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Industrial Pollution in Thailand

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1. Introduction

After years of rapid economic growth Thailand is now at a point where important decisions about the future development of the country have to be taken. The problem areas and the political alternatives for the Thai government, business groups and the population are the following: *agricultural development* (establishment of huge agrobusinesses and intensified production in the agrarian sector with extended use of chemicals, e.g. fertilizers and pesticides, or formulation of a land-reform policy and supporting measures for ecological farming), *forestry* (industrialization of forest use: reforestation by concessioneers - sometimes transnational corporations like Shell - or shifting responsibility for protection of forests and reforestation to the rural population), *tourism* (continuing an expansive tourism policy and thereby accepting an image as "sex heaven", or drastic measures in this field - among other reasons in view of the incalculable costs associated with AIDS), *industrial development* (developing heavy industry, especially petrochemicals, or emphasis on smaller, labour intensive branches and the service sector), *energy generation* (development of resource-/energy-consuming and pollution-intensive energy sources or employment of new and renewable energy sources, possibly produced in decentral units), *city planning* (accentuating Bangkok's role as Thailand's only megalopolis or attempting to decentralize growth and establish several urban centres). All of these issues are being discussed by a broad range of social groups. Initiating this discussion was the issue of whether Thailand should really strive to become a Newly Industrializing Country (NIC), as a political objective of this kind would imply long-range planning and decisions as well as reliance on the viability of a very one-sided development strategy.

Thailand occupies an extraordinary position among Third World countries: Neither is it caught in a "debt trap" (unlike Brazil) nor does it lack sufficient financial resources (unlike India). In this respect at least, Thailand evidently has some freedom of choice in defining its course of future development - a rare case among developing nations.

Finally, all conditions for an open public discussion among all relevant political and social groups on Thailand's future development are fulfilled. There are numerous NGOs, some concerned specifically with environmental issues, and one can also find environmentally active people in rural areas - the so-called "village groups". Furthermore, expression is relatively free. The press in particular can raise controversial issues which would be impossible to discuss openly in e.g. Malaysia, Indonesia or Singapore.

This article will concentrate on Thailand's industrial sector. Although present discussion in Thailand tends to stress other problem areas, it seems that Thailand's attitude towards the politics of industrialization could have the greatest impact on Thailand's environment. Since the Bhopal-disaster at least the effects of careless and unplanned industrial development in the Third World have received broad public attention. But reports about uncontrolled industrial development and its consequences continue.

The industrial countries have gone out of their way to support the accusation that they are pursuing an irresponsible and destructive form of industrial development. Toxic waste shipments, the sale of chemicals and drugs prohibited in industrial countries as well as the transfer of risky production processes from industrial to Third World countries are only some examples. This blend - unchecked domestic industrial development and the "takeover" of the industrial countries' crime - is turning industrial development in Third World countries into a high-risk venture. If this finally does result in a Bhopal-like accident most Third World countries will not have the means to react effectively. This incidentally is still the case in Thailand as well.

One of the difficulties encountered while working on this article was the selection of appropriate materials, as there is not very much reliable information on effects of industrial development on the environment. The main source is United Nations reports - specifically from their regional economics commission ESCAP (Economic and Social Commission for Asia and the Pacific). Other sources include studies from the Thailand Development Research Institute (TDRI), a non-governmental policy research institute founded in 1984, and reports from several governmental institutes were taken into account here.

2. Recent Economic Development

Thailand as a whole - or rather its government and media - is now in the grip of NIC-fever. Not a single day passes without a member of government or a

news article dealing with the topic of "When is Thailand finally going to be a NIC?".

More realistic commentators have suggested that in the near future Thailand might first become a NAIC, a "Newly Agro-Industrialized Country", a status which would describe the actual state of the Thai economy much better, where 70 per cent of the labour force is employed in the agricultural sector. The pressure to raise Thailand to the status of the fifth "tiger" in Asia, is so great that even highly alarming news does not seem to be registered at all. Washington, for example, has been reported as regarding Thailand as "almost a NIC" (*Bangkok Post*, July 23, 1989). This implies that Thailand might face the same export restrictions imposed on the other four Asian NICs - one reason why Malaysia has resisted NIC-status vigorously, even though its per capita GNP is twice as high! Moreover Thailand was frankly advised by Washington to concentrate more on Japan as a "Big Brother" (Japan accounted for 26 per cent of Thai imports and 50 per cent of foreign investment in Thailand in 1987) and less on generous "Uncle Sam" (with 19 per cent the US took the biggest single share of Thai exports in 1987).

The struggle for NIC status has been mainly a publicity affair up to now. Nonetheless, Thailand has been able to register enormous growth throughout the last four years. GDP growth has increased from 3.5 per cent in 1985 (the lowest since the beginning of planned economy in 1961) to 10.6 per cent in 1988, the highest rate in 22 years. Agricultural production rose by 8.5 per cent (1987 0.2 per cent), construction by 15 per cent and manufacturing by 13 per cent. The trade deficit has been balanced partly by earnings from tourism (arrivals up 21.5 per cent), which increased by 50 per cent to 75 billion Baht, and by remittances of Thai workers abroad. Although the current account deficit was at around 44.5 billion Baht, the balance of payments remained positive owing to foreign capital inflows (*Bangkok Bank Monthly Review* 1989: 113).

This development came so surprisingly that the Bank of Thailand as well as the National Economic and Social Development Board (NESDB) had to revise their 1987 growth predictions upwards (the Bank of Thailand from 5.8 - 6.3 per cent to 10.3 per cent and NESDB from 5.8 to 11 per cent) (*ibid.*: 120). Similar forecasts for 1989 (7.9 per cent) lagged far behind reality. In fact it was 11 per cent, i.e. above those of the Asian NICs.

The backbone of the boom, besides tourism, has been agricultural and industrial exports, significant domestic capital formation and a spectacular influx of foreign investment. Relative political stability, a favourable exchange rate, and above all comparative cost advantages were responsible for this development. Special attention must be paid to the relation between labour

costs and productivity growth. A Taiwanese worker for example costs six times as much as a Thai worker, but his productivity is only four times as high. Laws in working conditions are another inducement. Thai factories can operate 24 hours a day in three shifts, whereas only 16 hours of work are allowed in Malaysia and Singapore. Moreover, only 5 per cent of Thai workers are organized in labour unions which keeps strikes to a minimum (at least in the private sector) (*The Economist*, October 1987: 6). External factors for Thailand's boom are the political situation in China and long-term economic restructuring in all four NICs. All NICs are trying to replace labour intensive industries with capital-intensive production:

> "Thailand can thus benefit from the upgrading of the export structure in Hong Kong, Korea, Singapore and Taiwan ..." (Balassa et al. 1980: 12).

Meanwhile some of Thailand's economists doubt whether such a rapid growth is in fact desirable. Three different groups can be discerned:

1. The first one, calling itself the neo-classical school, sees contemporary development as a chance to keep pace with international development, in the mode of South Korea.

2. The second group, rather liberal-nationalistic, sees the dangers in too rapid development. This group "foresees dangers in Thailand's growing international dependence as well as rapidly rising foreign debt and high deficit spending. Therefore this group ... votes for 'controlled economic growth' and a restrictive credit policy.

3. Finally a third group, mostly academic economists in the large universities, is labelled the 'political economists' by their opponents. This group ... sees it as their duty to refer to the dark side of a NIC-like development. They focus on the unbalanced distribution of national income, the threatening environmental destruction, the strengthening of a democratic movement beyond Bangkok as well as legal security and other humanitarian aspects. (Luther 1989: 20).

Since the vast majority of government advisors belong to the first group a preliminary decision has already been taken - Thailand is to become the next NIC of the region.

3. Structure of Thai Industry and its Environmental Effects

Thailand's industrial sector accounts for a low share of employment (9 per cent) and a comparatively small share of total exports. Production is still dominated by the processing of agrarian goods. At present there are more than 90.000 industrial enterprises in Thailand, one-third of them in the Bangkok Metropolitan Region (which comprises Bangkok, Samutprakarn, Nakhon Pathom, Samut Sakhon, Nonthaburi and Phatum Thani). Bangkok and the surrounding central region account for about 90 per cent of industrial output. Most of the industry is small-scale, about half of all enterprises are rice mills. The processing of primary products is still the most important branch of Thai industry. Highly developed cooling and preservation techniques, the possibility of location far away from the capital, and labour intensity are characteristic of the agro-based industries. Other particulars include a remarkably high surplus value as well as the structure of ownership (except pineapple- and fishprocessing industries, the agro-industry is Thai owned) (Deissmann 1985: 53f.).

In the sixties the textile industry was ahead in terms of growth. Apart from the cotton and synthetic fibre industries, the jute and silk industries are important. In 1987 textiles and garments alone accounted for 16.1 per cent of total exports (The Economist Intelligence Unit 2/1989: 2). Other sectors of manufacturing are the cement industry (one of the oldest industries of Thailand), the metal industry (wires, steel tubes, plate, galvanized iron and tin), electrical machinery industry (mainly household equipment), rubber industry, chemical industry (especially detergents, pesticides, soap, synthetics and plastic products) as well as pharmaceutical industries, mechanical engineering, car production (tractors, draggers and the assembly of mainly imported car parts) and the production of petroleum products for the domestic market.

The generally small-scale and agro-based structure of Thai industry is responsible for the domination of domestic finance in industrial development. Foreign investment is concentrated to a large extent in Thailand's large scale industry and maintains a leading position there:

> "According to Tambunlertchai and McGovern, among the top 1.000 companies with industrial activities in 1980, the 28 per cent which were foreign-invested accounted for more than 40 per cent of total sales. 47 per cent of the top 100 companies were foreign firms accounting for 62 per cent of total sales. Foreign firms were concentrated majorly in chemical, petroleum, rubber and plastic products, iron steel and basic metal products, machinery and equipment and the mining industries. Foreign firms' activities in chemi-

cal, petroleum, rubber and plastic industries accounted for 95 per cent of the total sales in these industrial sectors." (Samarn Thangthongtawi 1989: 7).

Foreign investment is seen by the Thai government as a means to accomplish the aim of the fifth five-year-plan (1982-1986) to redirect the economy from import-substitution to export-orientation.

A generally moderate, steady degree of technological development has built the base for growing employment opportunities even in times of high population growth. Although unemployment does exist, it is not nearly as serious as in India, Mexico or Brazil, partly because rural poverty is limited and partly due to the labour intensive structure of industry and the service sector. This has probably been an important stabilizing factor in Thai society.

The level of Thailand's industrialization is still low today and industry does not dominate the economy. The corresponding relatively low impact of industrial pollution on Thailand's environment is certainly linked to this fact. But it cannot be said that the "Thai road to industrialization" has been able to avoid destruction of nature and society completely. However, compared to industrialized countries like the FRG, Thailand does not have a "tradition" of industrial pollution. The first case of threatening environmental pollution caused by industrial activity occurred in Thailand in 1973. 13 sugar mills, all located in a 10 mile stretch on the Mae Klong River in western Thailand, provided such a mass of organic waste that 400 people had to be treated in hospital for drinking poisoned water. Fish were dying in droves, drinking water had to be supplied by trucks, shrimps and mussel farms went bankrupt and fruit and vegetable orchards were ruined by polluted river water. The damage for farmers and fishermen alone was estimated at about 60 to 120 million Baht (*The Investor*, November 1974: 25f).

Since the beginning of the 1980s pollution by agromanufacturing industries has been reduced significantly. In the past ten years the Thai government has finally succeeded in persuading factory owners to install oxydation ponds. Generally this is expected to result in a 60 to 90 per cent reduction of the organic load in wastewater.

However, the success of reducing organic wastewater did not improve environmental quality, as concurrently new kinds of waste were being discharged by constantly advancing industrialization. Between 1978 and 1983 alone the number of registered plants increased by more than a third (TDRI 1986: 45). In itself the geographical distribution of industry is a major catastrophe. Ignoring the more than 50,000 rice mills throughout Thailand, Bangkok by itself accounts for around 53 per cent of the remaining 44,931

factories in the country. In comparison: A concentration of industrial production of "only" 50 per cent is reported for Mexico City (Hartje 1985: 8).

4. Industry and Hazardous Waste Generation: The Example of Samutprakarn

The high industrial concentration is consequently leading to a severe environmental degradation. This is even more true in view of the decline of the share of traditional agrobased industries (with their relatively easy treatment of wastewater) in total industrial production and increase of the share of sectors like textile, chemical, electric and electronic industries with their high potential of hazardous waste generation. Heavy metals, anorganic chemicals and other non-biodegradable substances are extremely dangerous to the environment and the population due to their toxicity. Heavy metals accumulate in the environment and possibly enter the food chain.

A structural change in industrial production can be traced quite easily in Thailand. In 1960, the food industry was responsible for around 34.5 per cent of GDP. This share dropped to 20.6 per cent and 15.6 per cent in 1970 and 1986 respectively. In contrast, the share of the textile indsutry increased from 5.2 per cent in 1960 to 9.2 per cent in 1970, and 15.2 per cent in 1986. A similar development can be observed in the rubber, chemical, petrochemical and electronic industries (Krerkpong Charnpratheep, n.d.: 1f). The structural change has had very negative implications for Bangkok: While most agricultural industries are located in the provinces, most of the hazardous waste generating industries are concentrated in and around the capital.

The part of Bangkok Metropolitan Region (BMR) which suffers most from pollution is Samutprakarn. In terms of economic strength, this province is far ahead of the rest of the country; GDP per capita is three times higher than the national average, and even 10 per cent above the respective figure for metropolitan Bangkok. 70 per cent of GDP is generated by the manufacturing sector, and around 45 per cent of the population is employed in this sector.

In a 1987 study by three consulting firms for the National Environment Board (NEB), Thailand's environmental protection agency, it was estimated that 24,770 tons of hazardous waste are annually generated in Samutprakarn alone (Watson Hawksley et al. 1987: 2-148). About three-quarters of that waste is discharged directly into the environment. The toxic waste is either dumped on factory grounds, thrown into the Chao Phraya River or trans-

ported to municipal solid waste disposal sites. There is no public hazardous waste disposal site existing in Thailand to date.

Furthermore, the study illustrated the effects of environmental pollution on residents in Samutprakarn. About 76 per cent of the surveyed households claimed to be affected by negative impacts from factories.

> "About 39 per cent of these households are affected by industrial wastewater. About 42 per cent of the affected households have complained to various authorities but only half consider that the complaints resulted in some level of improvement." (ibid.: 2-11).

The study showed that wastewater of 40 per cent of factories visited exceeded the effluent standards set by the Thai government. Moreover, a review of Environmental Impact Assessments (EIAs), which are required by the government to identify environmental impacts of a plant, disclosed their inadequacy:

> "The majority of these EIAs are considerably lacking in terms of acceptability and much remains to be done to bring them up to minimum acceptable needs for ONEB [Office of the National Environment Board, the author] to administer the national EIA program." (ibid.: 2-227).

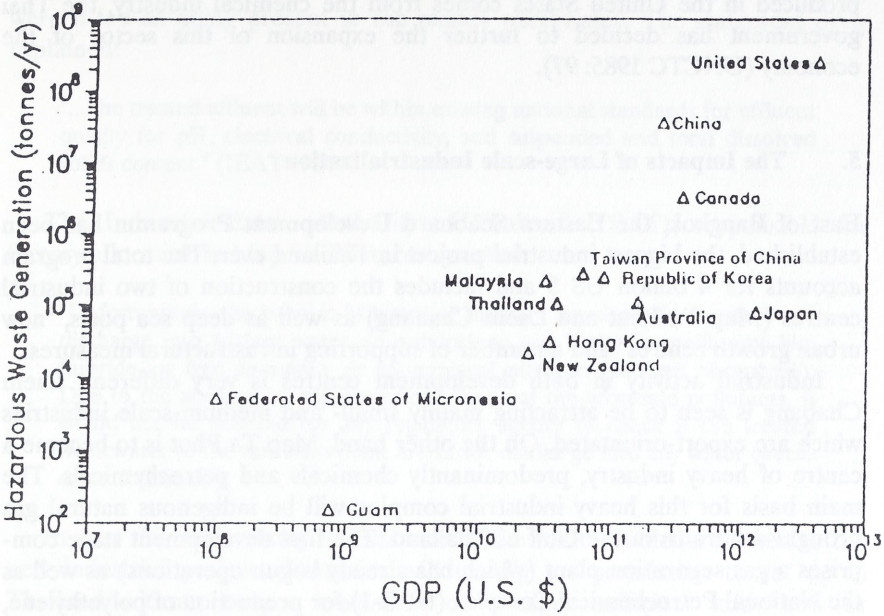
The EIA process is undermined further by special rights of the Board of Investment. If privileges are granted to a firm by the Board of Investment (e.g. exemption from taxes), they are usually linked to a license to set up the plant - before an EIA has been made and reviewed by the department responsible .

This in mind, the governmental measures to keep hazardous waste under control, tend to be ineffective. Legal procedures (licensing) are perforated by exemptions, public hazardous waste dumping sites are not provided, and control of effluent standards is inadequate. This is partly due to lack of sufficient manpower.

It is doubtful whether future development in hazardous waste generation can be managed. A preliminary National Hazardous Waste Management Plan forecasts a threefold increase of toxic waste between 1986 and 1996. In 2001 the volume of hazardous waste is expected to be 5.2 times as high as in 1986 (Samarn Thangtongtawi 1989: 52).

As shown clearly in figure 1, Japan, with a much higher GDP, was able to generate less toxic waste than Thailand. In Japan's case economic strength, the ability to use the latest technology and a tendency to relocate pollution intensive industries (see below) seem to make it easier to deal with pollution problems. But this does not sufficiently explain the differences between Japan

Figure 1: Harzardous Waste Generation in Various Countries



Source: ESCAP 1989a: 21

and Thailand. Japan's comparatively low waste generation is linked to its strategy of incorporating preventive measures into national environmental policy. This strategy could also be Thailand's key to coping with the increasing waste problem. Ideas on how to put preventive environmental policy into effect in Thailand already exist. Among these are the introduction of a pollution tax, restrictions not only on the waste quality (by emission or effluent standards) but also of waste volume, and tax reduction for machinery and equipment which reduces pollution or is used in recycling (Dhira Phantumvanit, Suthawan Suthirathai 1986: 12).

> "Investment in cleaner and more resource-efficient technology need not represent a drain on economy. Instead, the process of innovation can lead to unexpected improvements in the productivity, efficiency and competitiveness of industrial firms" (Thailand Development Research Institute 1987: 465).

And although a study made by the United States Environmental Protection Agency (USEPA) showed that more than 61 per cent of all toxic waste produced in the United States comes from the chemical industry, the Thai government has decided to further the expansion of this sector of the economy (UNCTC 1985: 97).

5. The Impacts of Large-scale Industrialization

East of Bangkok, the Eastern Seaboard Development Programm has been established, the biggest industrial project in Thailand ever. The total program accounts for 4 billion US $ and includes the construction of two industrial centres (Map Ta Phut and Laem Chabang) as well as deep sea ports, "new urban growth centres" and a number of supporting infrastructural measures.

Industrial activity in both development centres is very different. Laem Chabang is seen to be attracting mainly small- and medium-scale industries which are export-orientated. On the other hand, Map Ta Phut is to become a centre of heavy industry, predominantly chemicals and petrochemicals. The main basis for this heavy industrial complex will be indigenous natural gas brought ashore from the Gulf of Thailand. The first development stage comprises a gas separation plant (which has already begun operations) as well as the National Petrochemical Complex (NPC-1) for production of polyethylene, polypropylene and polyvinyl chloride (PVC). In addition, the tantalum plant at Phuket - which was burnt down in 1986 by residents afraid of toxoc chemical leakage - is now being rebuilt in Map Ta Phut and will be extended by a hydrofluoric acid plant. Furthermore, a fertilizer complex is planned, but is still facing financial problems. Other industries are to follow in a second development stage (up to 1994) including caprolactum, dimethyl terephthalate (DMT), acrylonitrile, styrene, melamine, titanium dioxide and related industries.

All of the industries mentioned above have a very high potential of polluting the environment by their wastewaters, gaseous emissions and solid wastes. To guarantee the protection of the environment the Sixth National Economic and Social Development Plan (1987-1991) states:

> "In continuation of the Fifth Plan, the impact of industry on the environmental condition of the Eastern Seaboard will be closely inspected, monitored and controlled." (NESDB n.d.: 324).

Unfortunately the problems with the new industrial development projects start right here. The case of the tantalum plant can be taken as an example: In

an Environmental Impact Statement prepared in 1986 by Thailand Tantalum Industry Corporation Ltd. (TTIC) none of the highly pollutive chemicals used in the daily production process (e.g. hydrofluoric acid and sulphuric acid) were listed as being present in the plant's wastewater. The statement dryly explained:

> "... the treated effluent will be within existing national standards for effluent quality for pH, electrical conductivity, and suspended and total dissolved solids content." (IEAT 1986: 4).

The Industrial Estate Authority of Thailand (IEAT), responsible for factory allocation in Map Ta Phut, commented:

> "Unfortunately, the present Ministry of Industry standards for waste water discharge into surface water do not include any limits for pollutants like fluoride, or free ammonia, or ammoniacal nitrogen (or even phosphate). Due to the absence of any prescribed limits of the aforesaid pollutants, it would not be possible for any regulatory agency to check if the treated wastewater of the tantalum plant are fit for discharge into any water course or sea." (ibid.: 5).

In part this controversy reflects one of the basic problems related to the new industrial projects: Factories will usually get permission to set up in Thailand without proper evaluation of whether sufficient know-how or resources (financial and human) are available to prevent any neglect of security. Nor are there attempts to make sure that the existing legal framework is adequate to deal with the new factories. In addition, a definite lack of knowledge on the effects of certain chemicals and the means of their disposal is obvious from time to time. In the case of the tantalum plant the Ministry of Industry was given urgent advice by IEAT to include parameters still missing in their standards in order to enable a pollutant control not only from the tantalum plant, but also from other prospective industries at Map Ta Phut. Furthermore, IEAT criticised that the same Environmental Impact Statement (EIS) - originally prepared for Phuket - had been submitted by TTIC for Map Ta Phut. Environmental conditions at two very different places are naturally not identical. It was recommended to prepare a new EIS, this time based on the environmental conditions in and around Map Ta Phut.

However, specific attention should be given to one final problem which is absolutely fundamental to the whole Eastern Seaboard Project: The various delays in the project were due, among other reasons, to the skyrocketing land prices of the new development areas (due to land speculation). This has resulted in high real estate prices, and so investing firms have tended to buy

only the minimum amount of land needed for a new plant. The resulting cluster of several chemical industries enhances the risk of an environmental disaster. The danger of a harmless accident in one factory, subsequently affecting other factories, too, and so endangering the lives of a large number of employees as well as the population in the new urban areas, is very real. Risk prevention regulations are not required in Thailand.

To minimize the environmental impact of the Eastern Seaboard Project, Thailand's National Environment Board (NEB) carried out a twelve-volume study labelled the Eastern Seaboard-Regional Environmental Management Plan (ESB-REMP). All major problem areas which could possibly be affected by the new industrial complexes have been covered by the study. Water and air quality problems, land use, forestry, problems with existing and planned factories, community development, waste management and occupational health safety measures are all examined by the study (NEB 1986). It took 20 months to complete this comprehensive plan and, in connection with a detailed cost-benefit analysis, a program for action has been worked out, with 35 recommendations, covering a period until 2008 and total costs of almost 880 million Baht.

But this plan will never be enforced. On November 9, 1989, the *Bangkok Post* reported that the general secretary of NEB, Mr. Arthorn Suphapodok, had scrapped the plan because the government had neither given it the necessary attention nor ever approved it.

> "'The plan is always the last topic in a meeting and time always runs out before it can be discussed. Even worse, we always end up with budget problems', he said." (*Bangkok Post*, November 9, 1989).

For the first time, open conflict emerged between NEB and the government. The second massive regional industrialization project, the Upper South and Songkhla Lake Basin Development Project or Southern Seaboard, is still very much in the planning stage. Some deep sea ports are being built, and development of existing cities like Songkhla and Had Yai as well as the improvement of palm oil plantations are planned. In addition, a "land bridge" is to be established, to provide a link between the Andaman Sea and the Gulf of Thailand. Oil refineries are envisaged to refine crude oil coming mainly from the Middle East, which will then be transported by pipelines to the Gulf of Thailand. From there, finished petroleum products will be shipped to countries like Japan. The idea is to provide an alternative to shipments through the Strait of Malacca. As reported by the Bangkok based daily newspaper *The Nation*, investment costs would be between 5 and 10 billion US $

(*The Nation*, July 7, 1989). A regional environmental management plan already exists for a part of this project. Arthorn Suphapodok has stated:

> "The problem involved in the SLBP project is an integration of natural resources utilization and environment conservation into economic development planning, using a new approach known as economic - cum - environmental development. This was actually the first truly economic - cum - environmental planning project carried out in Asia." (Arthorn Suphapodok 1989: 3).

Hopefully, this plan will not end up where the first one did.

6. Industrial Pollution and Foreign Investment

Without the cooperation of foreign investors the Southern Seaboard Project could hardly be financed - this also applies to all other big development projects in the country. In the fields of chemicals, petrochemicals, rubber and plastics foreign firms accounted for about 95 per cent of total sales in 1980. In past years foreign direct investment (FDI), especially in the chemical industry has increased rapidly, as ESCAP pointed out:

> "In Thailand, a dramatic increase in importance and attractiveness of the chemical industry to foreign investors was experienced. The share of FDI in the chemical industry to total FDI in the manufacturing sector rose markedly from 15.4 per cent and 9 per cent in 1983 and 1984, respectively, to 36.0 per cent and 23.0 per cent in 1985 and 1986, respectively." (ESCAP 1989a: 26).

Among industries which are granted promotional privileges by the Board of Investment, the chemical industry is ahead of all other industries in terms of investment volume. Main investors for the period 1962 to 1986 have been Japan and the Netherlands, followed by the USA, Great Britain and Taiwan. In recent years, South Korea became another important investor - also giving preference to the chemical industry.

Government representatives like Samarn Thangtongtawi from the Department of Industrial Works (DIW)/Ministry of Industry do not hesitate to describe transnational corporations' (TNC) interests in Thailand, e.g. the preservation of monopolistic advantages and low labour costs in Thailand, as being the main reasons for foreign investment. He also admits TNCs might be interested in exploiting Thailand's natural resources and in saving pollu-

tion control costs due to Thailand's lower standards and weak enforcement mechanisms (Samarn Thangtongtawi 1989: 4f).

How does foreign business exploit this situation? One way is by practising double standards in occupational safety and pollution control, resulting in different environmental policies in host and home countries. Two studies by the United Nations give evidence of the TNCs' practice of using different standards in their home countries and in Thailand: An analysis of the Thai pesticide industry disclosed that more than half of the TNCs working in this field adopted local standards for environmental management. Only about one quarter of the firms complied with global standards (ESCAP 1989 b: 30).

The second study, issued by the United Nations Centre on Transnational Corporations (UNCTC) Joint Unit on TNCs/ESCAP, found that more than half of the Thai based TNCs questioned do not depend on their headquarters for the formation and implementation of environmental policy. Only 9 per cent of the TNCs surveyed indicated that the responsibility for environmental policy formation lay mainly with their respective headquarters.

> "This reflects that apparently the general practice is one of 'local accommodation' by TNCs. ... It also implies that effective environmental management might depend more on government control than the self-initiated role of TNCs" (ESCAP 1988: 310).

Hence one can assume that global (i.e. stricter) standards have only limited chances of being applied by TNCs in Thailand.

Consequently, as UNCTC/ESCAP point out, effective environmental protection can only be guaranteed if the government takes responsible action. To leave environmental protection solely in the hands of the TNCs would only end up in operating on the basis of the smallest common denominator. A basic opportunity for Thailand to prevent negative impacts of the TNCs on environment could be the careful screening (e.g. by selectively applied incentive measures) of environmentally sensitive foreign investment inflows. But, as the ESCAP study clarifies, "efforts in this respect have so far been neglected" (ibid.: 326).

To date, the present Thai government has not given much thought to possible ways of transferring protection measures and emission standards from industrialized countries to Thailand. Bad training of employees, low environmental awareness of local management, insufficient control by the government and population as well as, at times, unsolved legal questions about responsibility in case of environmental damage all serve to underline the necessity of a type of environmental legislation which has to be even tougher in Third World countries than in industrialized countries (Gärtner 1985: 27).

This would imply for TNCs in Thailand that not only would they have to accept standards respected by their headquarters, but would also have to take stricter protective measures in compliance with Thailand's special situation (cf. *The CTC-Reporter* 19/1985: 15).

How little Thailand has in fact succeeded in imposing standards of effective environmental protection is shown by a dramatic case of pollution export, the export of toxic waste. In just two years (1984 and 1985) Thailand "received" more than 600 drums of hazardous waste from Singapore alone. They are now rotting in the port of Bangkok. There were similar illegal shipments earlier but most of the drums were buried in the vicinity of the port to make room for other incoming merchandise. This practice has now been stopped by the NEB. However, a solution of the problem is not in sight. In the one hand, Thailand does not have the legal basis to prevent further shipments of toxic waste, and, on the other hand, it does not possess a sealed incinerator to at least get rid of the waste in an acceptable way. The only measure which the NEB has been capable of taking is to analyze the content of the drums. The thoughts of the NEB Director of Environment Quality Standards on the results of the analysis reflects the desperate situation in a (worldwide) attempt to protect the environment: "He hopes that whatever he finds will not be too toxic." (*The Nation Review*, July 1, 1988).

7. Conclusion

When analyzing Thailand's recent economic development one has to believe that Thailand is on its way to joining the club of NICs in Southeast and East Asia. Efficient usage of natural resources, application of advanced technology and adoption of a concept of decentralization are seen by the Thai government as premises to meet their aim. Two large industrial complexes, the Eastern and Southern Seaboard Projects, are believed to be the necessary framework for Thailand's new industrial development policy. However, these decisions did not pass uncriticized. The government was strongly criticized not only for ignoring the environmental problems which are likely to be caused by this development policy but also for its economic difficulties. The World Bank commented the effort to process local natural gas as follows:

> "Petrochemicals have very high capital-intensity, create few jobs and require large-scale production for efficient operations. Also large investments are under way in the countries of the Middle East, which have capital in abundance and can utilize natural gas that would otherwise be flared off. Thailand cannot compete with these and other large scale producers and it

> may import petrochemical products at a price much below the cost of domestic production." (Balassa et al. 1980: 26f)

In addition, serious doubts have arisen about whether there will be sufficient internal demand for chemical products in relation to the projects' capacities, and whether Thailand has enough gas reserves (cf. Charit Tingsabadh 1987: 120).

Other critics have cast doubt on the claims of decentralization allegedly linked with the large-scale industrial projects. According to Deissmann, Bangkok's dominant position will even be reinforced by setting up the Eastern Seaboard Development Zone (cf. Deissmann 1985: 53).

The *Economist* summarizes in the same vein:

> "The biggest problem with the eastern seaboard project is that it is too big. It is too capital-intensive in a country that has a surfeit of cheap labour, and it requires too much coordination between authorities in a country that has a surfeit of authorities" (October 1987: 16).

In the face of such criticism it seems difficult not to draw the conclusion of counterproductivity in regard to Thailand's plans for the development of chemical and petrochemical industries.

However, plans to develop the petrochemical and chemical industries have to be regarded as isolated examples of an initial phase of large-scale industrialization. At this stage it would certainly be wrong to think of Thailand as a country covered with a network of similar huge projects. This is why it still seems correct to maintain that Thailand is in the unusual position of being able to choose between different strategies of development.

As one alternative strategy, the extension of Thailand's service sector has been suggested.

> "Thailand is more suited than almost anywhere else to make the leap from agricultural economy to service economy, by-passing the industrialization that has so far been assumed to be the necessary second stage of development." (*The Economist*, October 1987: 7).

Backing this argument is naturally the - not unproblematic - strong position of the country's tourist trade. Some ideas for fortifying the service sector are the expansion of Thai International Airways, improving Bangkok's position as an international conference centre or turning the capital into a centre of the media and information service industry.

Incidentally, the strategy of mainly boosting the service sector of an economy to reduce further degradation of the environment, has been widely

discussed with regard to industrialized countries. The extension of this discussion to Third World countries seems to be very promising in Thailand's case.

However, should the tendency towards large scale industrialization prevail in Thailand for the time being, it can be assumed that any attempt to extend the service sector with the help of tourism will subsequently fail (ironically, new industrial centres are planned for the immediate vicinity of Thailand's major tourist spots).

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