausted. Mechanisms such as public hearings therefore become dysfunctional.

4.1.4. Remedies available at the court

In addition to the delay, the efficiency of court interventions depend on both the accepted property right in terms of pollution and the remedies available in court. The property right of the 'polluter pays principle', is accepted by Indian judiciary for resolving environmental conflicts.[22] It is interpreted as 'the polluting industries are absolutely liable to compensate for the harm caused by them (to the people) in the affected area, and they are bound to take all necessary measures to remove sludge and other pollutants lying in the affected areas'.[23] Thus one can interpret that victims of pollution in India have a legal right to live in a pollution-free atmosphere and to obtain compensation for damages.[24] However, it has also encouraged situations such as the case of a carbide factory that was allowed to start operation and then to settle the pollution issue. Decisions are not always limited to this property right interpretation. Courts have tried different measures such as asking for expert studies, standard compliance, and putting the issue before the public enforcement agencies.

4.1.5. Possibility of monetary compensation for ongoing damages

Payment of monetary compensation depends on a number of factors such as citizens' willingness to accept compensation, the perception of the polluter on the finality of the conflict by compensation, and also on the cost of identifying and assessing damages. The third issue is a widespread problem due to the large number of people involved, and due to difficul-

---

[20] This has occurred in four out of seven cases. In two other cases, delay is also due to reasons other than environmental conflict. In the last case, legal action started only two years ago, and the conflict is going on unresolved.

[21] Highest court in a state of India.

[22] This is elaborated by the Supreme Court of India, in the case of *Vellore Citizen Forum* vs. *Union of India and Others of 1996*.

[23] This part of the above decision is quoted in Sahasranaman (1997: 437).

[24] However it is yet to be seen whether the legal decisions on all such conflicts really adhere to such a strict liability rule.

ties in assessment. However, there can also be moral reasons that prevent the payment of monetary damages by one party to another. For example, the group of citizens who raise the pollution issue may do so for moral ideological reasons, or with a broad social objective in mind, and thus may be reluctant to accept monetary compensation. That seems to be true in the present case, since almost all the cases of citizens' actions considered were initiated by an NGO. Those who led the movement invariably mentioned that they were doing it for reasons such as love of nature, social commitment, or as members of an organization which has ideological positions in terms of environmental conservation. The fact that a person or a group, who may not be directly affected by the pollution, can also file a case in the 'public interest' by sending a letter to the court,[25] as interpreted by the Public Interest Litigation (PIL) in India, may also make monetary compensation unreliable.[26] Persons or groups, with no direct personal loss have filed citizen suits against the development of tourist resorts, power projects, sand mining, wetland conversion, forest clearance, and so on. (However it should be noted that even people who are not directly affected by a project, may have non-use values associated with a piece of environment, and are therefore affected by it in one sense.) Monetary compensation is unreliable due to the PIL, because any payment of compensation to some or all of the directly affected people, may not end the possibility of having a pollution-related case filed in the court, and this can discourage one of the parties to pay compensation.

4.1.6. Unlawful actions by the citizens
Physical measures, such as preventing the movements of products and raw materials and political agitations including marches and strikes, etc. were employed in most of the cases considered here. These measures were carried out independently of legal action in some cases, and as a way of affecting the implementation of legal decision in others. They took the following forms: prevention of the start of operations when the court allowed it; demolition of equipment (as in the case of the carbide factory); prevention of transportation of materials and machines by blocking roads (in the case of a manganese factory and sand mine, clay mine and stone crusher units); gathering in front of a factory (in the case of an asbestos firm); breaking structures (pulp factory); and prevention of tree felling and movement of vehicles (in order to protect forest-growth on private lands). In essence, the citizens or concerned groups were taking actions that make it costlier for the polluters to start or operate.

---

[25] Note that this makes the cost of legal action very low.
[26] The following judgment by the Supreme Court of India, in the case of *People's Union of Democratic Rights* vs. *Union of India of 1982*, summarizes its attitude towards public Interest Litigation (PIL). '[It] is not for the purpose of enforcing the right of one individual against another as happens in the case of ordinary litigation, but it is intended to promote and vindicate public interest which demands that violations of constitutional or legal rights of large numbers of people who are poor, ignorant or in a socially or economically disadvantageous position should not go unnoticed and unredressed' (quoted in Sahasranaman, 1997: 461).

4.1.7. Citizen's cost of unlawful actions

While analyzing the costs borne by individual citizens, it can be seen that these are very small compared to the impact they created. These costs include spending a day or two picketing, writing a letter to the court, a small contribution to the fund collected from a large number of people to meet the legal cost, and so on. The involved NGOs are by and large professional organizations which derive different types of benefits. Their cost of becoming involved in any one problem is not seen to be high. It is therefore not surprising that the people who initiated the actions did feel that they were not limited by money and all said that what was required was mobilization and campaigning through cheaper forms of communication. Since, in many cases a large number of people were involved, the cost borne by a single individual was very low. The greater cost was the time spent on door-to-door campaigning, and participation in blocking roads and other physical efforts. This contribution may not be deemed costly in a place where nearly 30 per cent of the working-age population is unemployed,[27] and also when the leaders and others who may hold formal sector jobs do not have to sacrifice much due to the institutional characteristics of such labor markets[28] in the country.

4.1.8. High cost imposed on the polluters by unlawful actions

Although the cost borne by citizens for taking action is low, its impact on firms can be either high or low. This depends on the losses caused by delay in the starting of operation or the movement of materials and so on, and also on how quickly and effectively law enforcement agencies take action against such unlawful means. The empirical evidence is mixed in this regard. In some cases, physical action imposed high cost on a firm. For example, the carbide factory mentioned earlier could not start operation even with a legal order; equipment was destroyed even when a pollution-control plan was adopted in the manganese factory; material transport was blocked in the clay mine; trees have not been cut from private forests for the last eight years, and so on. In other cases, the physical action did not have much impact, as in the case of the new tourism resort, the existing pulp factory, and in the case of sand mining, etc.

The analysis of institutional features can be summarized as follows: enforcement of environmental regulation is weak; this encourages citizens to approach court and take other physical actions; this in turn causes significant delay; monetary compensation is unreliable; and the cost borne by the citizens to take action is small. However, the evidence on the cost imposed on firms by citizens' actions is mixed, with some firms/projects bearing high costs, where as others do not. We now consider the outcome of the citizens' actions in the following section.

---

[27] The official record of unemployment in Kerala is about 4 million in the late 1990s, where the total population is around 30 million.

[28] Formal sector labour rules are rigid in India and more so in Kerala with about 60 days of paid leave per year, firms and departments cannot fire workers even for continued absence, and with social, political, and trade union workers enjoying many privileges at the work place due to their political influence.

4.2. Evidence on the outcome of citizens' actions

It can be seen that the majority of cases (14/25) were movements against a new project or an extension program. All the citizens' actions were initially induced by an NGO, but in most cases attracted the support of significant sections of the local community. However in a number of cases, some sections of the local people supported the start or the continued operation of the industry or development activity. These sections, which supported industry or development, include local governments, workers, and the people who are supposed to derive direct benefits from the proposed project, for example islanders who were to be connected to the mainland through the construction of the bridge that would require the reclamation of wetlands. There were four projects proposed by the state government, and in these cases, too, one can expect that there existed wide political support.

It is interesting to analyze the main demand expressed by the different cases of citizens' actions. In 11 out of 14 cases of newly proposed projects or activities, the agitating citizens' demand was that there should not be any such project in their locality. This is not surprising since they were to suffer only damages and would not receive compensation. Their optimal demand therefore was that pollution should be reduced to zero, implying production would also be zero. In two cases, an NGO, which believed that environmental protection and economic development should move together, initiated the citizens' action, and tabled an initial demand for pollution control. However when the cases became a movement of local people, the demand changed to 'no project in our place'. In contrast to the demands relating to new projects, the demand against all the ongoing production/activities was for pollution control. It is not clear why this moderation in demand takes place in the case of ongoing pollution. It may be due to the perceived difficulties (or higher cost) of achieving zero-pollution because of many factors including opposition by workers and others getting pecuniary benefits from the operation of the firm.

The impact of citizens' suits was such that it led to the abandonment of seven out of 14 newly proposed projects. Two other projects were abandoned for reasons other than citizens' agitation, and four projects were delayed without a final decision. (In only one case did citizens' actions force the firm to adopt pollution control.) Of the new projects, not a single one started if it was opposed by citizens. Citizens' actions can therefore be viewed as very effective in terms of environmental conservation. However, as demonstrated by the theoretical analysis, citizens' actions can result in a social loss via the loss of potential social gain from production at optimal levels of pollution (in the case of newly proposed activities).

In two-thirds of the cases, where citizens encountered an existing firm, their actions did not have much impact, and here the contrast with the newly proposed projects becomes very evident. It seems that the cost through civil disobedience actions that could be imposed on existing firms is not high. Thus it is not surprising that citizens' actions are not effective in these cases and are inadequate to avoid the social losses due to the high pollution from the ongoing firms.

Since many newly proposed firms or activities cannot come into existence due to the high institutional cost imposed by citizens' actions, and since such actions are by and large inadequate to avoid the social losses due to the continued operation of highly polluting firms, it can be argued that the combined effect of citizens' actions and institutional constraints is to enhance social losses. It may be noted that the total losses are the sum of the above-mentioned two losses, since they both can and do occur.

It can be noted that the cooperative outcome, as described in game theoretical analysis, occurred in three cases. However, it is difficult to explain why one new firm could start operation with pollution control (i.e., asbestos factory), and some existing firms adopted pollution control (in the case of the Benzene nitrate factory and in one clay mining unit), due to the absence of information on cost and damage. One can speculate that the value to the asbestos factory of adopting a zero-pollution (or insignificant pollution) technology, i.e., $V(0)$, is high enough, and this factor may, as noted in the theoretical section, have encouraged the firm to start operation with the adoption of such technology. The firms and citizens could communicate and commit to the adoption of zero-pollution technology and acceptance of the firm's operation, respectively. The lack of support from counter-pressure groups, due to the low employment potential within the area, may have given an impression that the cost of civil disobedience can be high to the two existing firms, and this may have encouraged them to adopt pollution control.

So which firms do come into existence without encountering citizens' actions? In order to analyze this issue a representative sample[29] of 239 firms operating in Kerala were analyzed. By looking at the nature of production in these firms, it was seen that 94.56 per cent of firms could not be viewed as potential polluters. These include furniture units electronics assembly units, or heritage hotels, etc. Within the set, only 13 firms can be considered potentially polluting. Among these, six firms came to exist before the 1970s, implying that environmental awareness was not widespread during those times. Five firms started functioning during the 1980s and the 1990s, but in locations such as industrial estates where large polluters were already existing. Thus local people probably did not see the new firm as a visible threat, given the high level of pollution created by existing firms. Only two of the potentially polluting firms within the sample came to exist in a 'normal' location during the last two decades, without encountering citizens' actions. This shows that citizens' actions play a significant role in determining the industrial structure of the state, and make the start up of potentially polluting firms less likely.

5. Conclusions

This paper analyzed the outcomes when citizens act to protect the environment by filing court cases or by taking physical actions, in the context of

---

[29] These are firms listed in a directory prepared by the Kerala State Industrial Development Corporation. Since this listing is not based on the nature of production or pollution of the firms, it was felt that it is a representative sample of firms that exist in Kerala

institutional weaknesses of developing countries such as India. These institutional features include weak enforcement of environmental regulations, long delays taken for court settlements, and the low cost for taking, and the possibility of imposing high cost through, unlawful actions. The impact of these features, when combined with the institutional features specifically related to environmental issues (which exist in many other parts of the world too), such as the polluter pays principle, and the unreliability (impossibility) of monetary compensation for ongoing damages on the outcome of citizens' actions were analyzed here.

Theoretical analysis showed that the following outcomes are likely to happen: poor enforcement of environmental regulations make citizens act in ways other than alerting public enforcement agencies; the delays caused by approaching courts by the citizens affect the new and old firms differently; existing firms, and citizens interacting with a proposed firm, have no incentive to work for an out-of-court settlement. When actions of civil disobedience are less costly for citizens due to poor law and order enforcement, and impose high costs on the polluter, socially efficient outcomes are unlikely to happen through the interaction between the citizens and a new firm. However, the likelihood of achieving socially efficient outcomes through interaction between citizens and an existing polluter increases with the cost to be borne by the polluter due to civil disobedience, and decreases with the delay of court decisions. However, institutional weaknesses, such as the long delay in court decisions and the low cost of actions of civil disobedience, are likely to create a situation in which new firms can establish only with near zero-pollution if citizens are vigilant to act. This outcome, too, creates social losses, like pollution at higher than optimal levels by existing firms.

The empirical evidence indicated the following patterns in India: enforcement of environmental regulation is weak; this encourages citizens to approach court and take other physical actions; this in turn causes significant delay; monetary compensation is unreliable; and the cost borne by the citizens to take action is small. However, evidence regarding the cost imposed on firms by citizens' actions is mixed, with some firms/projects bearing high costs, where others do not.

Regarding the final outcome, citizens' actions led to the abandonment of seven out of 14 new projects, and only one started with pollution control. However such action could not make much impact on two-thirds of the ongoing pollution problems. The paucity of cost and damage data makes it difficult to explain the starting and adoption of pollution control in one new project, and the control of pollution by two existing firms. Analysis of the firms that came into existence without encountering citizens' actions demonstrates that the majority of them were not potential polluters. Among the polluting firms that exist in Kerala, the majority of them came into existence before the 1970s, or started operation in the vicinity of large polluters during the last two decades.

As a broad conclusion, one can say that under the institutional constraints prevalent in developing countries, citizens' actions (in the form of citizens' suits and actions of civil disobedience) may not be that effective in avoiding the social loss associated with pollution, and may aggravate it

Table 3. *Citizens' actions against environmental pollution: major features from 25 cases in the Indian state of Kerala*

Polluting project/ activity and location	Demand	Success/impact	Who were protesting	Nature of actions
New carbide factory, Nenmara, Palakkad	No factory in their location	Delaying the production	Significant section of people in the nearby locality with the support on NGO	Physical, legal and lobbying
New manganese dioxide factory, Kannur	For efforts to control pollution	Created further opposition to stop factory in spite of accepting pollution control demand; stopped plan; area used for other factories	,,	Negotiation, lobbying, physical
New tourism resort, Bekal	Against construction of tourism resort	Delaying the activity	Mainly an NGO	Physical, legal, lobbying
New petro-chemical, Kannur	Against the factory	Plan to start factory was dropped due to other reasons	A few local people	Lobbying
New nulcear power, Perngom	Against project	Abandoned the plan	Significant sections of local people with support of NGO	Lobbying
New expansion of clay mining, Madayippara	Against expansion project	Freezing the expansion plan	,,	Lobbying, physical
New units of stone crushing, Kanadiparaba	Against the units	Stopped one and failed to stop three	Some sections of local people with NGO	Lobbying, physical
New power project, Kannur	Against the project	Delaying due to other reasons	Significant sections of local people with NGO	Lobbying, legal

New chemicals, Malappuram	Initially to get more information	But local people then started opposing project; dropped the plan	„	Lobbying
Ongoing sand mining	For the sustainable use	Could make some control to exist, but majority of issues remain	„	Lobbying, legal
New asbestos factory, Thrichur	Initially to control pollution	Company accepted the control measures	„	Negotiation, lobbying, legal
Ongoing benzene nitrate factory, Thrichur	Control pollution	Company adopted some measures	„	Negotiation, lobbying
New reclamation of a part of wetlands for a bridge project, Cochin	Against the project	Delaying the project for the last seven years; could reduce the area proposed for reclamation	Some sections of local people with NGO	Lobbying, legal
Ongoing pulp factory, Chaliyar	For pollution control	Initially followed some measures, but continued with pollution until closed for other reasons	„	Lobbying, legal
New forest clearance in private land, Jeerakappara	Against any clearance	Delaying for the last eight years	Significant sections of local people with NGO	Lobbying, physical, legal
Ongoing clay mining, Koyilandi	To have less-harmful methods of mining	Could enforce some measures	„	Lobbying, physical
Ongoing lake development, Sasthamcottah	To have sustainable land use in the surroundings	Could not make much impact	„	Lobbying

Table 3. *Citizens' actions against environmental pollution: major features from 25 cases in the Indian state of Kerala (continued)*

Polluting project/ activity and location	Demand	Success/impact	Who were protesting	Nature of actions
Ongoing titanium factory, Chavara	To control pollution	Incomplete efforts by company	Significant sections of local people with NGO	Lobbying, legal
Proposed hydroelectric project, Pooyankutty	No project	Delaying the project	Activists and NGOs who are not directly affected by the project	Legal
Proposed hydroelectric project, Athirappally	"	"	"	"
Ongoing titanium factory, Trivandrum	Control pollution	Delay in establishing pollution control mechanism	Local people directly affected by the pollution	Physical, lobbying, legal
Ongoing carbon black factory, Ernakulam	Control pollution	Unsatisfactory functioning of the existing pollution control system	"	Physical, legal
Ongoing beer factory, Alappuzha	Control pollution	"	"	Physical
Chemical factory, Kottayam	Control pollution	Locked out for other reasons	"	Lobbying, legal
Zinc factory, Ernakulam	Control pollution	Continuing with pollution problems; arrived at some settlement with local people	"	Legal, lobbying

under some conditions. Thus the major policy insight of the paper is that such citizens' actions may not compensate for the laxity in public enforcement and hence there is a need for getting the institutions and 'law and order' enforcement right.

References

Amachar, G.S. and A.S. Malik (1996), 'Bargaining in environmental regulation and the ideal regulator', *Journal of Environmental Economics and Management* **30**: 233–253.

Becker, G.S. (1983), 'A theory of competition among pressure groups for political influence', *Quarterly Journal of Economics* **98**: 371–400.

Bowonder, B. and S.S. Arvind (1989), 'Environmental regulations and litigation in India', *Project Appraisal* **4**: 182–96.

Coase, R.N. (1960), 'The problem of social cost', *Journal of law and Economics* **3**: 1–44.

Coleman, J.S. (1990), *Foundations of Social Theory*, Cambridge, MA: Harvard University Press.

Cooter, R. and T. Ulen (2000), *Law and Economics*, Reading, MA: Addison-Wesley

Dasgupta, P.S. Hammond and E. Maskin (1980), 'On imperfect information and optimal pollution control', *Review of Economic Studies* **47**: 857–860.

Dasgupta, P. and I. Serageldin (eds) (2000), *Social Capital: A Multifaceted Perspective*, Washington, DC: World Bank.

Dreze, A. and A. Sen (1993), *Hunger and Public Action*, Delhi: Oxford University Press.

Fudenberg, D. and E. Maskin (1986), 'The folk theorem in repeated games with discounting or with incomplete information', *Econometrica* **54**: 533–554.

Guha, R. (1988), 'Ideological trends in Indian environmentalism', *Economic and Political Weekly* **23**: 2578–2587.

Hamilton, J.H., E. Sheshinski, and S. Slutsky (1989), 'Production externalities and long run equilibria: barganing and pigouvian taxation', *Economic Inquiry* **27**: 453–471.

Hayes, A.G. (1997), 'Environmental regulation by private contest', *Journal of Public Economics* **63**: 407–428.

Hettige, H., M. Haq, S. Pargal, and D. Wheeler (1996), 'Determinants of pollution abatement in developing countries: evidence from South and Southeast Asia', *World Development* **24**: 1891–1904.

Huber, C. and F. Wirl (1998), 'The polluter pays versus the pollutee pays principle under asymmetric information', *Journal of Environmental Economics and Management* **35**: 69–87.

Kuik, O.J., M.V. Nadkarni, F.H. Oosterhuis, G.S. Sastry, and A.E. Akkerman (1997), *Pollution Control in the South and North*, New Delhi: Sage Publications.

Mani, M., S. Pargal, and M. Haq (1996), 'Does the environmental regulation matter? determinants of the location of new manufacturing plants in India in 1994', Washington, DC: World Bank.

Mas-Colell, A., M.D. Whinston, and J.R. Green (1995), *Microeconomic Theory*, New York: Oxford University Press.

Maxwell, J.W., T.P. Lyon, and S.C. Hackett (2000), 'Self regulation and social welfare: the political economy of corporate environmentalism', *Journal of Law and Ecconomics*, **43**: 583–612.

Murty, M.N. (1999), 'Environmental regulations and economics of environmental policies', Working Paper No. 11/99, Institute of Economic Growth, Delhi.

Naysnerski, W. and T. Tietenberg (1992), 'The private enforcement of federal environment laws', *Land Economics* **68**: 28–49.

Naysnerski, W. and T. Tietenberg (1992a), 'Private enforcement', in T. Tietenberg (eds.), *Innovation in Environmental Policy*, Vermont: Edward Elgar, pp. 109–138.

Pargal, S. and D. Wheeler (1996), 'Informal regulation of industrial pollution in developing countries: evidence from Indonesia', *Journal of Political Economy* **104**: 1314–1327.

Peltzman, S. (1976), 'Towards a more general theory of regulation', *Journal of Law and Economics* **19**: 211–240.

Putnam, R.D. (with R. Leonardi and R.Y. Nanetti) (1993), *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton, NJ: Princeton University Press.

Ramakrishna, K. (1985), 'The emergence of environmental law in the developing countries: a case study of India', *Ecology Law Quarterly* **12**: 907–935.

Russell, C.S. (2001), *Applying Economics to the Environment*, Oxford: Oxford University Press.

Sahasranaman, P.S. (1997), *Law of Environment Protection*, Bangalore: Classic Publishers.

Spulber, D.F. (1989), *Regulation and Markets*, Cambridge, MA: MIT Press.

Stigler, G.J. (1975), *The Citizen and the State*, Chicago: University of Chicago Press.