Samut Prakarn Wastewater Management Project*

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"Oh no. Not again!" exclaimed the Director General of the Pollution Control Department, as he listened to the news being reported by the Department's representative at the facility site. "Just what we need right now – another round of demonstrations and protests from local villagers. If we can't find some way to stop their opposition and enlist their support, this Project is simply *never* going to be finished and start operating."

Thus begin another work day in the life of the senior official in charge of the biggest and most expensive environmental project ever initiated in Thailand: the Samut Prakarn Wastewater Management Project. At a cost of around 23,000 million Baht (US$ 750 million), it was designed and constructed to encompass virtually the entire developed area of Samut Prakarn Province, the highly industrialized neighboring province of Bangkok with a serious – and growing – water pollution problem.

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As the Director General knew well, it had taken four years for the project to go from planning stage in the Ministry of Science, Technology and Environment (now the Ministry of Natural Resources and Environment) (in 1993) to cabinet approval status (in 1997), with an initial target completion date of 2003. At the time of his appointment to the Director General post in November 2006, the project had been stalled and unable to operate, despite its having been 99% completed in 2005.

In fact, from the time of its approval by the cabinet, the Project had undergone challenge after challenge, and protect after protest, by a formidable alliance of local people and non-governmental organizations (NGOs), in addition to a scandal that remained under judicial review. The local opposition centered on the seemingly unshakable beliefs of thousands of residents in the Project area that the effluent from the Project would seriously deplete fishing stocks and thereby undermine their livelihoods. No amount of reassurances and Project modifications over the past several years had sufficed to allay these fears and win their support, or at least reduce their adamant opposition. Further, allegations of corruption concerning site selection, land purchasing, and contractor selection had embroiled the Project in a series of long-running, and as-yet unresolved, legal proceedings -- with a number of government officials, private firms and politicians with earlier involvements in, or connections to, the Project, still on trial.

Meanwhile, the water quality around Samut Prakarn continued to deteriorate, posing a serious and growing threat to sea water quality in the Gulf of Thailand, as well as creating a growing public health hazard. With no other project of any configuration on the drawing board to alleviate conditions in the area, the Pollution Control Department, in general, and its Director General, in particular, had to decide what to do

"This whole thing has become just one BIG headache!" he exclaimed aloud, unintentionally startling the secretary who was by now peering around the office wall with a look of alarm on her face. For the sake of future environmental projects that might someday come down the pipeline, he knew that it was critical that the problems of the Samut Prakarn Project be resolved in a manner that would augur well for future government efforts to tackle

the country's serious environmental threats. The difficulty lay in deciding what specific decisions and actions to take relative to the Samut Prakarn Project – afflicted, as it continued to be, with a never-ending chorus of intense and unyielding opposition.

Samut Prakarn: The Place, The Populace, and the Pollution

In the space of thirty years Samut Prakarn grew from a modest-sized community populated largely by fishermen and farmers on the banks of the Chao Phraya River into a bustling community of more than 1 million residents by 1990. Much of this growth was driven by an explosion of Thai and international companies setting up factories in the area during the 1970s-1980s in search of lower costs for factors of production, as the Bangkok metropolitan area became increasingly crowded and expensive. With labor and land, in particular, in the province less expensive than in Bangkok, just 30 kilometers to the south, Samut Prakarn became by the 1980s one of the most heavily industrialized provinces in Thailand. Some 5,000 factories – ranging from food processing, chemical, electronic to automobile industries filled the landscapes in all directions, with many of them located along the banks of the Chao Phraya River.

The Place

Among coast fishing villages, Samut Prakarn had always enjoyed a somewhat unique place. Not only it was situated on Thailand's most important river, which gave it ready access to the capital city for marketing its bounty from the sea, it enjoyed some of the most fertile farmland in the Central Region of the kingdom. Thus, rice production had long occupied a position in the local economy second only to the harvesting of produce from the nearby Gulf of Thailand. With the rapid growth in new entrants from the manufacturing and distribution sectors during the 1980s, Samut Prakarn had also became an important entrepot for a large number of industrial and commercial products in the central region of the country. However, it nevertheless retained its traditional economic role as the largest center of fishing – and, more recently, aquaculture, of any city within a 250 kilometer radius of the capital.

The easternmost village of Klong Daan, located some 40 kilometers from downtown Samut Prakarn was, on the surface, a typical Thai fishing community spread over some 37,500 rai (60 square kms.)[1]. In the adjacent river harbor could be spied hundreds of mostly small traditional fishing boats, the key to the livelihood of nearly every household in the hamlet. In front and side yards throughout the neighborhood, a visitor might find old fishing nets under repair by the fishermen and members of the family. An ongoing task, repairing the nets was done only during the daylight hours, when the fisherman were at home, momentarily away from their toils at sea.

Tradition was the byword in Klong Daan. Change came slowly, if at all. A visitor from a few decades ago would have no difficulty finding his way about the community. A new roof here, a new house there, perhaps a recent model SUV automobile. But, unlike other areas of Samut Prakarn where the ethos of industry had taken hold, shaping and changing traditional ways and viewpoints, Klong Daan remained an outpost of continuity and stability amidst an ever-changing outside world.

Figure 1 Klong Daan

(Photo: Courtesy of Yu Terashima/Fukuoka NGO Forum on ADB)

[1] www. Thai localadmin.go.th

The Populace

As of 2005, when the wastewater treatment plant was virtually completed, the population of Samut Prakarn was decidedly diverse with respect to its regional origins, its livelihood affiliations, and inclinations and capacity for *collective action*. Of the nearly 1 million residents counted in the 2000 Census, nearly 30% had settled in Samut Prakarn from other provinces within the previous 20 years, with most of that number coming from the Central (40%) and North/Northeast (35%). Some 55% of the residents indicated deep roots in the area, with many who were offspring of families who had lived in the area for 50 years or more.

Some 400,000 residents reported gainful employment outside of traditional endeavors such as small-scale neighborhood vending, with nearly 150,000 of that group indicating involvement in the one or more segments of the fishing industry, including seafood processing establishments. Another 200,000 residents reported themselves as being employed in the industrial or commercial factories that now dotted the increasingly crowded manufacturing landscape in the area. The remaining gainfully employed residents were mostly engaged in the staffing of agricultural and agrobusiness concerns (e.g., rice milling plants, livestock processing plants, etc.).

The residents of Klong Daan, one of the major fishing villages in the vicinity of Samut Prakarn, were both very much *like* and *unlike* those Samut Prakarn residents who earned their livelihood in non-fishing pursuits. Their main careers are fishing and aquaculture that have yielded a relatively good income as seen from the fact that only few residents have moved to work in other places while quite a number of workers have moved from outside to work for fishing in the village. In addition, this area is the biggest mussel farming in Thailand. Some observers of the local population were of the view that the protracted resistance to the wastewater treatment facility owed its origins and much of its success to date in the exceptional close-knittedness of the fishing community. Exploiting the bounty of the nearby Gulf of Thailand was inevitably a challenging and, at times, risky endeavor. The vagaries of weather,

of equipment, and of shifting fish populations necessitated degrees of cooperation and collaboration among members of the fishing community that those in engaged in work in the relatively recently arrived manufacturing plants rarely experienced and needed. Further, with most members of the fishing community descended from generations of fishermen stretching back, in many cases, more than a century, cooperation and collective effort were values that lay at the core of their worldview. Over the decades, the individuals in these endeavors had learned that to *not* stand prepared to assist each other and to do what was necessary to sustain their way of life would be tantamount to *group suicide*. Little wonder, then, it was precisely this group that arose in large numbers to contest the planned facility at the outset and, then, to lead mass demonstrations against it from the time of its construction until the present. Moreover, the villagers had learned from other places where several large projects, initiated by the government without public consent prior to the Samut Prakarn Project, which could harm people and the environment could be suspended or even canceled by the unity of local people. The two well-known projects were coal power plants in Prachuab Keereekhan Province and Thai-Burma gas pipeline project in Karnjanaburi Province.

The Pollution

Over the years of Samut Prakarn's rapid rise to a major center of industry- a province with the highest number of factories, and the accompanying explosive growth in its population, it also developed into one of the most polluted provinces in the entire country. With a wastewater system designed for the small, non-industrial hamlet that it had long been, the city's sanitation and wastewater management facilities were completely overwhelmed by the more than 5,000 factories and one million people with which these systems had to contend by 2005. The existing system simply could not cope with the large wastewater flows from all the industrial, commercial, and residential sources that had mushroomed in the space of a few short decades. Consequently, increasingly wastewater from these sources were increasingly flowing

into the nearby sea through open canals and rivers, and in the process, polluting large stretches of coastal areas in the Gulf of Thailand.

The result was a severe degradation in water quality and the creation of a hazardous health situation for upwards of a million people, as reported by a consultant company hired by the Dapartment of Pollution Control in 1995 to study the water quality in the Chao Praya River and canals in Samut Prakarn area and upper area of the Thai Gulf. Many of the waterways had become ecologically weakened, and most of the beneficial uses of the water from the Chao Phraya River e.g. for daily living, aquaculture, rice farming and making running water etc. have been lost. Due to the severity of the pollution, the Government of Thailand designated the province as a "pollution control area" in 1994, ensuring it of priority for government funding for environmental improvements.[2]

The pollution situation in Klong Daan could be characterized as much better than that elsewhere in Samut Prakarn since the area was quite far from the industrial area and the mouth of Chao Praya River. While industrial effluent was prominent in the other area, the water quality in Klong Daan area was relatively good as seen from the satisfactory yield from fishing and mussel farming. This was another reason from local people who told that they strongly opposed the construction of the project as they saw that it was unfair to bring a large amount of wastewater from distant polluted areas to their place without any public consulting. This wastewater could seriously harm the sea which was their place of livelihood and also health of the local people, especially children.

Background of the Project

The Samut Prakarn Wastewater Management Project, with the Thai government's Pollution Control Department as executing agency, was aimed at improving the environment in, Samut Prakarn province. The Thai government viewed the project as reflecting its policy of

[2] www.samutpwater.com cited in Payappaisarn, P., 2002: 53-54

developing comprehensive wastewater management strategies in severely polluted areas. In the Governments' view, further degradation of the environment and deterioration of public health were inevitable without the implementation of a comprehensive wastewater management program. Centralized wastewater collection and treatment was determined to be the most technically sound and appropriate approach for the situation—as well as the most cost-effective—when combined with an industrial pollution prevention program and enforcement of pollution control regulations.

Project Design: Guiding Principles and Systemic Elements

The project entailed an *integrated approach* aimed at tackling wastewater pollution at both the source and the final treatment points, representing a significant attempt to proactively minimize wastewater pollution. Overall, as stated in the ADB website "The project sought to improve the quality of the province's environment and public health in the province by providing modern, reliable, and cost-effective wastewater collection and treatment facilities. Complementary programs were being implemented to improve environmental monitoring and enforcement, as well as to promote cleaner production for industry."[3]

Its design included the collection and treatment of domestic and pretreated industrial wastewater – with the capacity to serve 129 square kilometers of residential area in which there were about 70,000 households, plus 3,600 factories and 20,000 small enterprises. The treatment plant was designed to treat wastewater after industry had pretreated it to remove toxic elements in accordance with Thai Government standards. Under the project, the pretreated industrial wastewater was to be collected by sewer pipes and carried to a treatment plant designed to further decompose and purify up to 525,000 cubic meters of wastewater a day.

The project was comprised of several distinct components and facets: Wastewater collection systems (sewers and associated pumping stations); a central wastewater treatment plant, wastewater and effluent monitoring systems, and a program for cleaner production for

[3] http://www.adb.org/projects/samutprakarn/default.asp

industrial efficiency; and, capacity building of Thai government agencies responsible for managing wastewater (mainly the Pollution Control Department.

The treatment plant was located at Klong Daan, a lightly populated area to the southeast of Samut Prakarn Province, with extensive shrimp and mussel farming. The location of the project is shown in Figure 2 below.

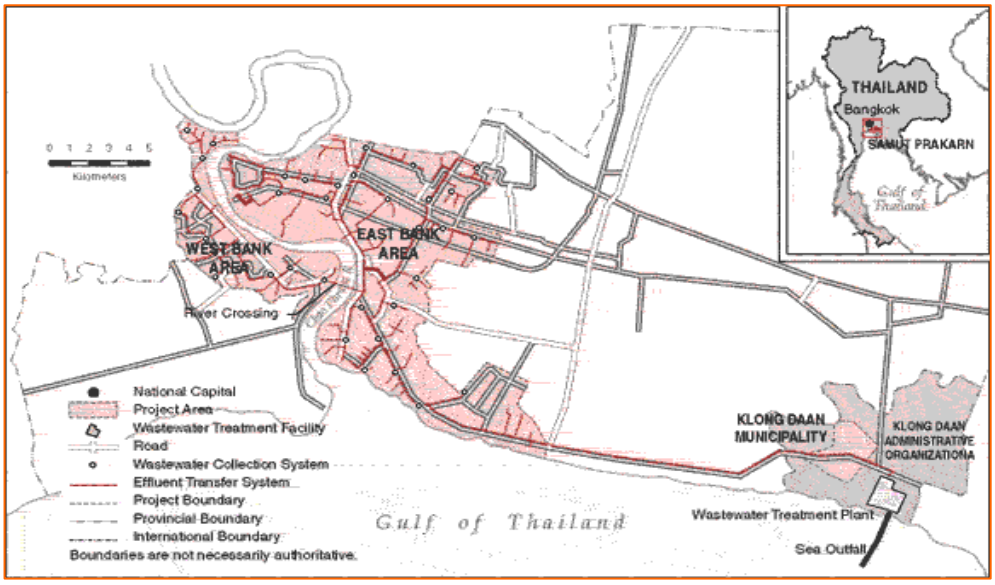

Figure 2 Location of the project at Klong Daan, Samut Prakarn

Project Operation: Expected Benefits and Results

The wastewater treatment plant was to collect wastewater from factories and households, using a system of more than 300 kilometers of sewer pipes. The treatment plant, which was only one component of the management strategy supported by the project, was designed to break down and purify industrial wastewater after it has been partially pretreated to remove toxic elements and domestic wastewater. The treated wastewater would then be released through a 3.4-km outfall pipe into the Gulf of Thailand.

As anticipated the Government at the time the cabinet approved the project in 1995, the Project would yield two primary benefits – i.e., improved health and a quality of life, as well as a cleaner environment. More specifically, by cleaning up the environment and raising water quality, the project was expected to directly benefit Samut Prakarn's one million residents by improving public health through lower incidence of water- and sanitation-related diseases. Further, the quality of life was expected to improve for low-income families, many of whom often lived close to factories in low-lying, flood-prone areas and were most exposed to polluted waterways. Additionally, by removing an estimated 72,000 tons of pollutants and about 90 tons of heavy metals from waste-water entering the sea on an annual basis, the anticipated result would be significantly improved water quality, thus enhancing mussel and fish farming yields.

Project Financial Issues: Cost, Financing, and Savings

The project was initially projected to cost was around 13,000 million Baht (US$ 394 million); but, after the redesign and relocation, its cost almost doubled to 23,000 million Baht (US$ 750 million). Of this amount, 40% was obtained through a loan from the Asian Development Bank (ADB) and the Japan Bank for International Cooperation (JBIC) (US$230 million from ADB, a fixed amount of B1,750 million equivalent (US$50 from JBIC, and the balance from the Government of Thailand).

To motivate greater involvement by industry in promoting a cleaner environment, the Government also, for the first time in Thai history, proposed to implement a "polluter-pays" principle. Specifically, given the determination that industry accounted for about 80% of the environmental pollution, the Government planned to allocate 80% of the clean-up costs to industry.

However, industry was also expected to reap significant financial benefits from the new system. For example, for "moderate" to "serious" polluters in the food and textile industries, the cost of using the type of centralized systems that the Samut Prakarn Project was designed to be, was estimated to be 1.3-40.0 times *less* per cubic meter than onsite treatment.

Implementation Nightmares: Great Expectations Meet Great Resistance

Wastewater Management Project in its early stages have predicted that a Project with such noble intentions and cutting-edge design would run into a beehive of local resistance. But, soon after its inception, it began encountering one objection and complaint after another from groups of concerned local residents, especially from the residents of the fishing village of Klong Daan.

Precipitating Actions – Design and Site Changes

When the project was first approved by the cabinet in October 1995 there were 2 sites of wastewater treatment plants planned to locate close to the industrial areas on both sides of the Chao Praya River in Samut Prakarn. The first plant was planned to locate on the west bank at Baang Prakod with the area of 350 rai. Its capacity in treating wastewater was 152,000 cubic meters per day with the cost of 2,722 mill. Baht. The second plant on the east bank was planned to locate at Baang Poo Mai with the area of 1,550 rai. Its cost was 12,866 Baht. The total cost of this first planned project including technology improvement was 13,612 mill. Baht. NVPSKG, an all-Thai joint venture, was chosen for the design and construction. The turn-key condition of the contract required the contractor to acquire the land for the two plants. In March 1997 the cabinet approved the merge of the two plants as proposed by the contractor for that it was unable to find the land for construction of the plants on both initial designed location. The proposed new site was located at Khlong Daan, a village about 20 kms east of the previous east bank site, where the land was available. Wastewater from the west bank would then be brought to the new site by putting sewage pipe underpass the river.

Once they came to the attention of local residents, these changes – particularly the change in plant location – triggered immediate objections from among many of the 60,000 villagers who lived in the immediate vicinity of the designated new site. The villagers' concerns centered on fears that the plant would usher in a number of adverse environmental and

social impacts. In particular, villagers were alarmed about the prospect of having to breathe foul odors that might emerge from the plant and the possibility that tremendous amount of outfall from the plant into the nearby sea would threaten marine life, and thereby the livelihood of local fishermen.

The responses to these villager concerns were seemingly unequivocal. To the concern about foul smells emanating from the plant, the project contractor —NVPSKG — said that it would apply a measure to minimize the smell and assured them that this would not be a problem. To the other major concern about possible damage to the marine ecosystem, Dr. Yuwaree In-na, the Pollution Control Department's Director of Water Quality Management, however, argued that the affect from the project would be just the opposite:[4]

> *The toxic materials, including heavy metals, presently flowing unchecked into the Gulf of Thailand from the Chao Phraya River and canals along the eastern seaboard pose a far greater danger to marine life. In contrast, the treated wastewater could be of sufficient quality to be reused as irrigation water for agriculture or mangrove swamps.*

But, objected the fishermen in the group, numbering an estimated 20-40 mussel farmers, the treated wastewater would be discharged in an area currently occupied by mussel farms, and mussels thrived in seawater, not in freshwater. To alleviate this problem, the Pollution Control Department promised to create a buffer zone around the outfall that would allow the freshwater effluent to be diluted. "Within 80 meters or so of the outfall, the effluent will have a negligible impact on mussels," said one of the Pollution Control Department's technical consultants. However, some mussel farms would have to be moved. The Government, it was reported, was considering compensating the affected fishermen, including providing assistance for moving.

[4] Ian *Gill, Bangkok Post*. September 24, 2000

From the villagers' perspective, however, reliance on these statements and promises was seen as risky. After all, they reasoned, it was their health and livelihoods that were at stake, not those of the Project planners, construction personnel, or onsite administrators. Further, as they saw it, nothing in the manner in which the Project had come into being and was being implemented offer any reliable encouragement that the completed Project would be anything other than the potential "destroyer"–of marine life and livelihoods–that they so feared.

Aggravating Factors–Alleged Corruption and No Environmental Impact Study

Having encountered what many felt as a dismissive attitude from Project administrators, villagers in the area of the newly re-designated plant site began making inquiry in a variety of forums to learn more about how their geographic area came to be selected as the proposed site for the plant. At the same time, their objections came to the attention of environmental NGOs which proceeded to join forces with the villagers to fight what they believed to be an unjustifiable action on the part of the Project planners and politicians.

These investigations soon surfaced sufficient peculiarities concerning the processes by which the plant relocation and land acquisition decisions had been made to convince the opposing villagers that corruption played a major role in both decisions. It came to light that the site in Klong Dan was purchased at an artificially high price. The market price of the land in the area at the time was about 480,000 baht per rai (6.25 hectares). Thus, the villagers and their NGO allies were astounded to learn that the land had been sold to the Project for prices that were more than *four* as much – or, as high as 2 million Baht per rai. Moreover, some areas were said to be public land as they were mangrove or contained natural waterways. They also found that some companies in the NPVSKG venture were belonged to politicians or their families and had a close link with the government. This discovery, in conjunction with the near-simultaneous revelation that all seventeen plots comprising the Project area had been sold by a single company owned by a big politician who was in power in the government, sufficed to further

convince the villagers and their allies that corrupt practices, not technical or economic imperatives, accounted for the changes in the initial design and site designation of the Project plant.

In addition, the fact that the Project planners and administrators had not bothered to conduct an environmental impact assessment further worried the villagers. The fact, as they later learned from the Pollution Control Department, that no such impact assessment was required under the applicable Environment Impact Assessment law,[5] did little to ameliorate their health and livelihood concerns. Indeed, many were incredulous that a project of such massive size and potential impact on the local environment and people could be altogether relieved of the requirement of such an assessment. This fact alone bred additional suspicion that Project planners and government officials "knew" that their concerns were legitimate. Otherwise, the villagers reasoned, the Project authorities would have conducted an impact assessment just so they could prove that the local residents had no cause for concern.

The villagers' concerns were buttressed by the statements of several independent technical experts, especially experts working for the Environmental Engineering Association of Thailand, who weighed in with the charge that the redesigned Project, with its lone plant, would improperly designed. It had been designed, the experts argued, for *community* wastewater only, not for industrial wastewater. This input from presumed neutral third parties further inflamed villager suspicion, in that it strongly suggested that an environmental impact assessment should have been conducted, even though it was not an absolute legal requirement. Finally, the experts' criticism of the additional costs of relocating the plant to just one site, in Klong Daan, cemented in the villagers' minds that the redesign and relocation decisions that these decisions were done for reasons other than technical and economic objectives. The additional electricity costs alone for pumping wastewater the longer distance to the Klong Daan, in the calculation of

[5] The 1992 Environmental Quality Act and its affiliated regulations required 22 types of development projects to be conducted the Environmental Impact Assessment (EIA) before decision making, including waste disposal project. The government argued that the Samut Prakarn Project was not covered by the laws.

the experts, approximated 1 million Baht per day, while additional site and sewer pipeline construction costs were around 10,000 million Baht.

Given the additional construction costs (e.g., for extending the sewer pipeline and pumping systems to move wastewater the longer distance to Klong Daan) and the increased power costs, as well as the failure of the Project planners to conduct an environmental impact assessment, the villagers were left to wonder *what* – other than a complete disregard for their health and welfare driven by corruption – would have motivated the plant design and site changes in the first instance.

The Birth of an Impasse: Futile Assurances and Unallayed Concerns

A recurrent theme throughout the villagers', and their allies, escalating opposition to the re-designed and relocated Project was the view that the government never informed or consulted the local people in Klong Daan about the project. No one, they maintained, would listen to their concerns, particularly their deep fear that the effluent from this project would have very serious impact on the sea water and local people's mussel farming and fishing career. Explained Mr. Chalao Thimthong, one of the local community leaders opposing the project, to a Thai magazine in 2002:[6]

> *In the beginning of the project construction, local villagers tried to get information from relevant government offices, but they did not tell anything and told the villagers to go to ask the project contractor who was constructing the project.*

The villagers then sent a letter expressing their opposition to the Ministry of Science, Technology and Environment. Soon afterwards, the then Director General of the Ministry's Pollution Control Department came to meet with the local people at Klong Daan in December 1998 to make the case that the effluent from the project would not have any effect on

[6] Images/klong_dan_12jpgimagesklong_dan_12jpg, cited in Jermpan, S. 2006: 40.

mussel farming and their fishing livelihoods. However, the discussions did not lead to the outcome that the Director General had hoped for: The villagers simply did not believe his reassurances. The protests continued unabated, although not always as non-violently as they were in the beginning. Mr. Chalao elaborated:

> *In December 2000 there was a large protest which thousands of Klong Daan villagers went to protest at the entrance of the project construc-tion site. The violence occurred when workers camet out from the site and beat the villagers with iron bars. Consequently, more villagers came out to join the protest.*

Despite the strong protests from the villagers, the government and the project contractor kept on constructing the plant and wastewater collection system. Seeing that their efforts were basically being ignored, the Klong Daan villagers then resolved to adopt some new fighting tactics, as Mr. Chalao explained:

> *We knew that the project has to construct the sewer pipeline passing through our community to the treatment site. If we could stop this, the project would certainly not be completed and could not be operated. We put the bamboo fence against the end of constructed pipeline and asked our female villagers to stop the company workers when they came to do the pipeline work in the community area. It worked.*

The revamped tactics employed by the villagers did not end there. To the contrary, the affected communities used all possible channels to express their opposition to the project and their demand that it be halted or relocated. This included the filing of a request with the Asian Development Bank to have the project in spected. The villagers scored a psychologically important victory, when the ADB, discovering that it had violated some of its own policies during Project preparation and implementation, acceded to the request in July 2001, and performed its first inspection of the Project plan. In March 2002, the

inspection panel submitted its report to the ADB Board, confirming what local communities and NGOs in Thailand had already complained to the Bank about, through letters, meetings, and protests dating back to 1999. The Bank had violated at least six of its own policies in approving financing for the Samut Prakarn project and, in so doing, had denied important information to residents affected by the project. The panel noted the project's massive cost overrun from an initial estimate but failed to resolve allegations of corruption involving private contractors, government officials, and ADB staff. The panel also found that:

- ADB staff had violated Bank policy by failing to classify the project properly, consider alternatives, conduct a thorough environmental assessment, follow its own rules for assessing the impact of the project on local communities, and disclose information to local communities;
- ADB Bank staff repeatedly violated operational policies and procedures (including Supplementary Financing of Cost Overruns, Bank Operational Missions, Environmental Considerations in Bank Operations, Involuntary Resettlement, Incorporation of Social Dimensions in Bank Operations, and Governance);
- Only after protests and pressure from local communities and NGOs did the Bank acknowledge that compensation for damages to livelihoods would be required if the plant is completed and becomes operational;
- "A relevant group has suffered direct and material harm as a result of ADB's non-compliance with operational policies and procedures"; The panel noted that the rights and interests of people whose livelihoods depend upon a healthy marine ecosystem in the project vicinity could be adversely affected by problems such as the dilution of salinity in the coastal mangrove areas, or the release of toxins or heavy metals from the treatment plant.

Although the Inspection Panel's investigation confirmed policy violations had occurred, its recommendations were perceived to be weak by independent observers. Moreover, the ADB subsequently failed, in the view of some observers, to take adequate action toward implementing even these weak recommendations.[7]

Thus, it came to pass that the Project, although 99% completed by the end of 2005, entered its current state of *suspension* -- unable to secure completion of the 1.2 kilometers of sewer pipeline that had to transgress the Klong Daan community due to ongoing serious obstruction from the local residents. It was this state of affairs that so vexed the current Director General of the Pollution Control Department in the aftermath of receiving the latest news concerning the imminent additional protests against the Project by villagers in the area.

The Quest for a Solution: Options Aplenty, But . . .

As depressing as the current situation was, the Director General could take some comfort in knowing that he had at his disposal a list of options prepared by a group of consultant companies that the Department had engaged to study and analyze the alternative approaches to resolving the impasse at which the Project had arrived. Their analysis included an examination of the technical and financial aspects and implications of each alternative, as well as an action plan for the implementation of each. The alternatives and their costs are shown in Table 1 below.[8]

[7] Mock Accountability: A Review of the Asian Development Bank's Inspection Function, Probe International, July 30, 2002. www.probeinternational.org/index.php.

[8] Pollution Control Department (PCD). 2002. A Study on the Alternatives for the Samut Prakarn Wastewater Management Project.; Interviewed Dr. Pornwipa Klangsin, Senior Officer, PCD. March 27, 2008.

Table 1: Alternatives for Handling the Project (Reported by Consultants, September 2005)

Alternatives	Additional investment costs (mil. Baht)	Operational costs (mil. Baht/year)
Alternative 1: To complete the project construction work, operate the system as planned with some modification/ improvement for the project such as improving the wastewater treatment system, improving sludge treatment system, extending the effluent pipeline for further 10 kms, etc.	1,700-4,600 Depends on level of improvement	Around 1,400
Alternative 2: To complete the project construction work, with some modification/ improvement for the project such as improving the wastewater treatment system, improving sludge treatment system, extending the effluent pipeline, etc. Then operate the system with no effluent discharged to the sea in summer, and reduce the amount of discharged water to the sea by reusing effluent.	5,454	1,407
Alternative 3: To cancel the existing Sumut Prakarn Wastewater Treatment Site and construct a treatment system at another location that could utilize the constructed wastewater collection system. The new system is more compact and use smaller area.	7,100	1,363

Table 1 (Continued)

Alternatives	Additional investment costs (mil. Baht)	Operational costs (mil. Baht/year)
Alternative 4: To cancel the whole constructed wastewater management project in Sumut Prakarn area and modify the wastewater treatment system and wastewater collection system for other uses. The proposed use of the wastewater treatment system was to be a coastal aquarium complex and the use of wastewater collection system as flood alleviation system.	7,100	1,640
Alternative 5: To suspend the project. Construct several small wastewater treatment plants at separated locations. Improve existing wastewater collecting system/construct new collecting system for the new treatment plants.	6,827	1,326

Now examining the document more closely, the Director General quickly surmised that the consultants had concluded that, from a purely technical and financial standpoint, the three most feasible alternatives were the following (in descending order of favorableness):

- **Alternative 1**: To complete the project construction work, operate the system as planned with some modification/ improvement for the project such as im-proving the wastewater treatment system, improving sludge treatment system, extending the effluent pipeline, etc.

- **Alternative 2**: To complete the project construction work, with some modif-cation/improvement for the project such as improving the wastewater treat-ment system, improving sludge treatment system, extending the effluent pipe-line, etc. Then operate the system with no effluent discharged to the sea in summer, and reduce the amount of discharged water to the sea by reusing effluent.
- **Alternative 3**: To cancel the whole constructed wastewater management project in Sumut Prakarn area and modify the wastewater treatment system and wastewater collection system for other uses.

Complicating matters, however, was the consultants' view that, from a study of *stakeholder* opinions, the Alternative 1 received the lowest acceptance, the Alternatives 2 and 3 were deemed only "moderately acceptable," while the two most favorable, courses of action would held to be:

- **Alternative 4**: To cancel the whole constructed wastewater management project in Sumut Prakarn area and modify the wastewater treatment system and wastewater collection system for other uses.
- **Alternative 5**: To suspend the project. Construct several small wastewater treatment plants at separated locations. Improve existing wastewater collecting system/construct new collecting system for the new treatment plants.

This lack of consonance as between solution alternatives with the superior technical and financial attributes *versus* those with the best prospects of gaining much-needed support from the local opposition centered in Klong Daan community was not a little worrisome. Nonetheless, the Director General resolved to continue to examine and ponder the consultants' alternatives in great depth, in the quest of spying a way forward with the project. In this undertaking, he knew that he would need to be ever-mindful of the criticality of taking into full account the continuing concerns of, and strong resistance by, the local residents. If he had needed any reminder, this morning's earlier telephone call about the latest planned protest rally was certainly *more* than adequate.

Appendix 1

Main Features of the Collection System

Project area		127 Km^2
Design residen./commer. Pop. (BOD load)		765,000
Design total equivalent population (BOD load)		4,120,000
Project components :		
*	Combined Sewer Overflows, CSOs	391 No
	Collect residential/commercial flows and	
	Industrial flows	
*	Industrial Direct Connections, IDCs	108 No
	Collect industrial flows only	
*	Pipelines 300 to 3000 mm diameter	125 Km
*	Manholes	850 No
*	Pump stations 200 to 10,9000 l/sec	7 No
*	River crossing, twin 800 mm	1.3 Km
	Design flows, ADWF	
*	Residential/ commercial	263,000 m^3/day
*	Industrial from street drains	114,800 m^3/day
*	Industrial from IDCs	147,200 m^3/day
*	Total industrial	262,000 m^3/day
*	Total ADWF	525,000 m^3/day
BOD load :		
*	Residential/ commercial	39,000 kg/day
*	Industrial	171,000 kg/day
*	Total	210,000 kg/day

Source: www.thaiengineering.com

Appendix 2

Wastewater Treatment Plant Main Features

Bar screens. Automatic:

(To remove floating trash such as wood. rags etc)

*	Coarse	65 mm
*	Fine	20 mm

Grit chamber:

(To remove grit and sand)

* Vortex grit removal unit (Pista Grit)
* Remove 95% of particles larger than 0.2 mm

Pretreatment ponds:

(To remove BOD, SS, toxics, heavy metals and to protect process against shock loadings

*	Volume	529,200	m^3
*	Retention time	24	hours
*	Unit loading	400	$g/m^3/day$
*	BOD_s removal	50%	
*	SS removal	60%	
*	Sludge removed by floating dredger		

Extended aeration basins:

(To remove BOD and nitrogen, bacteria feeds on organic pollutants to form settleable solids)

*	Suspended (floating) diffused air system		
*	Volume	453,000	m^3
*	Hydraulic retention time	20.5	hours
*	Sludge retention time	30	days
*	Mixed liquor suspended solids, MLSS	3,500	mg/l

Clarifiers:

(To settle out settleable solid products of aeration basins as activated sludge)

*	Peripheral feed low-bro circular clarifiers		
*	Number	8 to 12	
*	Diameter	55	m
*	Surface area	19,000	m^2 for 8
*	Sidewater depth	5.5	m
*	Hydraulic loading rate, PWWF	50	m^3/m^2/day for 8
*	Solids loading rate, PWWF + RAS	10.99	kg/m^2 /hour for 8
*	RAS concentration	8,000	mg/l

Source: www.thaiengineering.com

Appendix 3

Wastewater Treatment Plant Sludges & Outfall Main Features

Pretreatment sludges basin

(To store sludges which have been dredged from pretreatment ponds for up to 5 years)

*	Volume	481,000	m^3
*	Solid stored	51	T/day
*	Year capacity, no emptying	~ 5	years

WAS biosolids basin

(To store excess activated sludges not required as returned activated sludge for the aeration process. These are drawn off from the bases of the clarifiers and stored for up to 5 years)

*	Volume	526,000	m^3
*	Solid stored	51	T/day
*	Year capacity, no emptying	~ 5	years

Outfall

(To dispose treated effluent to acceptable dilution levels)

*	Length (incl. diffusers)	3,350	m
*	Pipe diameter	2600	mm
*	Dilution	10:1	

Source: www.thaiengineering.com