environmental performance.

China's pollution levy:

The study is done on water pollution levy, because its implementation and impact were well-documented. The economic analysis focused on explaning variation in two province-level measures: Industrial emission intensity and the effective water pollution levy rate. Contrary to conventional wisdom the results suggest that the water pollution levy has been neither arbitrarily administered nor ineffective in china (Shakeb, 1999).

Two sets of local factors play significant role in explaning the variations in the effective levy. First, reflecting the principles of environmental economics, is local valuation of pollution damage that has three components (total pollution, size of exposed population and local income)

Second is community capacity to understand and act on local environmental problems (indexed by measures of information, education and bargaining power).

The results are consistent with multiple-agent model. The implication of results is: the uniform implementation of uniform standards and/or levy rates is not optimal; local conditions determine what these should be (Shakeb, 1999).

This implies that power of local communities in actions that take place is significant and much of the actions take place at local level.

There is another study that uses new survey evidence to analyze the effects of regulation, plant-level management policies, and plant/firm characteristics on the environmental performance of Mexican factories. This study confirms that, local community pressure (informal regulation) has strong impact on environmental performance (Susmita Dasgupta, 1997).

The other study, is a paper that reviews the evidence from a survey of pollution abatement by 26 pulp and paper plants in four developing countries: Bangladesh, India, Indonesia and Thailand.

The results show that, community pressure, or informal regulation, emerges as a clear source of interplant differences. Under some circumstances, communities successfully pressure plants to abate even if little or no support is available from formal regulation. Also it is found that, existing formal regulation has measurably beneficial effects, even when it is weakely-developed (Raymond S.Hartman, Hu, Wh 1995).

The following table shows the impact of local pressure (informal regulation) on abatement activity by countries of study (Raymond S.Hatman, 1995).

	Country				
Pressure	Indonesia	Thailand	India	Bangladesh	Total
0	12.7	19	11.2	5	11.1
1	19	30	18.2	8	19.8
Total	14.6	26.3	14.3	5.7	14.5

The other component of multiple agent model was market. Market can create additional incentive for pollution control. Capital markets, if properly informed, may provied the appropriate financial and reputational incentives (Susmita, he, wh, 1997).

In this case investors play an important role, as it mentioned before, they value the firm's environmental performance, so environmental news would have a great impact in stock market. Recent studies confirm this statment (World Bank Report, 1999).

The study has been done in these countries: Argentina, Chile, Mexico, and philiphines. None of the four contries has a strong record of enforcing environmental regulations. (Susmita Dasgupta, 1997)

In this paper it's assessed whether or not capital markets in Argentina, Chile, Mexico, and the Philippines react to the announcement of firm-specific environmental news. In fact, the responses are much larger than those reported for U.S. and Canadian firms. Gains average 20 percent in response to good news, and losses range form 4 to 15 percent in the wake of bad news. (World Bank policy research report)

The following graphs, illustrate such impacts for two firms operating in Philippines and Mexico.

As it is shown, bad news has negative impact on prices. Bad news drops the price (case of Mexcio) and good news raise prices (Philippines).

The paper concludes that: "despite a generally acknowledged poor enforcement of environmental regulations, capital markets in Argentina, Chile, Mexico and the Philippines appear to react to the announcement of environmental events involving publicly traded companies. While fines and penalties used by the environmental agencies of these countries may have fallen short of creating incentives for pollution control, capital markets have penalized firms suffering from adverse environmental events, and rewarded firms with positive environmental news" (Sumita Dasgupta, 1997).

So the main emphasis of this model

dictators. Community representative take their place at the negotiating table along with regulators and factory managers. In this case, the negotiation cost will be less than the traditional case, also the access to information will be more under this approach (figure 1a).

The market

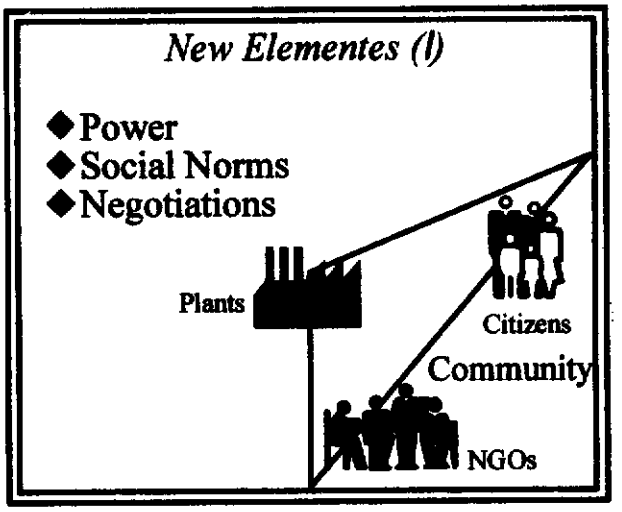
Many agents can affect the revenues and costs of factories that operate in local, national and international markets (Shakeb,1999).

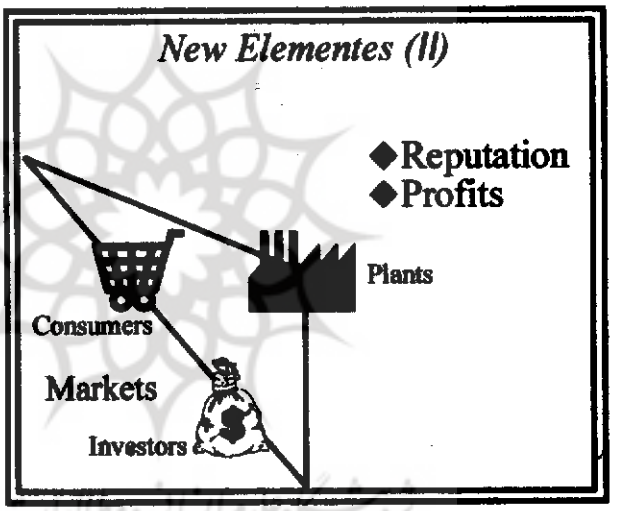
These days, in both developing and industrial countries, the decisions of many agents are affected by environmental considerations. Environmental plays a significant role in consumer and investors decisions, so public certification of bad or good performance, may result to large expected gain or losses (Susmita).

Therefore market can be another important incentive for pollution control, because a high level of pollution intensity may be a sign that shows firms production process is inefficient, so the investors are less likely to invest in that market, because there might be potential losses due to regulatory penalties and liabilty settlements. The studies confirm that stock market has been responsive to environmental news in countries of study (World Bank Report). This is going to be explained in detail after the following section.

Multiple agents, Multiple Incentives: A New View of Regulation

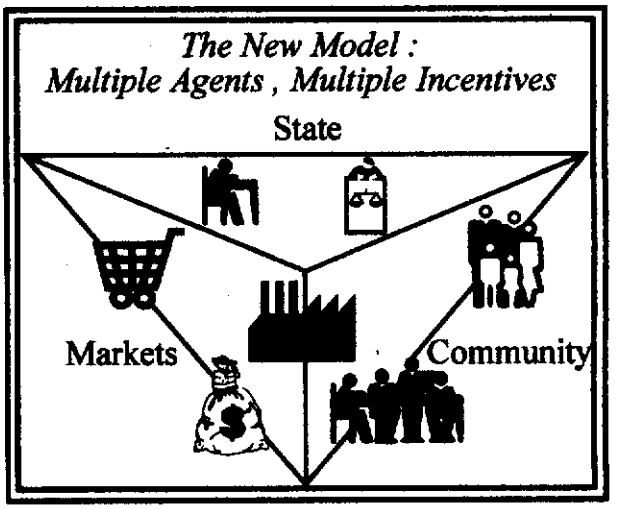
This new model (figure 2) is more effective than the traditional one, because it promotes two-way communication with participants. As communities and markets gain access to environmental information, pressure through many new channels can prompt polluters to reduce their emissions. This new regulatory model can be called the





'Regulatory Triangle' (Shakeb, 1999).

In Regulatory Triangle, instead of two agents that were in traditional



agents and multiple incentives and that make the new model much more effective than the traditional model. The other benefit of new model is its ability to explain the abserved variations, "once the new components - community and market- are introduced, the new regulatory model is abtained much more power to explain the abservable variation in factories environmental performance". Many studies in developing countries show a high variation among firms performance. Even in poor countries like Bangladesh, there are factories that have been met the international standards and also the factories which are among the world's most serious polluters (Raymond S.Hartman).

These variations could be explained, when considering the role of local communities and market in factories environmental performance.

Now the question to be asked is, what does new view of regulation mean in practice? To draw out the some of the implications, we will summarize the results of recent studies in some developing countries, regarding the role of local communities and market or the role of public information in

agents-Regulators and the Law- state is the center, and regulator is the only on who has the power of enforcing. He will use the law as a benchmark and will enforce the optimal level of environmental performance (Shakeb).

Fugure (1b) shows the conventional view from the perspective of environmental economics. The regular has to determine the MSD as the level of pollution rises, and also quantify the increase in MAC as polluters reduce their emissions and then determines the optimal pollution at point N* where MSD=MAC (by mandating factories not to pollute above determined level or setting a pollution charge, or allowing the factories to trade pollution permits). Because the transaction costs are zero, the regulator simply dictate them (Shakeb).

Both of these models would work effectively under the right assumptions, i.e. full information and zero transaction costs.

It is clear that both models are highly dependent on information as a key factor to determine the optimal level of environmental performance. It is much easier to manage pollution more cost-effectively, once the regulator have high-quality information, more integrated information systems and stronger public participation (World Bank Report). In the first model, regulator needs to have complete information about the polluter in order to be able to put the right level of enforcement. Also, in the second model, the regulator needs to have full information about the social damage curve and abatement cost curve, to be able to quantify the marginal social damage due to increase in pollution level and quantify marginal abatement cost of reducing pollution for polluter.

In fact the studies have reveled that most of developing countries are not able to meet these assumptions of full

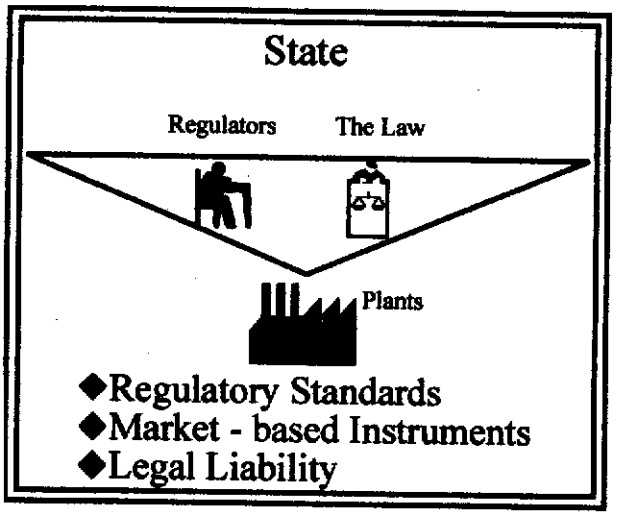


figure 1a

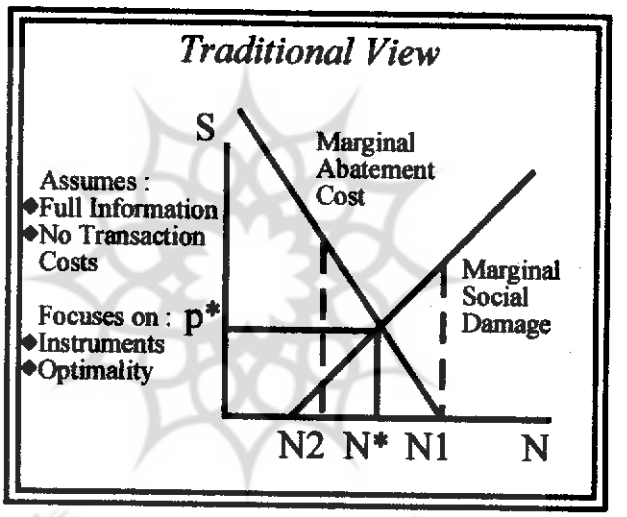


figure 1b

information and zero transaction costs, they are plagued with following problems: (Shakeb)

- Information is not fully available due to lack of strong monitoring quality. Data on factory emissions and ambient quality are often non-computerized. Information on abatement cost is almost never available.

- Bureaucracy is another problem in developing countries which violates the assumption of zero transaction cost.

- Human and technical resources: Agencies generally have little capacity for assessing the net benefits of alternative programs and using the results to establish priorities for allocation of scare resources.

- Political support: Serious enforcement frequently ecounters potent political resistance.

- Other limitations like weak institutions, lack of technical exports, lack of political commitment.

Considering the above argument, it is clear that applying regulation policy under inappropriate assumptions (limited information and high transacton costs) in developing countries, won't be cost-effective and optimal solution to correct market failure.

PART II

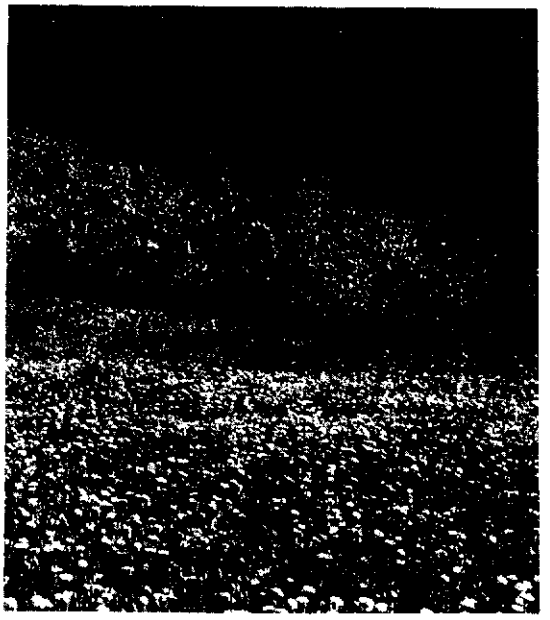
In this section we are going to introduce the new model which addresses the limitation of traditional regulation model, using the experience of selective developing countries. Their experience as participant-analysts has revealed the limitations of conventional regulatory model and suggested a number of scientific directions for revision (World Bank).

This new model, suggests powerful roles for two additional 'players': the Community and the Market.

The community

Recent evidence from Asia, Latin America and North America suggests that neighboring communitites can have a powerful influence on factories environmental performance (Shakeb).

In this case, the regulators become more like a mediators and less like



Since the correct data are not available in developing countries, it would not be possible for regulator to choose the optimal pollution level and tax rate

achieve a pre-determined level of abatement. Under this approach, the regulator sets a standard on the level of pollution based on scientific information. He then chooses an incentive based policy that achieves this standard in the least cost manner. This approach achieves cost-effectiveness but not social optimality. due to limitations of developing countries (non-competitive market structure, lack of full information, transaction costs and uncertainty), studies show that pollution charges have been worked out more efficient in developing countries than other policy instruments (S.Eskeland & Jimenze, 1992).

The study of World Bank on selected developing countries, comes up with successful experiences of these countries:

- **Colombia** is one of the countries which has started to move from traditional regulation form to pollution charge system. Seven regions in colombia with the greatest population, economic activity and population are the flagship for implementing the charge system.

- **The Philippines** has long maintained a traditional regulatory system (this system has been explained in the second part of paper). To provide new incentives and restore Laguna Lake, the LLDA instituted an "environmental user fee" (EFU) for industrial pollution. After two years of implementation, LLDA reports that BOD discharge from the pilot plants have dropped 88 percent.

- **Malaysia** has had a successful experience of implementing the pollution charges, as well.

- **China** in response to its serious emissions problems, instituted pollution charges in 1979, and almost all of the china's counties and cities have implemented the system. (World Bank Report, 1992)

● command and Control Method in Developing Countries:

This method imposes a quantity of pollution that a polluter can emit, or dictate the firm to adapt a technology in two forms of performance standards and design standards. Performance standards restrict the amount of pollution a firm can discharge or the quantity of output it can produce or the quantity or quality of input it can use. Design standards mandate producers to use the best available control technology. The design standard would be excessively costly for developing countries and generally they don't apply it specially in short run, the researches don't show any remarkable experience of applying this policy. Performance standard is easier and less costly to be implemented in comparison with design standards, yet it has its own limitations to be applied for a developing country. Still the policy is strongly dependent on information, which is not easily available in these countries.

Considering the constraints that developing countries governments confront, the question is which policies are more efficient, practical, and equitable? Many governments have chosen price-based intervention versus quantity-based, even though quantity-based interventions (such as tradable permits) can incorporate aspects of market-based incentives, they will in most cases require new administrative systems. so many governments in developing countries have found indirect instruments (charging or taxing relevent commodities), more efficient and applicable for developing countries. (S. Eskeland & Jimenez).

This indirect instruments can be considered as a regulatory model, therefore the conclusion of this part is that most of developing countries have chosen regulatory model among all other environmental policy models, in order to abate their pollution level to optimal level. What are the limitations of this model (regulation) for a developing country?

To have a better understanding of limitations, let's take a look at the traditional view of regulation:

The traditional View of Regulation

Figure (1a) shows the classic paradigm for analyzing pollution control issues.

There are two principal

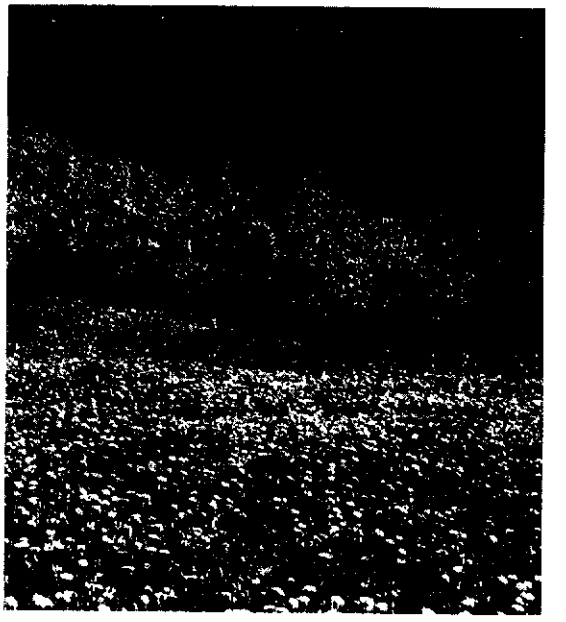
to justify the policy implementation. As it was mentioned, pollution abatement policies can be categorized as the incentive-based policies and the command-control method. Let's analyze the application of theses methods in a developing country:

● Incentive-Based Policies in Developing Countries:

These policies are either price-based (such as taxes and subsidies) or quantity-based (such as tradable permits). Both of these policies have exactly the same result as long as there is no uncertainty about abatement costs (Gunnar S Eskeland, 1992). The main problem that developing countries are facing is uncertainty due to lack of information. Data are not available in order to estimate the abatement cost or social damages of pollution. It would not be possible for regulator to choose the optimal pollution level and tax rate that maximizes net benefit of pollution or abatement. Therefore these policies won't be equivalent in developing countries.

Empirical investingations have strongly supported the theoretical case for tradable permissions (Gunnar S.Eskeland. 1992). Also for administrative reasons, tradable permissions may be preferable to tax or price instruments (Baumal and Oates 1998). In efficiency ground, tradable permissions are more effective, but in order to apply it, there is a need for competitive market structure which is not available in deveoping countries, therefore if a developing country wants to apply this method, it needs to design a completely new scheme, which would be so costly. In this case, although tradable permissions is an efficient method in general, it won't be efficient for a developing country due to limitation with market structure in those countries. So, we'll continue this discussion with price-based incentives

The environmental policies that would lead to optimal level of pollution abatement and optimal allocation among polluters can be classified as either incentive based policies or command and control instruments



like taxes and subsidies. Government using pollution tax, should select a base and rate so that the external cost of the activity is internalized. Such an instrument is often called pigouvian tax. It can be either a tax on pollution or a subsidy for abatement. They both have the same effect in short run, but in long run, when market entry and exit can be affected, a tax is normally preferable because it does not give firms incentives to enter subsidized polluting industry (Gunnar S.Eskeland and Emmanuel Jimenez, 1992).

China has experienced a combination of pollution charges and abatement subsidies. An empirical analysis of pollution abatement efforts of Chinese industrial firms under a combination of pollution charges and abatement subsidies, with the data on Chinese top industrial polluters and China region development, the econometric results show that this combination in China has been effective in providing incentives for industrial firms to abate pollution (Hua Wang and Ming Chen, 1998).

In general, the idea of combining different policy would be efficient due to flexibility that it provides, the more flexible the policy, the more applicable it would be. Pollution charges (taxes) have different bases: (Gunnar S.Eskeland and Emmanuel Jimenez, 1992) - (Baumol and Oates, 1998)

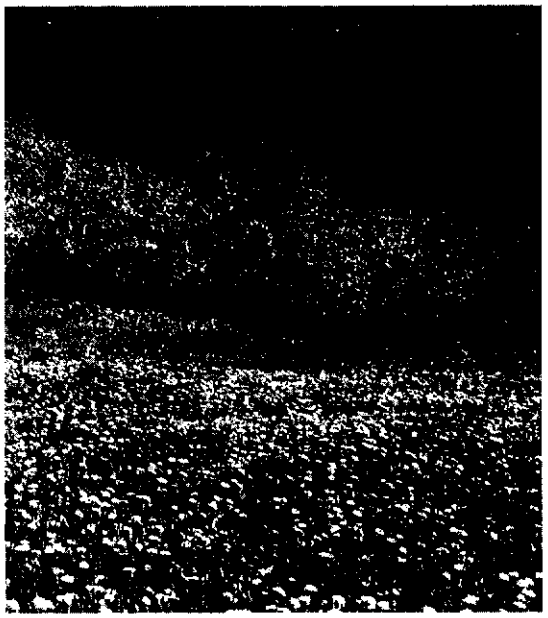
- Taxing the damage make it possible to differentiate between polluter according to the amount of damage caused per unit of emission.

- Taxing emissions minimized the cost of abatement by equalizing marginal abatement costs across sources but does not differentiate between sources according to damage emission charges, therefore it fails to privide incentive to relocate within a region.

- Taxing input and outputs of polluting activities mimics an emission or damage tax (imperfectly) but fails to give incentives to minimize emissions or damages for a given level of output or input.

comparing between a tax and uniform standard, a tax leads to higher social welfare than a uniform standard while achieving the same level of pollution (Baumol and Oates, 1998)

All these policies need information on abatement cost and social damage of pollution, which is not easy to be estimated in develoing countries, in this case using standards and pricing approach will be a cost-effective way to



Some of the problems in developing countries are poverty and rapid population growth

are not reflected in market transaction. Pollution affects the well-being of consumers or the profits of firms directly and not through the market channel. The damages due to pollution are not reflected in prices of goods transacted in the market. The externality is said to lead to market failure becuse the market mechanism fails to maximize social net benefit in the presence of externalities. In order to internalize the externality, or correct the market failure, there is a strong need of applying an optimal policy.

The environmental policies that would lead to optimal level of pollution abatement and optimal allocation among polluters can be classified as either incentive based policies or command and control instruments.

- Incentive-based instruments are those that operate by changing the price of pollution and thereby creating an incentive to producers to change their behavior. These consist of the following policies: pollution tax, output tax, tradable permits, abatement subsidy, technology tax/ subsidy.
- Command and control methods impose controls on the quantity of pollution that a producer can emit, or dictate the technology that producers can use. These consist of setting standards which could be two types: performance standards and design standards. Performance standards restrict the amount of pollution a firm can discharge or the quantity of output it can produce or the quantity or quality of input it can use. Design standards mandate producers to use the best available control technology.

This is typically technology for abating pollution at the end-of-the pipe. All these policies are valid uder certain assumptions that are the most essential condition for policy implementation. Without those assumptions, the policy is almost invalid. Those assumptions are:

- Full imformation
- Competitive market
- Zero transaction cost
- Certainty

Studies on selected developing countries, have revealed that basic assumptions which support the model-full information and zero transaction costs- are not met in practic. (Shakeb Afshan, 1996)

The objective of this paper is to address the limitations of applying those policy instruments that are mentiond above, in developing countries and then introduce a new model that reforms the traditional model in a least cost method. After analyzing different policies and their limitaitions in selected developing countries, the paper is going to answer the following question:

- What is the most common exiting policy that has been used in selected developing countries, among all those policies?
- What are the limitations, that most of these countries are facing in applying theses policies?
- Hos can we reform the existing policy model in a least-cost method to increase its efficiency?

The paper has two main parts, the first part is devoted to analysis of different policy instruments and the limitations of applying those policies in a developing country. Second part of the paper is devoted to introducing new model that reforms the limitation of traditional model in a least-cost method.

PART I

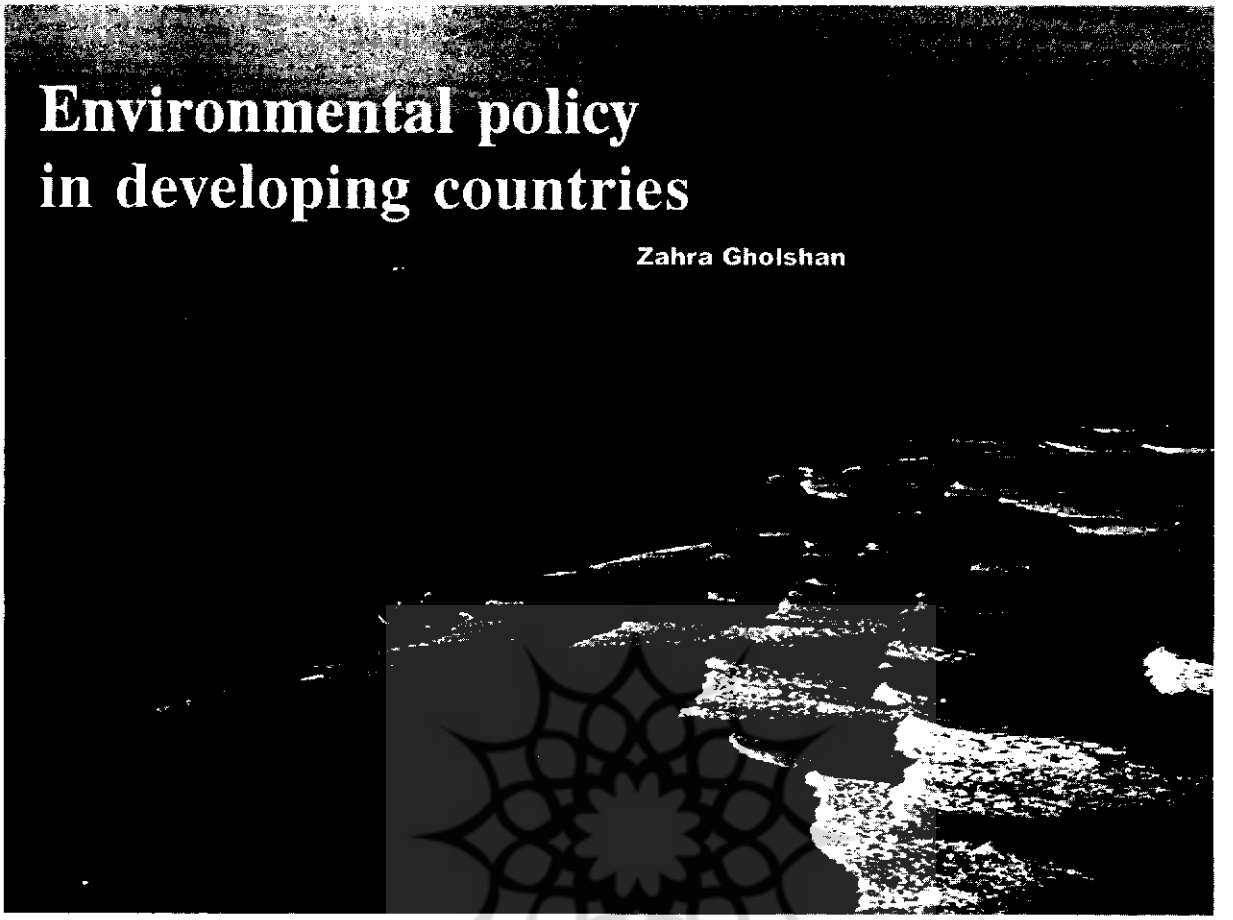
In this part different policy instruments for pollution abatement, considering the developing countries limitations, and which policy has been most cost-effective for countries of study, will be analyzed.

Choosing appropriate pollution control policy is a challenging and hard process in a developing country. Beacues further to environmental protection, the policy should promote growth by improving the allocation of resources and create appropriate incentives for protection of the environment. Studies show that poor countries are taking more steps to control pollution, but they must carefully justify such efforts because resources used to curb emissions could also be used to build schools or train doctors. (Greening industry, Ch1)

Therefore, choosing an abatement policy becomes more complicated due to cost-benefit analysis that is required

Environmental policy in developing countries

Zahra Gholshan



Introduction

The focus of environmental attention has een shifted in recent years from one that centers on developed countries to one that focuses on developing countries, as well. In fact, many who study environmental issues feel that addressing environmental degradation in developing countries should be the primary focus of the environmental policy. In this paper we are going to analyze different environmental policy instrumens that have been applied in some selected developing countries and address the problems that developing countries are facing in applying these policies, and in the second part of the paper we will suggest some new ideas in order to reform the exiting policies. The primary idea of this paper is based on six years research of World Bank in those countries, by establishing partnerships with environmental agencies in those countries. The countries that were studied included: Brazil, china, colombia, India, Indonesia, Mexico, and the Philippines.

One of the main problems in developing countries is poverty. Much of degradation in these countries is due to the low standard of living that currently exists in developing countries. Low income levels make it difficult to meet current consumption needs, so environmental resources are unwisely expolited to produce current income. Poor farmers face very high production and financial risks, they have limited access to market information. In many cases, producers have no choice but to overexploit the available natural resources (Rashid Faruqee, 1996)

The other common and major problem in developing countries, is rapid population growth. As population increases, the demand for productive agriculture land will increase in order to meet food needs and that would lead to overuse of the land and other resources. Also migration to urban areas due to population growth had increased urban population. Rapid expansion in industrial production and urbanization has led to increased levels of waste water pollution, solid waste and vehicle emissions and therfore air pollution.

Economists see the problem of environmental degradation as one in which economic agents impose external cost upon society, at large in the form of pollution. Pollution occurs as a by-product of production and consumption activities by the individual and affects the utility or production activities of another agent without that agent's permission or compensation. It is therfore called as externality. An externality occurs whenever the activities of one economic agent affect the activities of another agent in ways that

Up to now
21 oil fields have been discovered
in the Iranian waters of Persian Gulf
which 16 of them
have been developed

of gas liquids.

After the processing of enriched gasses, the plant produces 38.4 thousand barrels of stabilised gas liquids, and 6.4 million cubic metres of light gas. The liquid gasses are transferred via a pipeline to the Bandar Imam petrochemicals complex. The light gasses, undergoing pressure boosting, are transferred to the Karanj field for injection.

The 223.7 billion rials of capital invested in the project was funded by the National Iranian Petrochemicals Company, and is to be repaid with the gas liquid output of the plant. The project started in 1995 and completed in 1999.

Liquid Gas Plant-1600

The plant is located near the Bid Boland refinery. The first phase of the project was designed to stabilise the dew point of 17 million cubic metres of compound gas coming from the Aghar/Dalan fields. In winter, the outgoing light gas is channelled to the Bid Boland gas treatment plant for consumption by the National Iranian Gas Company (NIGC). The project was completed at a cost of 56.2 billion rials in early 2000.

After becoming sweetened, the allocated gas is sent to the national network. The extracted gas liquids are transferred to the Aghajari sour gas liquid system via a four-inch pipeline.

Development Plans of Oil and Gas Fields

Since late 1997, nine buyback contracts have been signed to produce 340 thousand barrels of oil, 214 million cubic metres of gas, and 391 thousand barrels of gas liquids per day. The capital invested in the nine project amounts to 10510 billion dollars, which is to be paid off from the sales of their products. Around 77.4 per cent of the total investments have been made in the South Pars offshore gas field.

Source: oil, Gas and Petrochemicals, Magazine, No.8

Common onshore gas fields with neighbouring countries- BCM

Field	Neighbouring country	In-place reserve	Total reserve	Output until March 2000	Remaining recoverable oil after March 2000	Output prediction during Third Plan (1000 barrels per day)
Gonbadli	Turkmenistan	13.25	9.7	5.83	3.87	0.5

Common offshore gas fields with neighbouring countries- BCM

Field	Neighbouring country	In-place reserve	Total reserve	Output until March 2000	Remaining recoverable oil after March 2000	Output prediction during Third Plan (1000 barrels per day)
South Pars	Qatar	13,130	8,523.3	0	8,523.3	226.5
Hengam Saman	Oman	22.4	14.8	0	14.8	1.13
Sazand Dahrom	Abu Dhabi	183.5	148.4	1.5	146.9	14.2
Sazand Yasaha	Sharjah	14.6	3.24	2.28	0.96	

Aghar Gas Field

The Aghar gas field, measuring 8 x 75 kilometres, is located near Ghir town, Fars province. The 14 gas wells of the field produce 23 million cubic metres of gas per day.

Dalan Gas Field

The field's nine wells are forecast to produce 17 million cubic metres of gas per day from 9 wells. The first well of the field was drilled in 1975.

Dalan Gas Treatment Plant

The Dalan plant fractionates gas liquids, dehydrates and dries gas, and stabilises gas liquids coming as feedstock from the Aghar and Dalan gas fields.

Project Cost (Aghar and Dalan)

The capital spent in the project including the underground operations stood at 756 billion rials by March 2000.

Iran's common oil and gas fields with neighbouring countries, contain about 1.8 billion barrels of crude oil and 12.7 billion cubic meters of gas

Parsi Gas Injection Station Project

The station consists of three rows of turbo compressors, each of which comprises two high-voltage and low-voltage turbo compressors. Meantime, around 10.8 million cubic metres gas is transferred daily through the Bid Boland/Karanj/Parsi pipeline at a pressure of 41 bar, and injected into the basin after two stages of pressure boosting up to 171 bar.

The gas injected into the field is expected to increase its output up to 39 thousand barrels per day and its secondary oil recovery up to 600 million barrels. The project is estimated to cost 301 billion rials, all of which has already been spent in the project. The project was inaugurated in June 1999, and gas injection into the Parsi oil field started from the same time.

Gas and Liquid Gas 1500 Plant

The project is designed to extract gas liquids from the associated gasses of the Karanj and Parsi fields, and transfer it as feedstock to a nearby petrochemicals complex under construction. The feedstock of the plant includes 7.8 million cubic metres of associated gasses from the Aghar and Dalan fields, and 5,900 barrels per day

Gas situation at the Aghar and Dalan fields- Bcm

Field	Initial in-place gas volume	Total reserve	Total output by March 2000	Output prediction during Third Plan (1000 barrels per day)
Aghar	293	240.4	0.68	239.72
Dalan	238.5	185.2	18.14	167.06
Total	531.5	425.6	18.82	406.78

Iran's Common Oil and Gas Fields

Based on march 2000 data, Iran's jointly owned offshore oil fields with the neighbouring countries have a total reserve of 857.6 million barrels of crude oil and the onshore fields' capacity stands at 946 million barrels. The offshore fields are expected to produce 200 thousand barrels of oil in the Third Five-Year Economic Development Plan (2000-2005) and the onshore fields 30.5 thousand barrels.

The gas reserve of the joint offshore fields stands at 8.88 trillion cubic metres and the onshore fields at 3.87 billion cubic metres. The offshore basins are forecast to produce 360 million cubic metres of gas in the Third Plan and the onshore fields 0.5 million cubic metres.

Common Onshore Fields

Among the discovered and developed oil basins, the three oil fields of Dehloran, West Paydar and Naft Shahr in western Iran and the Gonbadli gas field in northeaster Iran are jointly owned with the neighbouring countries.

Common Offshore Fields

Ever since the start of exploration activities in the Iranian waters of Persian Gulf, 21 oil fields have been discovered and 16 fields developed. Among the discovered fields, the four oil fields of Forouzan, Salman, Mobarak and Nosrat, the two undeveloped fields of Esfandiyar and South Pars oil shell, and the three gas fields of South Pars, Hengam and "B" are located in the joint marine border with the southern Persian Gulf states.

Common onshore oil fields with neighbouring countries- MBS

Field	Neighbouring country	In-place reserve	Total reserve	Output until March 2000	Remaining recoverable oil after March 2000	Output prediction during Third Plan (1000 barrels per day)
Dehloran	Iraq	3,693	681.3	32.7	648.6	13.5
West Paydar	Iraq	1,956.5	241.8	3.2	238.6	11
Naft Shahr	Iraq	692	212.4	153.6	58.8	6

Common offshore oil fields with neighbouring countries- MBS

Field	Neighbouring country	In-place reserve	Total reserve	Output until March 2000	Remaining recoverable oil after March 2000	Output prediction during Third Plan (1000 barrels per day)
Forouzan	Saudi Arabia	2,309	792.1	549.9	242.2	52
Esfandiyar	Saudi Arabia	532	169.7	0	169.7	20
B-Farsi Salman	Saudi Arabia	249.2	198.2	0	198.2	17
Bulip Upper and Lower Arab Formation	Abu Dhabi	4,073	1,525.2	1,291.4	397.3	116
Ilam-Mishrif Formation	Sharjah	128	46	42.4	3.6	
Nosrat	Dubai	188	71	26.2	44.8	23

allocated to Iran to be employed at times of emergency.

Therefore, considering that Iran lacks sufficient financial sources and at the same time, it badly needs investments to be done in its oil and gas industry, it seems quite essential to make use of foreign financial sources. And, for the time being, the only possible way to achieve this goal is through Buy-back contracts. However, it is vital to remember that signing such contracts with foreign companies ought to be in line with Iran's national interest and also, must be justifiable scientifically and technically.

An Analytical View of Other Methods of Funding

For oil upstream sector in Iran as was pointed out previously, the only method presently is being used to attract foreign capital for Iran's upstream projects, is the "Buy-back" method, which is referred to in financial literature as, "Pure Service Contract". Here, I will offer a brief and concise evaluation of other relevant methods:

a) At present time, employing the "loan method" is not appropriate for Iran with respect to its oil upstream sector and some of the reasons are as below:

1. Providers of loan interfere in the country's financial and economic affairs as well as its international affairs and relations.

2. Investments do not fully cover the relevant projects.

3. Fixed rate of interest (Risky).

4. Multiple contracts must be signed - contracts for: loan; contracts for construction, import, etc.

5. Observing "Article 80" of the I.R. of Iran's constitution, which puts some constraints on the pertinent activities.

b) The method of "Financing", is not appropriate for long term Iran's oil and gas structural upstream projects either, since it is a short term or at most, a medium term funding by foreign sources and institutes.

c) "Concession" method is inconsistent with Iran's constitution and other current laws.

d) Regarding the "PSC" and "Risky Service Contracts" methods, there should be a new review and evaluation of them with respect to the current laws of Iran. Because, it appears that in some cases, the assumed inconsistencies are merely due to the way of interpretation of some of the current laws. For example, by disregarding the issue of foreign contractors' ownership of oil & gas reserves in "PSC", one of the great inconsistencies with Iran's constitution and laws will be resolved.

e) There are other funding methods recently raised with respect to energy industry in Iran's economy. These methods require more time to study, particularly with respect to upstream projects. The method of funding through international capital market is emphasized upon however. Other important suggested alternatives are: Issuance of foreign bonds; extensive futures contracts; issuance of bonds backed by oil money and income (A.B.S.); financial institutes and offering of energy bonds and stocks in Iran's capital market.

Of course, some of the above new methods have seriously been considered. For instance, to fund some of the projects in developing Iran's oil and gas fields, issuance of foreign bonds is being considered, particularly with respect to: phases 4 and 5 of the south pars field near Qatar water territory; Salman and Foroozan joint fields with the UAE and S. Arabia, and also the Majnoon field near Iraq. It is estimated that the total value of the bonds which is to be issued within 2-4 years will be 800 million dollars. In order to implement these projects, NIOC will also contribute a sum of 400 million dollars per year. It is worthwhile to say that Iranian contractors are mainly responsible for the development of such fields.1

Conclusion

Although, the development in the oil and gas sector and enhancing the level of production through foreign funding is considered as a strategy of the I.R. of Iran's oil Ministry, employing domestic technical and financial capacity is always regarded by the senior executives in The Oil Ministry as an equal strategy.

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