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Thailand's Economic Structure: Towards Balanced Development?

The Environment in a Tourist Economy: A Case Study of pattaya

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THAILAND'S ECONOMIC STRUCTURE: TOWARDS BALANCED DEVELOPMENT?

Background Report

The Environment in a Tourist Economy: A Case Study of Pattaya

Supachit Manopimoke

Faculty of Economics
Thammasat University

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Contents

page

List of Tables

page

page

List of Figures

page

Executive Summary

Tourism has played a crucial role in contributing to the development of Thailand's economy over the past three decades. The tourism industry's growth rates have been high and continuous. Tourism development policy, however, has failed to encourage growth in harmony with the natural environment. As a result, pollution and environmental degradation are unnecessarily present at a number of important tourist destinations. In some tourist resorts, the severity of environmental degradation is so serious that it has brought about a decline in tourism.

Pattaya resort is a classic example of pollution contributing to a decline in tourism. Three decades ago, Pattaya was only a small fishing village, with a rich endowment of coastal resources. Tourism became the mainstay of Pattaya's economy in the 1970s. It took less than 20 years to transform Pattaya into a world famous beach resort. From 1973-76, the number of tourists visiting Pattaya increased by 30 percent a year. Between 1979 and 1990, the number of tourists increased fourfold, from 386,000 to 1.8 million, with an average annual growth rate of 16 percent. In most years, foreign tourists account for two-thirds of the total number visiting Pattaya. Pattaya is also popular for day-trips, due to its easy access and relatively short distance from Bangkok. Some 577,000 travelers visited Pattaya in 1986 and over 1 million in 1988, mostly Thais.

The peak tourism season for Pattaya is from December to January. Pattaya's monsoon season is from July to September, which corresponds to the low tourism season. Most tourists and travelers visit Pattaya for its beaches and natural environment.

From 1988, Thai visitors (tourists and travelers) to Pattaya clearly began to decline. By 1989, foreign arrivals were also noticeably down, especially considering both groups had previously shown strong increasing growth rates. As Thais are mostly repeat visitors to

Pattaya and have greater opportunities for obtaining news and information about Pattaya, they reacted differently to the changing environment. Decreases in visitation rates since 1988 were 14 percent for Thai tourists, 3 percent for foreign tourists, 24 percent for Thai travelers and 1 percent for foreign travelers. During the author's field observations in Pattaya, most hotel and restaurant managers indicated that the tourism business of the 1991-92 season could be 50 percent worse than the already depressed season of 1990. Pattaya's tourism decline during 1991-1992 was, in addition to environmental degradation, caused by the impacts of the Gulf-War and the May political unrest and violent in Bangkok.

Pattaya is a tourist economy. Seventy-five percent of Pattaya's employed population are engaged in the tourism related services or commercial businesses. In 1990, revenue generated from the tourism sector was as high as 17,285 million baht. This amount was a fourfold increase from the 4,559 million baht generated in 1986. Real revenue grew at an average annual rate of 74 percent from 1986 to 1988. In 1988, however, the real revenue growth rate was only 8 percent and decreased to 2.6 percent in 1990. Pattaya's tourism industry is also an important source of foreign exchange earnings. On average, revenues from Pattaya's tourism sector accounted for 16 percent of the country's total tourism revenue.

The rapid growth of tourism in Pattaya has brought about pollution and environmental degradation. Based on water quality survey reports of the Office of the National Environmental Board (ONEB), water quality in Pattaya has continually declined since 1976. Beginning in 1986, sea water in Na Klua and Pattaya beaches have become unsuitable for swimming. The quantity of dissolved oxygen (DO), biological oxygen demand (BOD), coliform bacteria and suspended solids (SS) in Pattaya beaches and Na Klua area are beyond the public health safety standards for coastal water set by the Office of the National Environmental Board.

Apart from marine pollution, tourism development in Pattaya has caused two other long-term environmental consequences. First, encroachment of construction on Pattaya's coastline has demonstrated a tendency to cause permanent coastal erosion and beach loss. Second, tourism has significantly damaged coral reefs at Ko Lan (Lan Island). According to surveys by the Asian-Australia Corporative Program on Marine Science in 1989 and 1991, there was only 1-10 percent of live coral on the east side of Ko Lan and 30-50 percent on the west and south west sides of the island where, tourist boats and tourism services are less prevalent. In general, coral reefs are considered under threat if more than 30 percent of a reef area is dead coral.

During 1990-1992, the government has increased its assistance in helping to solve pollution problems in Pattaya. This is partly in response to the potential health hazard posed by pollution and in part due to the serious tourism decline in Pattaya. Pattaya has been finally designated by the ONEB as a pollution controlled area, and has received a budget of 3,600 million baht to improve its environment.

This study attempts to assess the costs of the existing tourism development policy and estimate the costs of environmental protection for Pattaya's tourist economy. The amount of revenue lost due to a decline in tourism from 1988 to 1990 was estimated and used as a proxy for costs of the existing tourism policy. The estimated were that 1,367 million baht for this three year period, or an annual average of 455.7 million baht was lost. Estimated revenue loses would have been much higher if the economic status of potential tourists and travelers has been incorporated into the estimation methodology. In this study, it was found that the overall decrease in potential tourists resulted primarily from a decrease in high income tourists. Moreover there was an increase in the number of low income tourists during the same period, resulting in better aggregate numbers, This finding has important policy implications for tourism development and environmental protection. If pollution in Pattaya continues, fewer high income tourists are expected to visit Pattaya. While the number of low income tourists may initially increase, eventually their visits are also expected to decline when the resort areas' pollution reaches higher levels. Apart from lost revenues, beach loss and coastal pollution may be irreversible in terms of ecological costs.

Estimates of environmental protection costs include sewage treatment and solid waste disposal costs. Cost estimates were made with a margin of error of plus or minus 30 percent. The unit cost of sewage treatment in Pattaya is about 1.9 baht per cubic meter. Using this figure, the annual sewage treatment cost for Pattaya in 1990 was calculated to be 50.5 million bath, of which 23 percent was for land costs, 63 percent for construction costs and another 14 percent for operation and maintenance costs. Solid waste disposal costs were estimated to be 16.2 million baht for 1990, based on a per unit cost of 348 baht per ton. In sum, the annual cost of maintaining Pattaya's environment at a satisfactory level, for both the tourists and the local community, was 66.7 million baht for 1990. This amount is approximately 0.4 percent of the total revenues generated by the tourism sector. If we assume that the profits earned in the tourism industry are 20 percent of tourism revenue and the government is able to effectively collect a 30 percent corporate tax from the tourism sector, then the annual costs of environmental protection are 1.9 percent of tourism profits or 6.4 percent of tourism tax revenues. Other costs of environmental protection include an investment of a pier at Ko Lan

for preventing coral from tourist boat anchorings. In general the costs of environmental protection are incurred at one time as a lump sum. This problem has been solved in many countries by granting long-term loans to local authorities, who then recover the costs of environmental protection investments from the various users.

Cost estimates for the existing tourism policy and the alternative policy of environmental protection clearly indicate that the alternative policy is much more beneficial to the economy, in terms of both potential economic opportunities and in current cost savings. In 1990, the annual cost of environmental protection for the alternative policy is approximately 66.7 million baht which is only 0.4 percent of the 1990 tourism revenues or 6.4 percent of tax collected from Pattaya's tourism sector. The costs of the existing policy are the losses of invaluable natural resources and 455 million baht of potential income per year in the short term and potentially all tourism revenue in the near to long term. Pattaya's tourism development without advance planning and environmental protection is evidently a costly policy and denies Pattaya the opportunity to profit from truly sustainable management and exploitation of its considerable wealth in tourism resources.

This study also found that tourism development with advanced planning and environmental protection is a cost saving policy, as with other resource development policies. In addition, information on tourist seasons, rainfall patterns, and the carrying capacity of the marine ecosystem suggest that policy and strategies designed to disperse visitors seasonally will lead to a more efficient use of infrastructural facilities, for instance sewage treatment plants. This is because infrastructural facilities are usually designed to handle peak loads. Finally, a policy that promotes eco-tourism, currently adopted by many countries, could also reduce the costs of environmental protection.

สรุปสำหรับผู้บริหาร

ในช่วง 3 ทศวรรษที่ผ่านมา การท่องเที่ยวนับเป็นอุตสาหกรรมที่มีความสำคัญอย่างยิ่งต่อเศรษฐกิจของประเทศ มีอัตราการเจริญเติบโตที่รวดเร็วและมีแนวโน้มการขยายตัวที่ไม่หยุดยั้ง อย่างไรก็ตามเนื่องจากนโยบายการท่องเที่ยวที่ผ่านมาไม่ได้ให้ความสำคัญต่อการรักษาสภาพแวดล้อมควบคู่ไปกับการพัฒนาการท่องเที่ยว การท่องเที่ยวจึงก่อให้เกิดความเสื่อมโทรมทางสภาพแวดล้อมในแหล่งท่องเที่ยวที่สำคัญๆ มากขึ้นเรื่อยๆ ความเสื่อมโทรมของสภาพแวดล้อมในแหล่งท่องเที่ยวบางแห่ง ได้ทวีความรุนแรงจนกลายเป็นภาวะมลพิษและมีผลกระทบย้อนกลับมาทำลายอุตสาหกรรมการท่องเที่ยวอย่างรุนแรง

พัทยานับเป็นเมืองท่องเที่ยวชายทะเลที่เป็นตัวอย่างหนึ่งที่ชัดเจนของปัญหาที่กล่าวมาข้างต้น เมื่อ 30 ปีก่อน พัทยาเป็นเพียงหมู่บ้านชาวประมงเล็กๆ ริมฝั่งทะเลที่มีทิวทัศน์สวยงาม การท่องเที่ยวเริ่มมีความสำคัญต่อเศรษฐกิจของพัทยานับตั้งแต่ทศวรรษ 1970 เป็นต้นมา และเพียงช่วระยะเวลา 20 ปีต่อมาพัทยาได้กลายเป็นแหล่งท่องเที่ยวทางทะเลที่มีชื่อเสียงระดับโลก จากการศึกษาพบว่าในช่วงปี 1973–1976 อัตราการเพิ่มของนักท่องเที่ยวในพัทยาสูงถึงปีละ 30% ในช่วงปี 1979–1990 จำนวนนักท่องเที่ยวในพัทยาเพิ่มขึ้นประมาณ 4 เท่าตัว จากจำนวน 3.9 แสนคนในปี 1979 เป็น 1.8 ล้านคนในปี 1990 มีอัตราการเติบโตเฉลี่ยปีละ 16% นักท่องเที่ยวต่างชาติคิดเป็น 67% ของนักท่องเที่ยวทั้งหมดที่ไปพัทยา นอกจากนี้พัทยายังเป็นที่นิยมสำหรับนักทัศนาจรซึ่งไปเที่ยวแบบไปกลับเพียงวันเดียว เนื่องจากพัทยาอยู่ใกล้กรุงเทพฯ และมีเส้นทางการคมนาคมสะดวก ในปี 1986 มีจำนวนนักทัศนาจรไปเที่ยวพัทยา 5.8 แสนคน และเพิ่มเป็นประมาณ 1 ล้านคนในปี 1988 นักทัศนาจรส่วนใหญ่ (88.6%) เป็นชาวไทย นักท่องเที่ยวจะมาเที่ยวพัทยามากที่สุดในช่วงเดือนธันวาคมถึงมกราคม และมาน้อยในช่วงเดือนมิถุนายนถึงกันยายนเนื่องจากเป็นฤดูมรสุม นักท่องเที่ยวส่วนใหญ่มาพัทยาเพราะความงดงามของทิวทัศน์และชายหาด

อย่างไรก็ตาม ตั้งแต่ประมาณปี 1988 เป็นต้นมา จำนวนนักท่องเที่ยวและนักทัศนาจรในพัทยาได้ลดลงเรื่อยๆ อัตราเฉลี่ยการลดลงต่อปีของนักท่องเที่ยวชาวไทยจะรวดเร็วกว่าของชาวต่างประเทศมาก ทั้งนี้อาจเนื่องมาจากการได้รับข่าวสารเกี่ยวกับปัญหาของพัทยามากและเร็วกว่านักท่องเที่ยวชาวต่างประเทศ และนักท่องเที่ยวไทยในพัทยาส่วนใหญ่เป็นนักท่องเที่ยวที่ไปพัทยาบ่อยๆ ในระหว่างปี 1988–1990 อัตราเฉลี่ยของการลดลงต่อปีเป็น 14% สำหรับนักท่องเที่ยวชาวไทย 3% สำหรับนักท่องเที่ยวชาวต่างประเทศ 24% สำหรับนักทัศนาจรชาวไทย และ 1% สำหรับนักทัศนาจรชาวต่างประเทศ สำหรับปี 1991–1992 ผู้จัดการโรงแรมและร้านอาหารส่วนใหญ่ในพัทยาคาดว่าเศรษฐกิจการท่องเที่ยวของพัทยาตกต่ำลงไปกว่าปี 1990 ซึ่งตกต่ำอยู่แล้วถึง 50% เนื่องจากได้รับผลกระทบจากสงครามในตะวันออกกลาง และเหตุการณ์ไม่สงบทางการเมืองเมื่อเดือนพฤษภาคมในประเทศไทยเพิ่มขึ้นอีก

การท่องเที่ยวเป็นเศรษฐกิจหลักของพัทยาประมาณ 75% ของการจ้างงานอยู่ในภาคบริการและธุรกิจของอุตสาหกรรมการท่องเที่ยว รายได้จากการท่องเที่ยวของพัทยาในปี 1990 สูงถึง 17,000 ล้านบาท โดยเพิ่มขึ้นถึง 4 เท่าตัวจากจำนวน 4,000 ล้านบาทในปี 1986 เมื่อปรับค่าเป็นรายได้แท้จริงพบว่าในช่วงปี 1986–1988 รายได้แท้จริงจากการท่องเที่ยวของพัทยาเพิ่มในอัตรา 74% ต่อปีอัตราเพิ่มลดลงจะเป็น 8% ในปี 1989 และกลายเป็นเพียง 2.6% ในปี 1990 รายได้จากการท่องเที่ยวของพัทยาโดยเฉลี่ยคิดเป็น 16% ของรายได้จากการท่องเที่ยวทั้งหมดของประเทศ นอกจากนี้ในแต่ละปีโดยเฉลี่ยแล้วประมาณ 31% ของนักท่องเที่ยวชาวต่างประเทศทั้งหมดที่มาเที่ยวประเทศไทยจะไปเที่ยวพัทยา พัทยาจึงเป็นแหล่งรายได้เงินตราต่างประเทศที่สำคัญของประเทศด้วย

การเติบโตอย่างรวดเร็วของอุตสาหกรรมการท่องเที่ยวในพัทยา ได้ก่อให้เกิดภาวะความเสื่อมโทรมถึงขั้นเป็นภาวะมลพิษในพัทยา จากการศึกษารายงานการสำรวจคุณภาพน้ำทะเลของสำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติพบว่าคุณภาพน้ำทะเลบริเวณนาเกลือและหาดพัทยาได้เริ่มเสื่อมโทรมมาแล้วตั้งแต่ปี 1976 แต่ยังไม่ถึงขั้นเป็นพิษ ตั้งแต่ปี 1986 เป็นต้นมาความเสื่อมโทรมที่ได้สะสมตัวมานานได้กลายเป็นภาวะมลพิษ น้ำทะเลบริเวณหาดพัทยาและนาเกลือมีปริมาณความสกปรก (BOD) ปริมาณบักเตรีโคลิฟอร์ม (Coliformbacteria) และตะกอนลอยน้ำ (Suspended Solids) เกินค่ามาตรฐานคุณภาพน้ำทะเลที่กำหนดไว้เพื่อการว่ายน้ำของสำนักงานคณะกรรมการสิ่งแวดล้อมแห่งชาติ น้ำในคลองพัทยาและนาเกลือเน่าเสียจนเป็นสีดำส่งกลิ่นเหม็นมีปริมาณออกซิเจนละลายน้ำเป็นศูนย์ นอกจากปัญหามลภาวะทางทะเลแล้วพัทยายังมีปัญหาสภาพแวดล้อมเสื่อมโทรมที่สำคัญอีก 2 ประการ ประการแรก คือ ปัญหาการสูญหายของชายหาดและการสึกกร่อนพังทลายของชายฝั่ง เนื่องจากมีการสร้างอาคารสิ่งก่อสร้าง เช่น โรงแรม ภัตตาคารและร้านค้า ใกล้แนวชายฝั่งมากเกินไปทำให้คลื่นที่ซัดเข้าฝั่งเกิดแรงสะท้อนอย่างรุนแรงกว่าที่เคยเป็นอยู่ตามธรรมชาติและกวาดทรายจากชายหาดไปมากขึ้นเรื่อยๆ ปัญหาประการที่สองคือปัญหาการทำลายปะการังที่เกาะล้านจากการสำรวจโดยผู้เชี่ยวชาญพบว่าในปี 1991 ปะการังเป็นบริเวณด้านตะวันออกของเกาะ มีเหลืออยู่เพียง 1–10% แต่ด้านตะวันตกและตะวันตกเฉียงใต้ ซึ่งไม่ค่อยมีเรือนักท่องเที่ยวเทียบ และไม่มีร้านอาหารและร้านค้าตั้งอยู่หนาแน่น ยังมีปะการังเป็นเหลืออยู่ประมาณ 30–50% โดยทั่วไปการตายของปะการังในบริเวณหนึ่งๆ ถ้าเกิน 30% จะถือว่าเป็นอันตรายต่อระบบนิเวศของปะการัง

*ภาวะความเสื่อมโทรมและความเป็นพิษของเมืองพัทยาได้ทวีขึ้นเรื่อยๆ ในปี 1990–1992 รัฐบาลได้ยื่นมือเข้ามาร่วม*แก้ไขปัญหา เนื่องจากเศรษฐกิจการท่องเที่ยวของพัทยาตกต่ำและมีภาวะมลพิษทางทะเลสูงขึ้นเรื่อยๆ คณะรัฐมนตรีได้ประกาศให้เมืองพัทยาเป็นเขตควบคุมมลพิษเมื่อวันที่ 16 กรกฎาคม 1992 และได้อนุมัติงบประมาณจำนวน 3,600 ล้านบาท สำหรับการแก้ไขปัญหาของเมืองพัทยา

การศึกษานี้ได้ทำการประเมินว่าความเสื่อมโทรมของสิ่งแวดล้อมภายใต้นโยบายส่งเสริมการท่องเที่ยวที่เป็นอยู่ในปัจจุบันมีต้นทุน (cost) เกิดขึ้นเท่าไร และถ้าหากจะมีนโยบายส่งเสริมการท่องเที่ยว โดยมีการลงทุนเพื่อรักษาสภาพแวดล้อมด้วยจะต้องลงทุนเท่าไร การประมาณต้นทุนที่เกิดจากนโยบายส่งเสริมการท่องเที่ยวที่เป็นอยู่ปัจจุบัน วิธีใช้การประมาณปริมาณรายได้จากการท่องเที่ยวที่สูญเสียไป เนื่องจากการลดลงของจำนวนนักท่องเที่ยวในระหว่างปี 1988–1990 จากการประมาณการพบว่ามีการสูญเสียรายได้จากการท่องเที่ยวไป 1,367 ล้านบาท เฉลี่ยแล้วสูญเสียไปประมาณ 455.7 ล้านบาทต่อปีในช่วง 1988–1990 การประมาณการนี้เป็นการประมาณระดับต่ำ เนื่องจากในความเป็นจริง นักท่องเที่ยวในพัทยาได้เริ่มลดลงอย่างสม่ำเสมอ ตั้งแต่ประมาณปี 1985 เป็นต้นมา โดยมีการลดลงอย่างชัดเจนในกลุ่มนักท่องเที่ยวที่มีรายได้สูง แต่เนื่องจากมีการเพิ่มขึ้นของจำนวนนักท่องเที่ยวในกลุ่มนักท่องเที่ยวรายได้ต่ำควบคู่กันไป จำนวนนักท่องเที่ยวโดยรวมจึงลดลงไม่มาก การลดลงเช่นนี้ถ้าพิจารณาในเชิงรายได้แล้ว นับเป็นการลดที่สำคัญและน่าวิตกมาก เพราะหมายความว่า ถ้าพัทยายัง

เสื่อมโทรมลงเรื่อยๆ นักท่องเที่ยวที่มีรายได้สูงจะมาเที่ยวพัทยาน้อยลง นักท่องเที่ยวที่มีรายได้ต่ำจะยังคงมาเที่ยวพัทยามากขึ้นในระยะแรกแต่ก็จะลดลงในที่สุด เพราะสภาพแวดล้อมเสื่อมโทรมทวีขึ้นจนไม่คุ้มต่อการลงทุนมาเที่ยวที่พัทยาอีกต่อไป นอกจากต้องสูญเสียรายได้ส่วนนี้แล้วการที่จะฟื้นพัทยาให้สะอาดสวยงามเหมือนเดิม จะต้องใช้เงินจำนวนมหาศาลซนิดที่ไม่มีประเทศใดในโลกนี้จะกล้าลงทุน ความสูญเสียบางอย่าง เช่น ชายหาดที่หดหายไป ความเน่าเสียของน้ำทะเลบริเวณนาเกลือและพัทยาใต้ก็อาจฟื้นคืนไม่ได้ นอกจากต้องลงทุนถมทะเล สร้างหาดเทียม หรือทำเป็นแผ่นดินเพื่อแก้ปัญหาและปิดความเน่าเสียนั้น

ในด้านการประมาณการเกี่ยวกับต้นทุนการรักษาสภาพแวดล้อม ได้ศึกษาเฉพาะต้นทุนการรักษาสภาพแวดล้อม 2 ประเภทใหญ่ๆ ที่สำคัญ คือ การบำบัดน้ำเสีย และการกำจัดขยะมูลฝอยในเมืองพัทยา จากการประมาณการบนความถูกต้อง +/- 30% พบว่า ค่าบำบัดน้ำเสียต่อลูกบาศก์เมตรในพัทยาเท่ากับ 1.9 บาท ในปี 1990 ค่าบำบัดน้ำเสียในพัทยาเท่ากับ 50.5 ล้านบาท ในจำนวนนี้ 23% เป็นค่าที่ดิน 63% เป็นค่าก่อสร้าง และ 14% เป็นค่าบำรุงรักษาและการจัดการสำหรับค่ากำจัดขยะมูลฝอย พบว่าปี 1990 ต้นทุนค่ากำจัดขยะในเมืองพัทยาเท่ากับ 16.2 ล้านบาท โดยมีต้นทุนค่ากำจัดต่อตันประมาณ 348 บาท รวมกันแล้วการบำบัดน้ำเสียและกำจัดขยะเพื่อให้พัทยาเป็นแหล่งท่องเที่ยวที่ได้มาตรฐานนานาชาติมีต้นทุนประมาณ 66.7 ล้านบาท สำหรับปี 1990 ต้นทุนจำนวนนี้คิดเป็น 0.4% ของรายได้จากการท่องเที่ยวในพัทยาต่อปี และถ้าสมมติว่าภาคธุรกิจเอกชนในพัทยามีส่วนแบ่งกำไรจากธุระกิจการท่องเที่ยวเท่ากับ 20% ของรายได้จากการท่องเที่ยว และรัฐบาลสามารถเก็บภาษีจากการท่องเที่ยวในพัทยาได้เท่ากับ 30% ของเงินกำไรจากธุรกิจการท่องเที่ยวในพัทยา ต้นทุนค่าบำบัดน้ำเสียและกำจัดขยะจะคิดเป็นประมาณเพียง 1.9% และ 6.4% ของส่วนแบ่งกำไรจากรายได้การท่องเที่ยวและเงินภาษีที่เก็บได้จากการท่องเที่ยวตามลำดับ

นอกจากต้นทุนที่กล่าวมาแล้วข้างต้น ยังอาจมีต้นทุนอื่นๆ เช่น ค่าสร้างท่าเรือที่เกาะล้านเพื่อมิให้ปะการังซึ่งเป็นตัวดึงดูดนักท่องเที่ยวต้องถูกทำลายเป็นต้น ต้นทุนการรักษาสภาพแวดล้อมส่วนใหญ่มีต้นทุนคงที่ (Fixed cost) สูง และต้องลงทุนทั้งหมดครั้งเดียวจึงจะใช้งานได้ ปัญหานี้ในหลายๆ ประเทศใช้วิธีการให้ส่วนท้องถิ่นกู้เงินไปสร้างและเก็บเงินจากผู้ใช้บริการเพื่อผ่อนคืนให้รัฐบาลส่วนกลาง

ผลการประมาณต้นทุนทางเลือกนโยบาย 2 ทางข้างต้น แสดงให้เห็นว่านโยบายการส่งเสริมการท่องเที่ยวที่ควบคู่ไปกับการลงทุนรักษาสภาพแวดล้อม จะเป็นการประหยัดต้นทุนมากกว่าอย่างมหาศาล นโยบายการท่องเที่ยวที่รักษาสภาพแวดล้อมต้องลงทุนปีละประมาณ 66.7 ล้านบาท คิดเป็นเพียง 0.4% ของรายได้จากการท่องเที่ยวที่สูงถึงกว่า 17,000 ล้านบาทต่อปี หรือประมาณ 6.4% ของภาษีที่เก็บได้จากการท่องเที่ยวต่อปี แต่ถ้ายังคงใช้นโยบายส่งเสริมการท่องเที่ยวแบบที่ผ่านมาคือลงทุนอย่างไม่เพียงพอหรือไม่ลงทุนในการรักษาสภาพแวดล้อมเลย นอกจากความสูญเสียทางด้านทรัพยากรธรรมชาติที่ฟื้นคืนเหมือนเดิมไม่ได้แล้ว ยังต้องสูญเสียรายได้จากการท่องเที่ยวปีละอย่างต่ำที่สุด 455 ล้านบาทต่อปีในระยะต้น และอาจสูญเสียรายได้จากการท่องเที่ยวที่เคยได้ถึงปีละ 17,000 ล้านบาทไปทั้งหมดในระยะเวลาอันใกล้ เมื่อพัทยาเสื่อมโทรมจนไม่มีนักท่องเที่ยวผู้ใดไปเยือนอีก การส่งเสริมการท่องเที่ยวโดยไม่รักษาสภาพแวดล้อมจึงเป็นการเพิ่มต้นทุนแก่อุตสาหกรรมการท่องเที่ยว และยังทำลายโอกาสทางเศรษฐกิจและโอกาสในการพัฒนาทรัพยากรท้องถิ่น

นอกจากข้อค้นพบที่สำคัญด้านความคุ้มทุน หรืออันที่จริงความเกินคุ้มของนโยบายส่งเสริมการท่องเที่ยวที่มีการรักษาสภาพแวดล้อมควบคู่ไปด้วยแล้ว งานวิจัยนี้ยังพบว่ากลยุทธการรักษาสภาพแวดล้อมสำหรับการท่องเที่ยวที่ประหยัดต้นทุน จะเหมือนกับกลยุทธการบำรุงรักษาสิ่งแวดล้อมทั่วไปคือ ต้องเน้นการวางแผนและป้องกันปัญหาล่วงหน้ามากกว่าการตามแก้ปัญหา การลงทุนมหาศาลเพื่อแก้ปัญหาพัทยาในปัจจุบันของรัฐบาลเป็นหลักฐานที่ดีที่สุดสำหรับประเด็นนี้ นอกจากนี้

ยังพบว่านโยบายที่ส่งเสริมให้นักท่องเที่ยวมาพักผ่อนแบบกระจายตลอดปี โดยเฉพาะอย่างยิ่งช่วงเดือนมิถุนายนถึงตุลาคมซึ่งมีนักท่องเที่ยวน้อย จะทำให้การใช้เครื่องบำบัดน้ำเสียมีประสิทธิภาพมากขึ้น เนื่องจากการลงทุนด้านการบำบัดน้ำเสียหรือการกำจัดขยะมูล ได้ใช้ปริมาณของเสียในฤดูท่องเที่ยวชุกเป็นเกณฑ์ในการลงทุน นอกจากนี้ในช่วงเดือนดังกล่าว ยังมีสภาพธรรมชาติ (น้ำฝน) ช่วยในการเจือจางน้ำเสียที่ถ่ายเทลงสู่ทะเลหรือทางน้ำ การประชาสัมพันธ์ให้นักท่องเที่ยวช่วยรักษาสภาพแวดล้อม (Eco-Tourism) ก็เป็นวิธีที่อาจช่วยลดต้นทุนการรักษาสภาวะแวดล้อมได้วิธีหนึ่ง

The Environment in a Tourist Economy: A Case Study of Pattaya

1. INTRODUCTION

Tourism has made crucial contributions to the development of the Thai economy. The tourism industry has generated many employment opportunities and social benefits. It has also been a major source of revenue and foreign exchange earnings for Thailand since 1982. Today, Thailand is one of the world's most popular holiday destination. Revenue from tourism increased from 21 billion baht in 1981 to 110 billion baht in 1990. The number of international tourists grew from 2 million to 5.2 million over the same period.

This growing and enormous trade in tourism has not been achieved without far-reaching environmental consequences. To a large degree, Thailand has based the growth of tourism on the exploitation of natural resources. For over two decades, tourism development proceeded ad hoc, responding to demand with little or no planning or coordination. As a result, pollution and environmental degradation are unnecessarily present at a number of major tourist destinations. In some tourist resorts, the severity of environmental degradation is so severe that it has brought about a decline in tourism.

As tourism's impact on the environment is more and more the tourism industry's major problem for maintaining growth or in maintaining the status quo. The appropriateness of existing tourism policy has become an important development issue in recent years. Whether the industry should shift its pattern of growth from quantity to quality, i.e., from

exploiting to maintaining the natural systems which the industry itself is dependent on, will depend on the costs of shifting to an alternative policy.

This study took Pattaya, the most famous and popular beach resort in Thailand, as a case study to explore the consequences of environmental degradation and its impacts on the tourist industry. It is expected that the findings from this study will provide policy insights for the future direction of tourism development.

1.1 Study Objectives

The objectives of the study are as follows:

(1) to examine tourism's impact on the environment in Pattaya,

(2) to assess the gains from tourism growth and costs of environmental degradation and protection in Pattaya and

(3) to provide policy insights for the future direction of tourism development.

1.2 Study Methodology

This study is descriptive policy research. The impact of the May 17-20 political unrest and violent on tourism prevented the gathering of unbiased new primary data and necessitated the analyses and estimations be mainly based on secondary data. Most of the tourism data were obtained from the Annual Statistical Report on Tourism in Thailand and Annual Survey Report on Tourism in Thailand prepared by the Tourist Authority of Thailand (TAT). Unless noted the source for all tables are these two works. Field observations and a telephone-interview survey on the current tourism situation and on the private costs of wastewater treatment in Pattaya were conducted by the author to supplement TAT data. The field observations and phone survey took place in August 1992 and the entire study took three months, from August to October 1992, to finish.

1.3. Presentation

The report is organized into six sections. Section 2 describes Pattaya's tourist economy and assesses its importance in terms of revenue and foreign exchange earnings, to the tourist sector and to the Thai economy. Section 3 examines the impact of tourism on Pattaya's natural environment. Section 4 estimates the costs of environmental degradation and protection and relates these costs to the tourism industry of Pattaya. Section 5 concludes the

study with an analyses and discussion of the findings and their implications for tourism development policy.

2. PATTAYA'S TOURIST ECONOMY

2.1 Overview of the Study Area

Pattaya is a coastal resort city on Thailand's east coast, about 150 kilometers southeast of Bangkok. Pattaya can also be geographically described as a 25 kilometer long coastal strip which contains about 36 square meters of land and 172 square meters of sea. Pattaya's climate and location are defined as tropical rain forest. However, the climate is favorable all year round, making it an ideal beach resort location. Pattaya is famous not only for its calm seas and delicate, beautiful beaches but also for its well established tourist facilities and the variety of tourist entertainment venues.

Pattaya's tourist areas are all located within two or three kilometers of the coast. There are four primary areas of development and of tourist importance in Pattaya: Na Klua, Pattaya Beach, Jomtien Beach and Ko Lan

Na Klua, a residential area, is the old downtown area of Pattaya. The shore area in Na Klua is a mud flat, and therefore, not attractive for swimmers or most tourists. Settlements are on the banks of Na Klua River and in its vicinity. Many squatters reside near the swamps that are close to the sea. Industrial establishments, such as tapioca factories, vehicle-repair shops, a boat-repair yard, furniture factories, sawmills, as well as building material factories, exist in this small community. Among these establishments, there is a college, temples, schools and other public facilities, such as a tax office, a postal office, a fire station and a police station.

Pattaya Beach has a beautiful curving coastline, about four kilometers in length. It is the major tourist area of Pattaya City. The bay and beach are extensively used for recreation. There is a road running parallel to the beach from north to south. The northern end is the quietest section of the resort, while the southern end is lively where most of the tourist facilities, such as souvenir shops, restaurants, discotheques, beer bars and night clubs line both sides of the beach road. During the day all types of water sports and excursion boats are available to tourists.

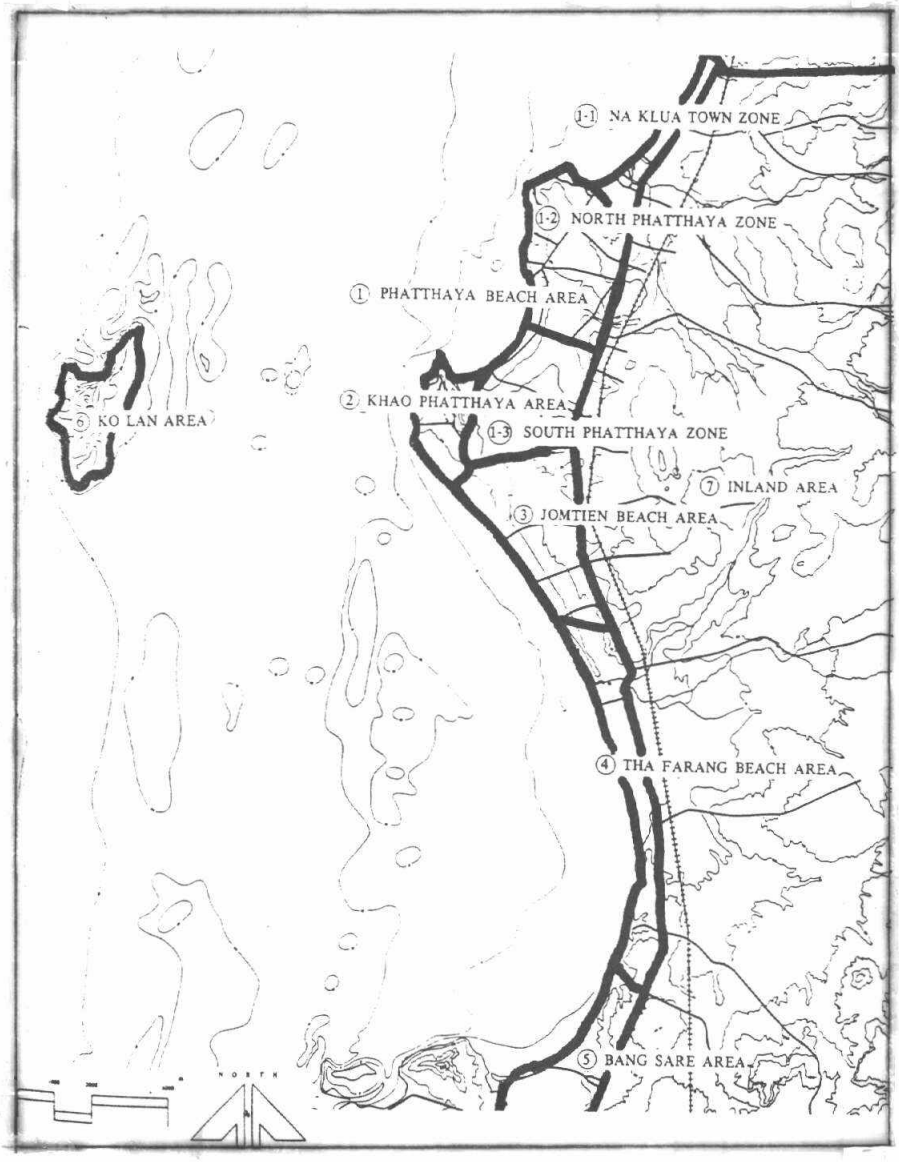

Figure 1 The Study Area

Source: JICA (1990)

Jomtien Beach lies immediately south of Pattaya Beach. This beach is about 6 kilometers long. Jomtien beach is now the more popular beach for watersports and wind surfing as there is less water traffic and pollution than at Pattaya Beach. Development, which extends about 7 kilometers along the coast, consists of hotels, bungalows, high and low rise condominiums, shops, etc.

Ko Lan is a small island (4 square kilometers in area) offshore from Pattaya Beach. It takes 45 minuets by ferry or 20 minutes by speed boat from Pattaya beach to reach Ko Lan. The island is a popular destination for day-trips from Pattaya. Apart from its relative tranquillity, white and sandy beach, major tourist attractions on the island include viewing coral reefs from glass-bottom boats, snorkeling, wind surfing, parasailing, and scuba diving. Many seafood restaurants are available on the island.

2.2 Pattaya's Tourist Economy

Prior to 1960, Pattaya was a small fishing village with a small population. Agriculture, mainly tapioca plantation and fishing were the major sources of income. The calm sea of Pattaya Bay was mainly used by local fishermen as a shelter from strong winds and waves during the Monsoon season. In the 1970s, tourism suddenly became an important economic force that presaged Pattaya's current tourist based economy. The major source of employment has gradually changed from agriculture and fishing to commerce and services. Today, the tourism sector is the mainstay of Pattaya's economy, providing most of the job and income opportunities for the area. In 1991, Pattaya's registered population was 57,366, with a further 100,000 non-registered residents. The annual population growth rate was 6.2 percent (1982-1991). Based on the 49.3 percent employment rate in 1987, 77,000 of these 157,000 were officially employed (see JICA 1990, pp. 43, 68). The sectoral distributions for 1991 are presented in Table 1.

As shown in Table 1, about 75.2 percent of the employed population was engaged in the commercial and service industries. These represent the tourism sector in Pattaya, and reflect the importance of tourism to Pattaya's economy. Other sectors, such as transport, fisheries and agriculture, together account for only 24.8 percent of Pattaya's total employment.

Table 1 1991 Sectoral Employment, Pattaya

Sector	Employment	Sector as % of Total
Service	43,445	56.0
Commercial	14,895	19.2
Agriculture Fishery	1,862	2.4
Transport	2,793	3.6
Production Procession	10,241	13.2
Clerical	1,552	2.0
Others	2,793	3.6
Total	77,581	100.0

Source: TAT

Tourism in Pattaya is not only important to the economy of Pattaya, it also represents an important source of foreign exchange earnings for Thailand. Data presented in Tables 2 and 3 support the contention that Pattaya is the most important international beach resort in Thailand, with respect to expenditure flows.

International tourists visits to Pattaya as a percentage of the total international tourists visits to Thailand for the period 1985-1990 are shown in Table 2. During this period, an average of 30.7 percent of the international tourists visiting Thailand, visited Pattaya each year.

Table 2 Number of International Tourist Arrivals in Thailand and Pattaya 1985-1990

Year	Thailand	Pattaya	Pattaya as % of Total
1985	2,438	562	23.1
1986	2,818	634	22.5
1987	3,483	1,012	38.1
1988	3,483	1,256	38.2
1989	4,231	1,294	33.1
1990	5,299	1,252	28.9

Source: TAT

Table 3 Foreign Guest Arrivals at Accommodation Establishments in Major Cities of Thailand , 1984-1989

Year	1984	1985	1986	1987	1988	1989
Total	1,287,869	1,467,696	1,785,840	2,517,758	3,076,102	3,331,523
(%)	100.0	100.0	100.0	100.0	100.0	100.0
Chiang Mai	161,451	215,600	268,129	352,376	418,249	501,873
(%)	12.5	14.7	15.0	14.0	13.6	15.1
Kanchanaburi	10,000	8,021	25,601	37,479	40,822	54,618
(%)	0.8	0.6	1.4	1.5	1.3	1.6
Pattaya	471,800	562,434	633,624	1,012,181	1,255,517	1,293,847
(%)	36.6	38.3	35.5	40.2	40.8	38.8
Phuket	144,601	156,174	253,731	334,889	509,322	523,013
(%)	11.2	10.6	10.1	13.3	16.6	15.7
Hat Yai	360,239	389,324	445,362	601,718	705,721	758,759
(%)	28.0	26.5	24.9	23.9	22.9	22.8
Sungai Kolok	139,778	136,143	159,393	178,575	185,710	199,413
(%)	10.9	9.2	8.9	7.1	6.0	6.0

Source: TAT.

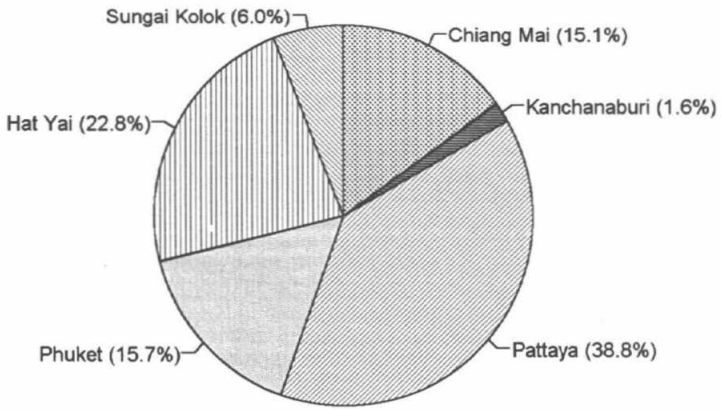

Figure 2 Guest Arrivals in Major Cities in Thailand, 1989

Foreign guest arrivals for all types of accommodation establishments for major tourist cities (excluding Bangkok), in Thailand for the period 1984-1989 is presented in Table 3 and Figure 2. Pattaya, among Thailand's six major international tourist cities, hosted the largest number of international tourists during this period. Foreign guest arrivals for 1989 are

graphically presented in Figure 2. In 1989, Hat Yai and Phuket ranked second and third to Pattaya's 38.8 percent share, with 22.8 percent and 15.7 percent of the total number of international tourists visiting the six cities.

2.3 Tourism Growth and Development

As described earlier, in the 1960s, tourism was not an important economic force in Pattaya. Agriculture and fisheries were the major sources of employment. Pattaya's potential as a beach resort was perhaps first recognized by US. military personnel from the Sattahip and Utapao US army bases, located 30 kilometers to the south of Pattaya. During the Viet Nam War, US. military personnel who visited or worked in Thailand, often spent their vacation time at Pattaya. Statistical data on the number of visitors to Pattaya during the 1960s are not available. Estimates are that there were at least 30,000 to 70,000 US. military personnel visiting Pattaya each year, from 1966-1971 (JICA 1977, pp. 2.24-2.26). At that time Pattaya had no tourist hotels and facilities. US. military personnel were reported to have rented bungalows from wealthy Thai officials near the south end of Pattaya beach.

The conscious development of Pattaya from a small fishing village into an international beach resort began in the 1970s, accompanying and contributing to Thailand's tourism boom. In addition to US. military personnel vacationing in Pattaya, other visitors to Pattaya during this early period were primarily from the wealthy class. Tapioca plantations and tapioca processing factories in and near Pattaya gradually gave way to tourism development, in the form of bungalows, food stores and souvenir stands. In only two decades, Pattaya was transformed from a fishing village into a world-famous beach resort.

The number of Thai and foreign tourists arrivals at hotels in Pattaya for the period 1973-76 is presented in Table 4. These numbers range from 279,000 to 400,000 of which over 90 percent were foreigners.

The Tourist Authority of Thailand's (TAT) figures for tourists arrivals in Pattaya for the period 1979-1990 are shown in Table 5 and Figure 3. Beginning from the late 1970s, tourist visits to Pattaya increased rapidly. From 1979 to 1990, the number of tourists visiting Pattaya increased fourfold, from about 386,000 to 1.8 million. International arrivals alone increased by nearly a factor of three between 1982 and 1990, from 450,000 to 1.3 million. The number of Thai tourists during the same period also increased by a factor of three. Overall, the major trend of tourist growth in Pattaya in the 1980s can be summarized as

Table 4 Tourist Hotel Arrivals, Pattaya 1973-75

Year	Total	Thai	Foreign
1973	279,278	14,997	264,281
(%)	100.00	5.40	94.60
1974	363,815	23,972	339,843
(%)	100.00	6.60	93.40
1975	40,000	26,400	373,600
(%)	100.00	6.60	93.40

Source: TAT

Note: Source is TAT 1976. Data for 1973 and 1974 are actual counts from 19 major hotels in Pattaya. Data for the year 1975 are estimates based on a count of 254,066 tourists from 7 hotels.

Table 5 Tourist Arrivals, Pattaya 1979-7990

Year	Thai	Foreign	Total
1979	-	-	386,439
1980	-	-	476,563
(% change)	-		23.3
1981		-	505,804
			6.1
1982	150,000	450,000	600,000
			18.6
1983	162,000	432,000	594,000
	8.0	(4.0)	(1.0)
1984	211,000	471,000	682,000
	30.2	9.0	14.8
1985	234,000	562,000	796,000
	10.9	19.3	16.7
1986	494,736	640,750	1,135,486
	111.4	14.0	42.6
1987	755,493	969,032	1,724,525
	52.7	51.2	51.9
1988	694,373	1,276,562	1,970,935
	(8.1)	31.7	14.3
1989	607,789	1,316,659	1,924,448
	(12.5)	3.1	(2.4)
1990	475,520	1,275,735	1,751,255
	(21.8)	(3.1)	(9.0)

Source: TAT

Note: Figures in parentheses are negative.

having an average annual growth rate, in number of total tourists, of 16 percent. The particularly high increase in 1987 was most likely the result of the international promotional campaign, "Visit Thailand Year," held in that year. The increase in the number of Thai tourists has been even greater than that of international tourists.

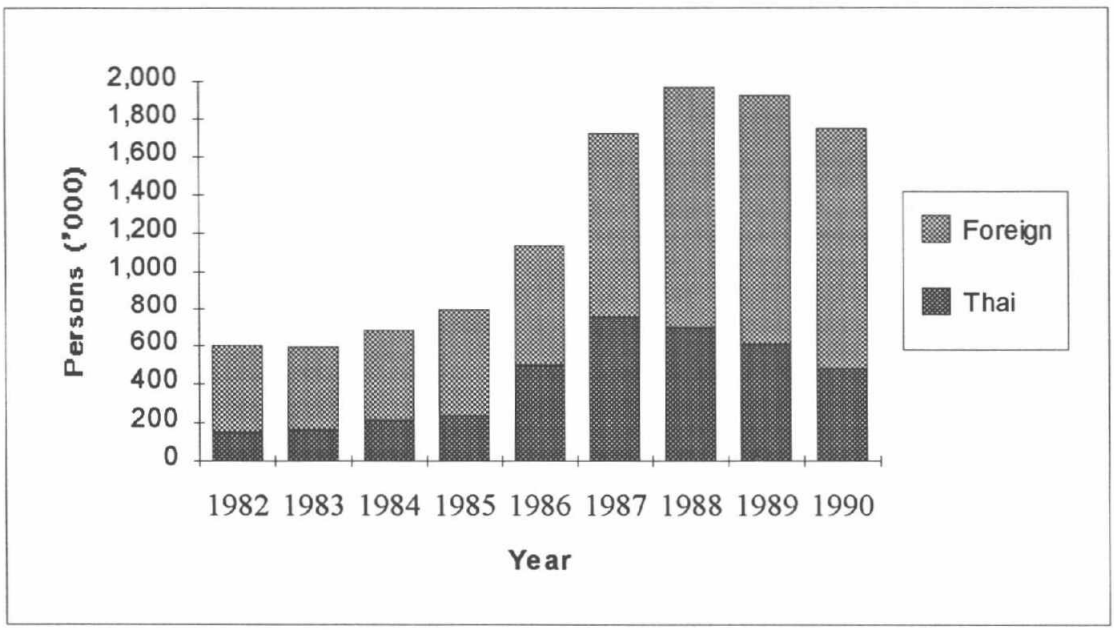

Figure 3 Tourist Arrivals, Pattaya 1982-1990

Average annual growth rates were 21.4 percent for Thai tourists and 15.2 percent for foreigners. From 1979 to 1987, the number of Thai tourists grew every year. In 1988 Thai tourist visits began an accelerating decline, so that by 1990 fewer Thais visited Pattaya than in 1986. The growth trend for international tourists followed a similar pattern to that of Thai tourists, except that the decline began one year later.

As described earlier, international tourists have accounted for the greatest percentage of the total number of tourists visiting Pattaya. By 1990, they accounted for 67 percent of total tourists. For a period in the late 1980's foreign tourists accounted for less than 57 percent. Foreign tourists currently account for a percentage that is almost 30 percent less than the share reported in the 1970s.

Pattaya is only 3 hours by car from Bangkok and is surrounded by many other tourist attractions, making it a popular destination for day-trips. The annual number of travelers (visitors who do not stay over night, i.e., day-trappers) to Pattaya for the period 1986-1990 are presented in Table 6.

Table 6 Travelers Arrivals, Pattaya 1986-1990

Year	Thai	Foreign	Total
1986	566,584	11,185	577,769
1987	697,365	13,491	710,856
(% change)	23.1	20.6	23.0
1988	933,648	156,271	1,089,919
	33.9	1,058.3	53.3
1989	701,682	141,557	843,239
	(24.8)	(9.4)	(22.6)
1990	542,859	153,334	696,193
	(22.6)	8.3	(17.4)

Source: TAT

Note: Figures in parentheses are negative values.

The number of travelers visiting Pattaya per year is about two times less than that of tourists for the same period. In 1986, which is the first year that TAT began to record the number of travelers to Pattaya, there were 577,000. These increased to 711,000 in 1987 and 1,089,000 in 1988, with annual growth rates of 23.1 percent and 53.2 percent respectively. From 1988 onward, the numbers of travelers to Pattaya decreased to 843,000 in 1989, and to 696,000 in 1990. The annual decreases were 22.6 percent and 17.4 percent respectively. As expected, travelers to Pattaya are primarily Thai. On average, Thai travelers account for as much as 88.6 percent of the total number of travelers who visit Pattaya each year.

TAT data for 1991 and 1992 tourists visits to Pattaya are not yet available. However, based on information from tourist related businesses, via a telephone-interview survey and informal interviews conducted by the author in August 1992, the number of tourists and travelers to Pattaya in 1991 may have decreased by as much as 20 percent, from that of 1990.

Most hotel and restaurant managers also expressed concern that this year's tourism business in Pattaya will be significantly less than last year's, which suffered from the international decline in tourism due to the Gulf War. Currently, Pattaya's (and Thailand's) tourism sector have yet to recover from the May 17-20, 1992, political unrest and violence that occurred in Bangkok. Many also believe that the number of tourists and travelers to Pattaya in 1992 could be as low as 50 percent of the low number of visitors who came in 1991. "Crisis" is the word that many used to describe the condition of Pattaya's tourism industry.

Table 7 Tourist Accommodation Establishments, Pattaya 1980-1990

Year	Establishment	Room
1980	31	3,784
1981	103	6,582
1982	124	7,642
1983	152	8,647
1984	170	9,720
1985	195	10,504
1986	198	10,696
1987	201	11,262
1988	259	14,297
1989	316	18,097
1990	323	19,433

Source: TAT

As previously discussed, it took only two decades to transform Pattaya from an unknown fishing village into a world-famous beach resort. In the 1980s, Pattaya became a leading international beach resort destination. This beach resort's rapid development derived mainly from private sector investments. Tourist class hotels, as well as restaurants, night clubs, beer bars and other tourist facilities, were quickly constructed on Pattaya's coast. Table 7 details the number of tourist accommodation establishments for the years 1980 to 1990.

Within the brief period of ten years, the number of accommodation establishments in Pattaya increased over tenfold. This growth was primarily demand driven. The growth in tourist accommodations, has no doubt been accompanied by an increase in the supply of other tourist facilities and services. In 1992, Pattaya boasted over 27,000 hotel rooms and a large number of tourist catering facilities. Despite the development of other marine resorts, such as Hua-Hin, Cha-am, Phuket and Samui, Pattaya's short distance from Bangkok and well established tourist accommodations and services have allowed it to remain the most popular international beach resort in Thailand.

The pace of tourism development in Pattaya has been rapid. The development, however, has been impulsive and poorly organized. Pattaya's water and beaches are intensively used for recreation and entertainment, without effective land use controls and/or adequate infrastructural facilities. Tourist class hotels, as well as restaurants, night clubs, bars and other tourist facilities, are found in a disorderly fashion along the shoreline. Hotel constructions in Pattaya, as in most of Thailand, have not been developed systematically and with few land use regulations. Investors choose the hotel site, decide on the number of rooms,

the structure and the height of the hotel with little consideration for the impact on others or the community. At south Pattaya, there are more than one hundred illegally constructed restaurants and shops, occupying an 800 meters long stretch. These, and many of the legal establishments, discharge untreated waste water directly into the sea. This pattern of tourism growth has resulted in adverse effects on the marine water, the coastline and on the beaches. Such effects have produced both immediate problems and serious long-term consequences for the tourism industry, the community and for the environment.

2.4 Tourism Revenue

Pattaya's tourism sector has generated substantial revenues for both Pattaya's and Thailand's economies. Pattaya's tourism sectors annual revenues were estimated for the period 1986-1992, and are presented in Table 8 (appendix A describes the estimation methodology).

Table 8 Tourism Sector Revenues, Pattaya 1986-1990

Year	Thai		Foreign		Grand
	Tourist	Traveler	Tourist	Traveler	Total
1986	504,348	239,756	3,793,838	20,998	4,558,940
1987	1,074,354	315,746	6,682,992	27,274	8,100,366
1988	933,648	525,812	12,803,334	221,105	14,681,982
1989	701,682	387,952	14,820,745	208,506	16,740,435
1990	542,859	415,477	15,586,324	213,934	17,285,652

Note: See appendix A.

In 1986, the total revenue generated from Pattaya's tourism sector was estimated to be 4,559 million baht. This increased almost fourfold within five years to 17,285 million baht. Since international tourists account for almost two-thirds of the total tourists who visit Pattaya, revenues from the tourism sector are a major contributor to Thailand's foreign exchange earnings.

To account for price inflation, nominal revenues were adjusted, using a 1986 general price index (1986=100), from the March 1990 Bank of Thailand Quarterly Bulletin (Vol. 30, No. 3). These real revenues are presented in Table 9. The changes in real growth rates are not small. Between 1986-1988, real revenue from the tourism sector grew at an average annual

rate of 74 percent per year. In 1988, real revenue grew at a more modest 8.2 percent and in 1989 decreased by 2.6 percent.

Table 9 Revenue Change in Pattaya Tourism 1986-1990 (1,000 baht)

Year	Nominal Value	Real Value
1986	4,558,940	4,558,940
1987	8,100,366	7,896,678
(% change)	77.7	73.2
1988	14,681,982	13,798,852
	81.3	74.7
1989	16,740,435	14,933,483
	14.0	8.2
1990	17,285,652	14,550,212
	3.3	(2.6)

Pattaya's tourism generated real revenues and those for the whole country for the period 1986-1990 are presented in Table 10. Revenue generated by Pattaya's tourism sector contributed significantly to foreign exchange earnings. In 1986, these revenues accounted for over 10 percent of the total real tourism revenues for the country. This proportion grew by 2 percent per year until 1989 when it decreased by 2 percent in 1990. On average, Pattaya's tourism sector real revenues accounted for approximately 16 percent of Thailand's total tourism sector real revenue.

Table 10 Real Revenue from the Tourism Sector of Thailand and Pattaya 1986-1990 (million baht)

Year	Thailand	Pattaya	Pattaya as % of Thailand
1986	37,321	4,559	12.2
1987	50,024	8,100	16.2
1988	78,859	14,682	18.6
1989	96,386	16,740	17.4
1990	110,572	17,286	15.6

3. POLLUTION AND ENVIRONMENTAL DEGRADATION IN PATTAYA

Coastal environments are one among the many types of fragile natural environments. Human action without proper planning and care upsets the ecological balance of these areas. Worldwide evidence has shown that costly and/or irreversible environmental and economic effects are typical consequences of inadequate development planning.

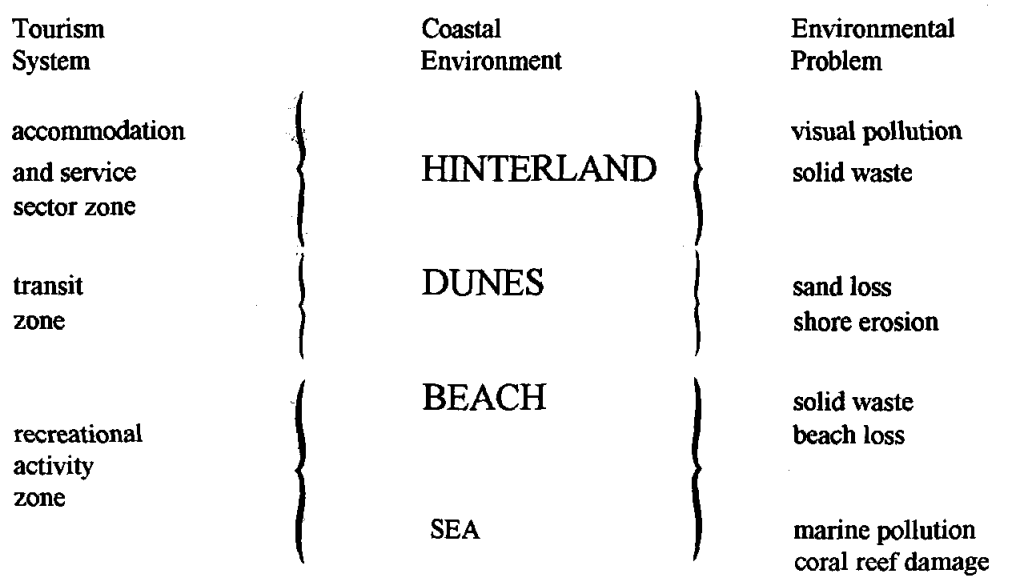

Figure 4 The Tourism System, Coastal Environment and Environmental Problems in Pattaya

In Pattaya, tourism development without planning and the provision of infrastructural facilities has brought various forms of both pollution and environmental degradation. Four major problems will be examined in this study: (1) marine pollution, (2) solid waste pollution, (3) beach loss and coastal erosion and (4) coral reef damage. The extent of these problems are presented below.

The coastal environment of Pattaya can be divided into four major zones: hinterland, dunes, beach and sea. The tourism system, the four zones of the coastal environment, together with potential environmental impacts, are schematically presented in Figure 4.

Table 11 Waste Water Volume Generated in Pattaya 1986-1990

Year	Waste Volume (cum/d)										
	Domestic	Public	Tourist Accommodation				Commercial		Industrial	Total	
			Hotel		Condominium						
	(a)	(b)	Avg. occ. (c)	Peak occ. (d)	Avg. occ (e)	Peak occ. (f)	Avg. (g)	Peak (h)	(i)	Avg. (a+b+c+e +g+i)	Peak (a+b+d+f +h)
1986	16,510	2,476	4,706	8,557	266	839	2,585	4,886	3,180	29,723	36,448
1987	24,179	3,627	5,586	9,010	266	839	3,043	5,121	3,180	39,881	45,956
1988	25,953	3,542	7,206	11,437	290	912	3,898	6,421	3,180	44,069	51,445
1989	24,312	3,647	8,397	14,477	290	915	4,517	8,004	3,180	44,343	54,535
1990	26,075	3,911	8,399	15,554	3,878	12,604	6,384	14,642	3,180	51,827	75,996

Note: See Appendix B.

3.1. Marine Pollution

3.1.1 Volume of Wastewater Generated

Marine pollution from the discharge of inadequately treated effluent originating from coastal areas is the most severe environmental problem experienced in Pattaya. There are five principal sources of wastewater: residential, public, tourist (hotels and condominium), commercial and industrial. Table 11 shows estimates of the peak season and the average total daily quantity of wastewater generated in the three principal sewage catchment areas of Na Klua, Pattaya, and Jomtien, from 1986 to 1990 (see Appendix B for the wastewater volume estimation methodology). The peak season and average biological oxygen demand (BOD) loads of the quantity of wastewater generated are also presented in Tables 12 and 13.

Within a period of five years, the volume of wastewater increased twofold corresponding to the increase in the number of tourists. The average daily wastewater were 29,723 cubic meters/day for 1986 and 51,827 cubic meters/day for 1990. For the peak season, they were 36,448 and 75,996 cubic meters/day respectively. The average quantity is about 71 percent of that for the peak season. The peak season volumes determine wastewater treatment plant design and cost estimations. The quantity of wastewater and BOD loads generated in Pattaya follow the same pattern as Na Klua. In general, standard of living improvements and technological progress lead to higher water consumption rates. Therefore, the volume of wastewater generated in the future is expected to increase at a faster rate than that shown in Tables 11-13.

To show that the tourist industry is the major source of wastewater in Pattaya, estimates of wastewater volumes were disaggregated to wastewater from the residential, tourist and industrial sectors. The volume of wastewater generated by the residential sector was estimated using the information that the employment rate reflects 49 percent of the total population and that 75.2 percent of the total employed population is engaged in the tourist sector (see Table 1). Tourist sector wastewater originates from public facilities, hotels, condominium and tourist related commercial activities. These disaggregated wastewater sources and their volumes are presented in Table 14.

For the period from 1986-1990, on average, the volume of wastewater per day generated by the tourist sector accounted for 65.5 percent of total wastewater volume. The industrial sector in Pattaya, which is comprised of mainly tapioca processing and the fishing

industry, is declining as a result of more attractive investment and employment prospects in the tourism sector, and is, therefore, expected to generate even less wastewater in the future. The volume of wastewater from the industrial sector accounted for only 6.4 percent of the total wastewater volume. Wastewater from the residential sector was 28.2 percent of the total.

It is evident that, Pattaya's tourist sector generates the largest share of total wastewater volumes. As the current capacity for sewage treatment facilities in Pattaya is inadequate to treat the daily volume of wastewater, the polluted sea water can be attributed primarily to the tourist sector.

Table 12 Average Biological Oxygen Demand (BOD) Load Generated in Pattaya, (Kg./day) 1986-1990

Year	Avg. for Domestic	Avg. for Hotel	Avg. for Industry	Total Avg. Load
1986	3,276	8,557	954	11,833
1987	4,667	9,010	954	13,677
1988	5,052	11,437	954	16,489
1989	4,915	14,477	954	19,392
1990	6,037	1,554	954	7,591

Source: See Appendix B.

Table 13 Peak Biological Oxygen Demand (BOD) Load Generated in Pattaya, (Kg./day) 1986-1990

Year	Peak for Domestic	Peak for Hotel	Peak for Industry	Total Peak Load
1986	3,707	1,711	954	6,372
1987	5,065	1,802	954	7,821
1988	5,524	2,287	954	8,765
1989	5,532	2,895	954	9,381
1990	8,585	3,111	954	12,650

Source: See Appendix B.

Table 14 Wastewater Volume Generated by Sector 1986-1990

Year	Residential	Tourist	Industrial	Total
1986	10,236	23,032	3,180	36,448
1987	14,991	27,785	3,180	45,956
1988	16,091	32,174	3,180	51,445
1989	15,073	36,282	3,180	54,535
1990	16,167	56,650	3,180	75,997

Note: Calculated from table 11.

3.1.2 Sewage Treatment Facilities in Pattaya

Prior to 1984, Pattaya had no sewage treatment plants. There was only a simple and primitive public sewage system at the estuary of Na Klua River. The system consisted of pits and drainage ditches along the roads and streets. Sanitary wastewater ran to the waterway or to the sea via these ditches. At most Pattaya beach resorts, there were no sewage systems. A few large hotels had their own wastewater treatment plants. Other establishments, such as restaurants, shops and households, discharged their wastewater directly to the ground or to the sea.

The first public sewage treatment plant in Pattaya was constructed and began operation in 1984. The system was an activated sludge type with a capacity for treating 1,500 cubic meters of wastewater per day. Due to a number of factors, the system ceased to function after one year. In 1986, Pattaya built a second central sewage treatment plant using rotary biological contractor (RBC) technology. The system's capacity is 4,000-6,000 cubic meters of wastewater per day (or about 1,410 kg BOD/day at 92 percent efficiency).

Based on estimates of wastewater volume generated in Pattaya for the period 1986-1990 (presented in Table 11), the percentage of treated wastewater in Pattaya was never more than 17 percent and averaged, for the five years, 12 percent of the total wastewater volume generated (Table 15).

The percentage of daily treated wastewater in 1986 ranged from 11.0-16.5 percent of the total daily wastewater volume generated. These percentages declined over the next five years, as the capacity of the sewage treatment plant remained fixed, while the daily volume of

Table 15 Treated Wastewater Volumes, Pattaya 1986-1990

Year	Total Wastewater	% Treated (at 4,000 cu.m/day)	% Treated (at 6,000 cu.m/day)
1986	36,448	11.0	16.5
1987	45,956	8.7	13.1
1988	51,445	7.8	11.7
1989	54,535	7.3	11.0
1990	75,996	5.3	7.9

Note: cu.m/day = cubic meters per day

Table 16 Volume of Treated Biological Oxygen Demand (BOD) Loads, Pattaya 1986-1990

Year	Total BOD Loads (kg./day)	% Treated BOD Loads (kg./day)
1986	6,372	22.1
1987	7,821	18.0
1988	8,765	16.1
1989	9,381	15.0
1990	12,650	11.1

wastewater generated increased with population and tourism growth. The treated quantity per day in 1990 was as low as 5.3-7.9 percent of the total daily wastewater volume generated.

The amount of daily treated wastewater in terms of BOD loads was also a small percentage of the total daily BOD loads generated. Estimates of daily treated BOD loads in Pattaya for the period 1986-1990 are presented in Table 17. The estimates show that in 1986, the sewage treatment plant in Pattaya treated only 22.1 percent of the total BOD loads. In 1990, the daily treated quantity declined to half of that treated in 1986, due to population and tourism growth. On average, the plant can treat only 16.5 percent of the total BOD loads generated in the area.

It is evident that there have been large quantities of raw sewage discharged into the sea. Sea water pollution in Pattaya has increased rapidly in recent years. A review of Pattaya's sea water quality in the next section confirms this.

Table 17 Water Quality, Pattaya 1992

Sample station	PH	SS (mg/l.)	DO (mg/l.)	BOD (mg./l.)	Coliform Total (MPN/100 ml.)	Fical
Pattaya River						
- middle	6.98	7	-	16.6	24×10^{12}	27×10^{10}
- end	6.99	10	-	13.7	17×10^{10}	4×10^{10}
- estuary	8.20	15	-	1.4	80	4
Pattaya Beach						
- Wong-Amert Hotel	8.26	38	6.9		300	300
- Soi Ping-pa	8.43	67	5.7	-	90	90
- Dusit Resort Hotel	8.42	23	6.5	-	2,400	2,400
- Pattaya Soi 6	8.50	16	6.8	-	2,200	110
- Central Pattaya	8.61	32	7.0	-	900	900
- Sailing Yacht Club	8.31	55	6.4	-	1,100	1,100
- Thai Panit Bank	8.04	22	6.4	-	900,000	900,000
- Pattaya River Estuary	8.26	6	7.7	-	240,000	30
- Royal Cliff Hotel	8.20	7	6.2	-	3,300	330
Jomtien						
- Thep-Prasit Road	8.30	33	5.9	1.3	50	50
- Mermaid Hotel	8.24	34	6.2	1.9	17	17
- Grand Jomtien Palace Hotel	8.25	63	6.0	2.4	1,600	1,600
- Soi Chaiyapruk	8.25	17	5.8	1.3	3,300	30
Na Klua						
- New Pier	7.90	177	7.8	4.2	1,700	11
- Market	7.00	35	8.0	325.0	240,000	130,000
- Bangkok Palace Hotel	8.40	13	5.6	2.2	200	< 2
- Krating Canal	8.50	26	1.5	1.5	2,400	< 2
- Rongpo Village	7.20	182	6.6	6.4	2,400	9

Source: ONEB (1992)

Note: SS: Suspended Solids
DO: Dissolved Oxygen
BOD: Biological Oxygen Demand

3.1.3 Sea Water Quality

Although there were no sewage treatment plants in Pattaya in the 1970s, the sea water in the coastal area of Pattaya was not yet polluted, primarily due to the small population and low number of visitors. In 1976, survey teams from ONEB and Japan International Cooperation Agency (JICA) conducted water quality surveys along Pattaya's shoreline. They reported that the sea water along the shoreline was not in a condition that was characteristic of the best ocean resorts. The sea water as a whole was not seriously deteriorated. However, the river mouth of Na Klua was highly polluted due to the high BOD effluent from tapioca processing factories and domestic wastewater. Waste materials were also heavily deposited on the bottom of the waterway and in the Na Klua estuary.

Coliform surveys were also conducted in 1976-1977. Coliform, from human excreta and including other enteric pathogens, is good indicator of the effects on the marine environment from human activities. Coliform surveys indicated that the direct discharge of domestic wastewater was becoming a serious problem for tourism development. The number of coliform bacteria found near the Na Klua and Pattaya rivers exceeded 1,000 MPN/100 ml, the standard value for coastal water quality considered safe for swimming and other water activities. Some samplings were as high as 1,600, 2,400, and 6,000 MPN/100 ml. The research team also stated that disorderly tourism development and inadequate infrastructure pose even more serious problems for the near future and measures should be taken to address these problems as soon as possible. The survey team proposed a development plan for Pattaya which would cost of 9,194.9 million baht, of which 430.5 million baht was for sewage system treatment plants for the three catchment areas of Pattaya.

Water quality surveys conducted by ONEB in 1978 and 1984 reported similar results to those found above, according to water quality indicators such as measure of the alkalinity and acidity of a solution of water (PH), the quantity of dissolved oxygen (DO), biological oxygen demand (BOD) and suspended solids. The number of coliform bacteria found in the coastal water of Na Klua and Pattaya Beach, (especially the area in front of Siam Bayshore Hotel, Pattaya River mouth, Pattaya Yacht Sailing Clubs and south Pattaya) had increased and spread rapidly within a ten year period. The highest numbers of coliform bacteria found at the same sampling stations along Pattaya Bay increased from 6,000 MPN/100 ml in 1976 to 11,000, 22,000 and 240,000 in 1978, 1984 and 1986 respectively.

The 1986 survey found DO content for areas of the Pattaya River to be zero (the DO standard set for sea water quality is a minimum of 4 mg/l). The value of BOD had increased to 5.25 mg/l in ambient water and 23.4 mg/l at effluent discharging points (the BOD standard for ambient water quality is less than or equal to 2 mg/l). The BOD for sea water in front of the Siam Bayshore Hotel was found to be as high as 23.4 mg/l. On average, about 58.9 kg. of BOD loads is discharged into the sea near the mouth of Pattaya River every day.

The 1987-1988 survey results concluded that the quality of sea water along the coastline of Pattaya had deteriorated, in terms of suspended solids and total coliform, to levels that were unsafe for swimming. Coliform counts were as high as 1,600,000 MPN/100 ml at the mouth of Pattaya River. In addition large quantities of garbage obstructed the flows of both the Pattaya River and Na Klua River, as well as emitting strong odors. Suspended solids were also found spread on the beaches and shoreline of Pattaya, in quantities exceeding the current standards (i.e., 30 mg/l). Since 1987, the pollution of Pattaya's sea and beaches has been the increasing focus of newspaper, magazines and other mass media reports, both domestic and international.

In 1990, the ministerial cabinet approved a plan proposed by the Ministry of Science, Technology and Energy to combat the problems of Pattaya's marine pollution. A number of projects for improving the condition of Pattaya were studied. In 1992 the National Environment Committee under the chairmanship of Prime Minister Anand Panyarachun approved an act to designate Pattaya and Phuket as the two first areas of environment and pollution control, in Thailand. This act has prompted an additional water quality survey whose results are summarized below and in Table 17.

The condition of marine pollution in the Na Klua area is most serious. The water of Na Klua River is no longer suitable for domestic use as is indicated by (but not limited to) its unpleasant black color and very strong odor. The shoreline is highly polluted by solid waste dumpings and the large volume of wastewater originating from the community, Na Klua Market and fishing piers.

The Pattaya River is also seriously polluted, primarily due to domestic wastewater discharging from illegal settlements on both river banks and hotels and restaurants. Garbage dumping and siltation have further worsened the condition of the river. A sand dam was recently built to prevent polluted river water from flowing into the sea. The river water is now pumped to a central sewage treatment plant at Soi Pattaya 17 to improve its quality before entering Pattaya Bay.

The condition of Pattaya Beach is no better than that of Pattaya River. The major cause of marine pollution in this area is due to the large quantities of wastewater directly discharged (via a storm water drainage system) from hotels, restaurants and buildings constructed on the seaboard of Pattaya.

At Jomtien, the general condition of the sea and beaches meet current standards. The water quality and natural environment in the high density areas near hotels and condominium, (e.g., in front of Grand Jomtien Palace), have begun to deteriorate. This deterioration is reflected in excess coliform bacteria and suspended solid standards. The increasing popularity of Jomtien among tourists and the accompanying expansion of high buildings such as hotels and condominiums from Pattaya Beach into Jomtien suggests that the pollution associated with Pattaya beach may also soon characterize Jomtien. Close environmental monitoring and prevention measures are urgently needed if these pollution patterns are to be avoided.

Based on the water quality surveys reported above, sea water pollution in Pattaya has increased since the late 1970s. As tourism grows over time, without planning and adequate sewage treatment facilities, pollution problems will become more acute and pollution symptoms more easily recognized by the public. In 1992, marine pollution in Pattaya was cited by concerned people, as the major cause of Pattaya's declining tourism industry.

3.2 Solid Waste Problems

3.2.1 Quantity of Solid Waste Disposed

Solid waste management is important in terms of sanitation, appearance and the amenity of a tourism resort. There is no heavy industry in Pattaya, most solid wastes are generated by the domestic sector and the tourism industry. The quantities of solid waste disposed by both residents and visitors, in Pattaya, were estimated for the period 1986-1990 and are presented in Table 18 (Appendix C describes the methodology for solid waste estimations).

Table 18 Estimates of Solid Waste Volumes by Sector 1986-1990 (1,000 tons)

Year	Resident	Tourist	Total	Rate (kg/d)
1986	9.3	16.0	25.3	69.3
1987	14.2	24.4	38.6	105.8
1988	17.1	29.4	46.5	127.4
1989	17.1	29.3	46.4	127.1
1990	17.2	29.4	46.6	127.7

Source: see Appendix C.

The estimates shown in Table 18 indicate that residents and visitors in Pattaya disposed of 25.3 thousand tons of solid waste in 1986. This increased to 46.6 thousand tons in 1990, due to increases in population and visitors to Pattaya. It should be noted that the quantities are probably understated, as constant rates of individual waste disposal were used instead of the more likely increasing rates for solid waste disposal. On average, the quantity of solid waste disposed from the tourism industry accounted for 63 percent of the total solid waste generated in Pattaya.

3.2.2 Solid Waste Disposal in Pattaya

The current management of solid waste in Pattaya City is poor. In addition, the city does not have the capacity to dispose of all the solid waste generated within the city. The waste disposal method is open dumping. The solid waste dumping site in Pattaya is located at the catchment boundary of Huai Chak Nok Reservoir. This poses severe potential health problems to nearby communities. Ground water has been found to be contaminated, especially in the rainy season, since 1982. Suction Tankers provided by Pattaya City to empty sewage are inadequate and there are also illegal tankers operated by the private sector. Since there are no designated disposal sites, sewage disposal is haphazard as well as unhealthy. Sewage is frequently spread over plantation grounds without the use of retaining ponds.

3.3 Beach Loss and Coastal Erosion

Coasts, particularly beaches, are among the least stable and most physically transformable of the earth's landform systems. Beaches exist where supplies of unconsolidated

sediments are delivered to the margins of water bodies, and because waves and currents redistribute and shape these accumulations. Shoreline changes can occur, if the natural balance is altered. Any factor, natural or man-made, which alters the supply and/or the distributions of wave energy and currents in time or space, will have repercussions on the form and position of the shoreline.

In Pattaya, construction beyond the coast line has resulted in wave reflection and loss of offshore beach materials. Coastal erosion and loss of beach sand may already be permanent or more significant than currently understood or appreciated. The most important natural resource which first attracted visitors to Pattaya is thus threatened. Visual inspection indicates that areas where such problems have occurred or appear imminent are in south Pattaya, the south end of Jomtien Beach and in front of the Ambassador City Complex.

At south Pattaya, many restaurants, beer bars and night clubs are built on the beach, or over the sea on timber piling or timber piers or small concrete boat ramps.

At the south end of Jomtien Beach, the coastal road and sea wall have been constructed too close to the shore. Storm waves are reflected by these constructions leading to erosion, loss of beach area and sand. Early signs of these problem have been observed at the south end of the coastal road.

At the south end of Jomtien Beach, new structures, in the newly developed area, are set back from the shore. The exceptions are the Ambassador City Hotel Complex, a privately owned marina for sailing yachts and powered boats, which comprises a small harbor basin protected by two breakwaters, and a small beach resort with timber/thatch cottage accommodations. The terrace of the Ambassador City Hotel is the most serious example of construction encroachment causing coastal erosion.

Although seasonal wind and wave changes generated by the monsoon weather patterns affect sand movements, the coastline of Pattaya is, according to an Asian Institute of Technology's study, an inherently stable beach, due to a geometric equilibrium the coastline has naturally developed (JICA 1990). Therefore problems of beach loss and coastal erosion in Pattaya are likely to be caused by the construction of buildings, seawalls and promenades too close to the natural shoreline.

3.4 Coral Reef Damage

Tourism and recreation have significantly damaged the coral reefs of Ko Lan Island. Baseline information of coral communities around Ko Lan are available through field surveys conducted in 1989 and 1991, by the Coral Reef Ecological Study Team of the Asean-Australia Cooperative Program on Marine Science, (Asean-Australia Cooperative Program on Marine Science 1989, 1991). The survey in 1989 revealed that coral communities on Ko Lan Island are mostly found on the west and south side and to a lesser extent on the east side. Coral communities on the south-west of the island have developed better than other areas due to the support of the south-west monsoon and less stress from tourism activities. Overall, the condition of the these reefs are fair to good. It was estimated that there is about 30-50 percent of live coral present on the west and south-west sides of the island. Only 1-10 percent of the coral has survived on the east coast. Since the condition of the reefs for various sites vary with the intensity of tourist use and tourism facilities, tourism is indicated as the major source of coral community disturbances. Anchoring of tourist boats and waste sedimentation resulting from tourism activities are identified as the most serious problems for coral development on Ta Van Beach, Tien Beach and the east side of the island.

There are no piers for passenger embarkation and disembarkation, with the exception of an inadequate concrete pier 110 meter long on the east of the island. Boat anchors and attached chains smash corals, by dragging or entangling coral branches, when they are thrown onto reefs for landing. Biological waste from restaurants, bars and other tourist services and activities reduce the degree of seawater transparency which is one essential factor for coral growth. Corals are very demanding in their environmental requirements. Water that is muddy or fresh will easily kill them. Nor will they grow at depths beyond the reach of sunlight, for they are dependent upon single-celled algae that grow within their bodies.

Other sources of environmental damage to coral reefs in Ko Lan are solid wastes, oil and grease discharged by boats, the illegal collection of coral pieces as souvenirs and the use of explosive for fishing. Tourism activities, such as snorkeling, scuba diving and glass-bottom boats also create stress on coral communities and disturb their recovery process.

The latest survey on coral communities at Ko Lan in 1991 reports that most coral communities are classified as being in moderate condition. Although human impacts from tourism activities tend to have increased stress on coral development, strong damage did not

occur during the two year period of interval surveys. Long-term monitoring is, however, strongly recommended by the survey team for heavily touristed areas.

4. CORAL OF ENVIRONMENTAL POLICY

The previous chapters indicate that Pattaya's tourism development and growth has resulted not only in benefits, through the generation of substantial revenues, but also in serious environmental degradation. Environmental pollution and degradation have affected tourism growth through the spoiling of once beautiful and clean beaches. This section analyzes the costs of two types of policy: 1) an alternative tourism policy of environmental protection and 2) the existing (defacto) tourism policy, where tourism continues to contribute to environmental degradation.

4.1 Costs of Environmental Protection

The costs of protecting the environment, while using it as an input to the tourism industry can be classified into two categories: abatement costs and avoidance costs. Abatement costs are the expenditures devoted to reducing anticipated environmental impacts. Pollution abatement costs are preventive expenditures. Investments in infrastructural facilities, for example, tourist ports and various types of waste treatment plants can be classified as abatement costs. Avoidance costs are the costs of preventing environmental damage by avoiding an activity or use of a resource. Opportunity costs or benefit foregone by not developing a project, or part of a project are examples of avoidance costs.

The estimation of environmental protection costs for Pattaya beach resort will cover two major cost items: wastewater treatment costs, and solid waste disposal costs. These estimates are rough approximations due primarily to the unavailability of data. Since the purpose of the estimation is to provide a bracket of costs to guide policy making, these estimates can still serve as references. The sources of cost data are from the Master Plan Study for the Development of Pattaya Area (JICA 1990), the Office of the Environmental Board, the Division of Environmental Health of the Pattaya Town Council and the author's survey conducted in August 1992. The estimation methodology is simple, as the characteristics of the cost data available do not allow modeling or model type estimation techniques. Cost estimates are made with a plus or minus 30 percent margin of error and cover the following sewage treatment and solid waste disposal infrastructure system costs:

(1) Construction costs

(2) Operation and maintenance costs

(3) Land costs in terms of land rents (as land is not exhausted at the end of the plant life).

4.1.1 Sewage Treatment Costs

Table 19 presents estimates for sewage treatment costs for the period 1986-1990. The unit costs obtained are an average of the cost data from 10 centralized plants and 10 on-site private plants that use three sewerage plant technologies: Oxidation Ditch, Activated Sludge and Rotating Biological Contractor. Cost estimates include disposal and sewage costs (costs of constructing trunk sewers, manholes, pumping stations and rising mains). The effluent standard for all plants is 20 mg/l BOD and 30 mg/l suspended solids. The following assumptions were made in the estimations.

1. A 20 year economic life of a sewage treatment plant.
2. Plant costs per year are equal to total plant costs divided by the economic life of the plant.
3. Land rent per year is 0.5 percent of plant costs, or 10 percent of land costs, if land cost data is available.

The estimated unit cost of wastewater treatment is 1.9 baht/cubic meter (1990 price). This estimate is converted to 1986 through 1990 prices using the producer price index prepared by the Bank of Thailand. The annual wastewater treatment costs for 1986 to 1989 were then calculated based on the estimated unit costs, and are presented in Table 20.

The annual cost of wastewater treatment in 1986 was about 17.7 million baht. Annual costs increased to 50.5 million baht in 1990, an increase of 280 percent in a five year period. The number of tourists increased 210 percent during the same period. Land rents, plant costs, and operation and maintenance (O & M) costs accounted for about 22.7 percent, 63.2 percent and 14.1 percent of the annual total wastewater treatment costs. However, an analysis for hotels' wastewater treatment costs show that land rents, plant costs and operation and maintenance costs are 2.3 percent, 22.8 percent and 75 percent of total costs. The relatively small quantity of wastewater generated by individual hotels and the high land cost in Pattaya probably encourages each hotel owner to try to minimize fixed costs (i.e., land and plant costs).

Table 19 Estimates of Wastewater Treatment Cost for Pattaya

Year	Site	Land Rent (mb/y)	Plant Cost (mb/y)	O&M Cost (mb/y)	Total Cost (mb/y)	Capacity (cu.m/d)	Unit Cost (cu.m/d)
1976	PT	1.47	14.01	6.78	22.26	41,800	1.46
1986	PT	0.14	1.36	0.36	1.86	4,000	1.27
1990	PT	0.35	3.49	0.43	4.27	13,000	0.90
1990	NK-A	1.23	6.51	0.43	8.17	15,000	1.49
1990	NK-B	3.83	6.45	0.43	10.71	15,000	1.96
1990	CT	1.02	10.15	0.43	11.60	20,000	1.59
1990	PT-A	23.92	11.95	0.43	36.30	40,000	2.49
1990	PT-B	8.80	12.49	0.43	21.72	40,000	1.49
1990	PT-C1	4.68	13.33	0.43	18.44	40,000	1.26
1990	PT-C2	7.01	13.33	0.43	20.77	40,000	1.42
1990	Hotels	0.05	0.50	1.64	2.19	1,500	4.00

Note:

1. O&M (operation and maintainance) cost for the 1986 = 30,000 * 12 (Pattaya City)
2. O&M cost for all the 1990 were estimated based on the city's effluent charge of 672 baht/hotel room/year (at an effluent rate of 800 liters/room/day)
3. The estimate for the last plant was based on survey data of ten Pattaya hotels collected by the author in August 1992.
4. O&M cost/year for the 1976 = total O&M cost/20. For more details see JICA 1976, Table 6.3.1
5. For details on all 1990 estimates, see JICA 1990, pp. 370-92.
6. mb/y is million baht per year
7. cu.m/day is cubic meters per day

Table 20 Estimate of Wastewater Treatment Cost for Pattaya 1986-1990

Year	Wastewater (m/cu.m)	Producer Price Index (1976=100)	Unit Cost (b/cu.m)	Total Cost (mv/y)
1986	12.10	143.80	1.46	17.70
1987	15.60	154.10	1.56	24.40
1988	17.60	176.00	1.79	21.50
1989	18.70	186.70	1.89	35.50
1990	26.60	187.20	1.90	50.50

Note: Estimates were based on an average unit wastewater treatment cost of 1.9 b/cum (averaged from the cost data in Table 19 and converted to be 1990 price). The producer price index were taken from Bank of Thailand Quarterly Bulletin (Vol.30, No.4, pp.84-5).

4.1.2 Solid Waste Disposal Costs

Based on the estimated quantity of solid waste disposed in Pattaya, presented in the previous section, solid waste disposal costs for 1986-1990 were estimates and are shown in Table 21. Estimates were based on the 1990 unit price disposal costs of 348.3 baht/ton (JICA 1990, Table 4.2.21, p. 397). The disposal method is a sanitary land fill (defined as waste covered daily with soil) with an environmental protection design. Again the producer price index for converting the unit disposal cost into 1986-1989 prices were taken from the Bank of Thailand Quarterly Bulletin

In 1986, solid disposal costs in Pattaya amounted to 6.8 million baht. These costs increased to 16.2 million baht in 1990, an almost threefold increase in a five year period.

Table 21 Estimates of Solid Waste Disposal Costs for Pattaya 1986-1990

Year	Solid Waste Volumes (ton/year)	Producer Price Index (1976=100)	Unit Costs (baht/ton)	Total Costs (mill.baht/year)
1986	25,262	143.8	267.6	6.8
1987	38,631	154.1	286.7	11.1
1988	46,488	176.0	327.5	15.2
1989	46,358	186.7	347.4	16.1
1990	46,565	187.2	348.3	16.2

4.1.3 Other Environmental Protection Costs

Other environmental protection costs include the costs of protecting coral reefs from tourist-boat anchorings. The construction cost of a pier at Ko Lan may be used as a proxy for protection costs. The JICA study proposed an estimate of 26.4 million baht as the construction cost for a safe embarkation and disembarkation passengers pier at Ta Van Beach (JICA 1990, p. 648). This amount is only a reference point for the cost of preserving the coral reefs at Ko Lan as a pier generates other benefits beyond the protection of coral reefs.

4.2 Costs of Environmental Degradation

Cost estimated in the previous section represent abatement costs or costs of a tourism policy with environmental protection measures. The costs of environmental degradation assessed in this section can be considered as the costs of the existing tourism strategy.

Literature studies on the costs of environmental degradation suggest the use of survey-based methods for valuing environmental impacts of development projects in the absence of data on market or surrogate-market prices. The concept of willingness to pay and the contingent valuation methods are often used in those studies (Cummings, Brookshire and Schulz 1986; Freeman 1979). This approach faces two types of estimation problems: the nature of the environmental problem and the nature of the contingent valuation methods.

Difficulties in estimating environmental costs are primarily the result of the presence of international or regional boundaries and of externalities. Although the concept of cost (or benefit) is basically economic in nature, environmental costs are incurred by the underlying physical and environmental system not directly reflected in current economic markets. Estimation of these costs must therefore be based on other types of knowledge. For example, estimates of air pollution costs should also be based on scientific knowledge of the relationship between pollutant concentrations and human health. Estimates of water pollution costs require knowledge of the relationship between pollutant levels and biological productivity. Lack of knowledge regarding these relationships is a major barrier to empirical estimates of costs and benefits (or impacts).

Functional relationships between environmental quality and economic welfare impacts are as follows.

1. When waste products are transmitted to the environment or when human actions lead to environmental instability, the damage caused depends crucially on the assimilative abilities of the environment. The amount of waste products emitted determines the load upon the environment. The ability of the environment to absorb pollutants is called absorptive or carrying capacity. If the emissions load exceeds the absorptive capacity, then the pollutant accumulates in the environment and causes damage.

2. When pollutants accumulate in the environment, they cause changes in various measures of ambient environmental quality.

3. Changes in ambient environmental quality lead to changes in the flows of environmental services. These changes may in turn be reflected in changes in the way individuals use the environment.

4. Changes in environmental services lead to economic welfare impacts.

The first two sets of relationships are almost totally non-economic in nature, as they primarily involve physical and biological processes of transportation, dispersion and transformation of (non-market) residuals. The fourth set of relationships is completely within the realm of economics, as it involves the theory of economic welfare and the use of economic data. The third set of relationships represents the interface between the natural science and social science disciplines. Aspects of the third set of relationships are primarily behavioral or social, for example, how recreation use varies, with changes in water quality. Other aspects are almost wholly physical, for example, the effects of air pollution on human health and mortality. Some types of environmental change involve interactions between these behavioral and physical dimensions; for example, the effect of an air pollutant on a particular type of vegetation is a biological question, but if farmers alter crop patterns as a way of adapting to changes in air pollution, then the behavioral and biological aspects of the relationship must be considered together.

With regard to pollution damage, Blades (1989) notes that there are conceptual and practical difficulties in estimating the total costs involved. Although it would be interesting to measure the market value of the pollution damage costs, the practical difficulties and resources required are enormous. Hueting (1989) discusses several ways to deal with damage costs and preventive expenditures. His skepticism about using the willingness-to-pay method to determine these costs provides insight into its weakness.

The nature of the contingent valuation methods inherits a number of problems. First, the contingent valuation methods do not analyze actual behavior, the most important question concerns their accuracy in simulating the conditions of the real world. Surveys are, by their nature, hypothetical and, furthermore, people have little experience in making explicit decisions about the value of environmental goods. Second, survey techniques are subject to a number of biases which may affect the reliability of the results, for example, information bias and instrument bias (see Dixon, et.al. 1988).

Despite the problems described above, the willingness-to-pay approach and the contingent valuation methods still provide useful information for policy making, if the

methods are carefully applied and the results are correctly interpreted. This study, however, employed an approach based on the concept of opportunity cost to estimate the costs of environmental degradation in Pattaya. This choice of approach is based on an awareness that a survey of tourists' willingness to pay for a clean environment in Pattaya under the current situation would face high degrees of selection bias due to the serious impact of the Persian-Gulf War on tourism in Pattaya.

In the next section, the size of revenue foregone due to a loss of potential visitors in Pattaya during tourism's decline will be estimated and used as a proxy for environmental degradation costs.

4.2.1 Loss of Tourism Revenue

The amount of revenue foregone due to a loss in potential tourists is dependent on the number and economic status of these tourists. The analysis below attempts to determine these two parameters.

Changes in the number of tourists and travelers to Pattaya or Pattaya's visitor growth rates are summarized in Table 22.

Table 22 Pattaya's Visitor Growth Rates, 1986-1990

Category	1986	1987	1988	1989	1990
T-Tourist	111.4	52.7	-8.1	-12.5	-21.8
F-Tourist	14.0	51.2	31.7	3.1	-3.1
Total	42.6	51.9	14.3	2.4	-9.0
T-Traveler	n.a.	23.1	33.9	-24.8	-22.6
F-Traveler	n.a.	20.6	1,058.3	-9.4	8.3
Total	n.a.	23.1	53.2	-22.6	-17.4

Note: T and F stand for Thai and foreign respectively.

Beginning in 1988, the number of Thai visitors (tourists and travelers) to Pattaya clearly began to decline. By 1989 foreign arrivals were also noticeably down, especially considering both groups had previously shown strong increasing growth rates. The average decreased visitation rates during the period 1988-1990 was 14 percent per year for Thai tourists. (Note that the average annual growth rate of tourists in Pattaya for the period 1979-1990 was 16 percent.) Foreign tourist visits declined by 3 percent from 1989 to 1990. The

number of Thai and foreign travelers both declined from 1989-1990, with rates 24 percent for Thai travelers and 1 percent for foreign travelers.

Changes in the number of tourists and travelers in Pattaya, described above, are consistent with changes in the quality of environment reported in the previous section on Environmental Degradation in Pattaya. Although, the available data do not permit us to perform correlation and/or causality tests, the decline in the number of visitors to Pattaya during the period under study is theoretically and logically a response to a deteriorating natural environment. (The decline in 1990 was also partly caused by the Persian-Gulf War.) Other qualitative and quantitative information also support this hypothesis. That is, environmental degradation leads to a loss in the number of tourists (and tourist related revenues).

Despite pollution problems, Pattaya should continue to be a more attractive (e.g., better facilities, closer proximity to Bangkok, lower costs and better year round weather) than other beach resorts in Thailand. Tourism pattern profiles in Phuket (another important international marine resort of Thailand) were compared to those of Pattaya. Phuket's tourism boom began after Pattaya's and its degree of environmental degradation also lags behind that of Pattaya's. The point of this comparison is that when Pattaya began to become seriously polluted in 1986-87, tourism declined, and tourists may have chosen to visit Phuket instead. Table 23 and Figure 5 presents the number and annual tourist percentage changes for both resorts for the period of 1985-1990. The results seem to support the above premise, in that while the number of tourists in Pattaya was decreasing, the number of tourists in Phuket continue to increase. This suggests that marine pollution was a primary cause of Pattaya's decline, rather than general economic factors that should have affected both resort destinations equally (it costs more to visit Phuket). If Pattaya were as clean as Phuket, why would tourists pay more for the equivalent product.

JICA conducted a tourism market survey in Pattaya in 1989, with a sample of 1,582 tourists, 26 travel agents and 59 hotels (JICA 1990, pp. 58-67). Survey responses indicated that 84.7 percent of foreign tourists and 70 percent of Thai tourists visited Pattaya for the purpose of swimming and relaxing on beaches. Marine and beach pollution disappointed more than half of both Thai and foreign tourists. Environmental deterioration in Pattaya has reached levels that are easily visible. hotel managers and travel agencies, who run tourist related businesses in Pattaya, are even more sensitive to Pattaya's environmental problems and are even more pessimistic about the resort's future growth prospects. The majority of hotels and

travel agencies believe that Pattaya's tourism potential is likely to remain stable or to decline in the near future.

Table 23 Tourist Arrivals at Accommodation Establishments in Pattaya and Phuket 1985-1990

Year	Pattaya			Phuket		
	Thai	Foreigner	Total	Thai	Foreigner	Total
1985	233,613	572,434	806,047	189,094	156,174	345,268
1986	300,343	633,624	933,967	223,223	253,731	476,954
(% change)	29	11	17	18	63	38
1987	405,270	1,012,181	1,417,451	212,060	334,889	546,949
	23	60	52	(5.0)	32	15
1988	471,508	1,255,517	1,727,025	216,851	509,322	726,173
	16	24	22	2	52	33
1986	398,354	1,293,847	1,692,201	287,001	523,013	810,014
	(15.5)	3	(2.0)	32	3	12
1990	329,382	1,251,921	1,581,303	n.a.	n.a.	n.a.
	(17.3)	(3.2)	(6.6)	n.a.	n.a.	n.a.

Source: TAT.

Note: Figures in parentheses are negative values.

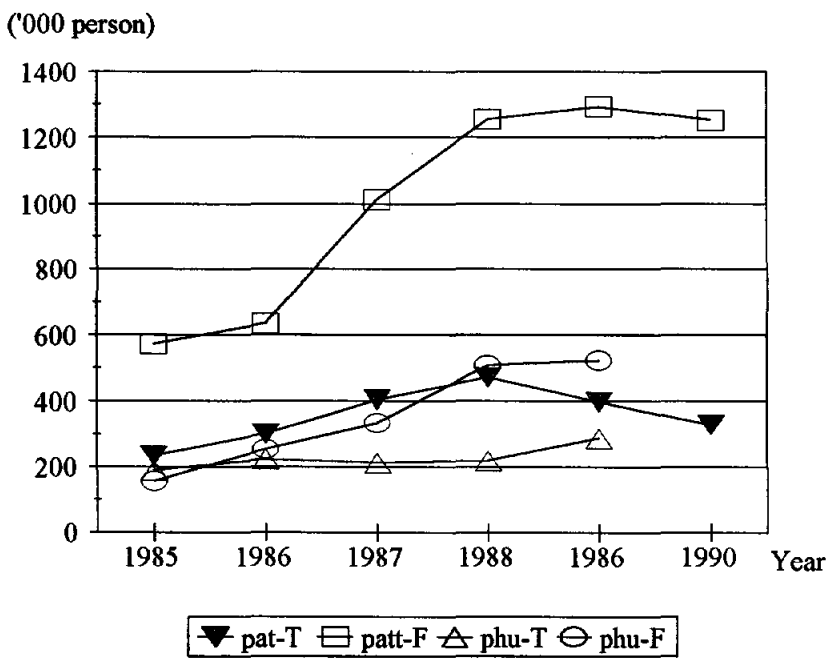

Figure 5 Guest Arrivals at Accommodation Establishment in Pattaya and Phuket

A survey conducted in 1990 on the Status of Tourism-related Business Investment in the Central Region also found that Pattaya's business community regarded future growth prospects pessimistically, similar to the perceptions found in the JICA study (Social Science Research Institute, Chulalongkorn 1990, pp. 24-54).

Based on the above declining visitation rates and the average annual number of visitors (calculated from the data in Table 5), and assuming that the number of tourists and travelers remain at pre-decline levels (1986-87), the number of potential tourists and travelers lost can be estimated using the following equation:

Number of Visitors loss = Avg.No.of visitors/yr * Avg.decline rate * No. of yrs

1. Thai tourists loss = 439,161 * 1,045,621 * 0.14 * 3
2. Foreign tourists loss = 24,646 * 821,529 * 0.03
3. Thai travelers loss = 330,445 * 688,427 * 0.24 * 2
4. Foreign travelers loss = 953 * 95,258 * 0.01

The number of potential tourists and travelers lost can then be used to estimate the amount of revenue lost, using the data on average visitor expenditures and tourists' length of stay provided in Appendix A. The total revenue loss was 1,367 million baht for the period 1988-1990.

The time lag between Thai and foreign tourists in their response to the polluted environment in Pattaya may be explained by information acquisition. As Thais are more likely to be repeat visitors to Pattaya (JICA 1990, p. 60) and have greater opportunities for obtaining news and information about Pattaya, they reacted differently to the changing environment.

The relationship of tourists and information acquisition is confirmed by an analysis of changes in the proportions of nationality groups visiting Pattaya during the same period. Growth rates for tourists of nations living close to Thailand, for example the Asian-Pacific countries, have declined faster than those of other nations.

Table 26 presents the percentage ratio of international guest arrivals to Pattaya and guest arrivals at accommodation establishments in Thailand by nationality for the period 1985-1990. Data for constructing these ratio are presented in Tables 24 and 25. The figures in Table 26 indicate that the percentage share of foreign tourists to Pattaya increased for all nationality groups from 1986-1988 and declined after that. The declining rate for the Asian-Pacific group

26 indicate that the percentage share of foreign tourists to Pattaya increased for all nationality groups from 1986-1988 and declined after that. The declining rate for the Asian-Pacific group (those closest geographically to Thailand) is the greatest despite its greater rate of increase for the earlier period.

The effect of environmental degradation on tourism growth, presented above, is not the whole story. Economists categorize environmental quality as a luxury good. This means the good will be consumed relatively more by high income groups, or environmental degradation is more of a concern to high income tourists than to low or middle income tourists. Therefore, Pattaya's environmental degradation may have discouraged visits by high income tourists more than low income tourists. This is a concern for tourism development policy.

Table 24 Guest Arrivals at Accommodation Establishments in Pattaya 1985-1990

Nationality	1985	1986	1987	1988	1989	1990
Grand Total	796,047	933,967	1,417,451	1,727,025	1,692,201	1,581,303
(%)	100	100	100	100	100	100
Thai	233,613	300,343	405,270	471,508	398,354	329,382
	29.3	32.2	28.6	27.3	23.5	20.8
Foreign	562,434	633,624	10,121	1,255,517	1,293,847	1,251,921
	70.7	67.8	71.4	72.7	76.5	79.2
The Americas	36,249	42,879	62,824	65,889	80,610	82,200
	4.6	4.6	4.4	3.8	4.8	5.2
Europe	222,437	263,825	423,931	502,143	554,393	578,808
	27.9	28.3	29.9	29.1	32.8	36.6
Middle East	128,112	104,725	94,522	136,516	122,491	38,083
	16.1	11.2	6.7	7.9	7.2	2.4
Asia & Pacific	138,217	175,677	348,036	435,261	392,849	441,823
	17.4	18.8	24.6	25.2	23.2	27.9
Others	37,484	46,521	82,368	115,708	123,898	111,067
	4.7	5.0	5.8	6.7	7.3	7.0

Source: TAT

Table 25 Number of International Tourist Arrivals in Thailand 1981-1990

Year	Total	The Americas	Europe	Middle East	Asia & Pacific	Other
1981	2,015,615	140,138	516,482	67,792	1,254,071	37,132
1982	2,218,429	139,231	405,099	107,087	1,532,005	35,007
(% change)	10.1	(0.6)	(21.6)	58	22.2	(5.7)
1983	2,191,399	146,712	380,623	106,440	1,529,776	27,848
	(1.2)	5.4	(6.0)	(0.6)	(0.1)	(20.5)
1984	2,346,709	163,315	410,857	127,081	1,618,413	27,043
	7.1	11.3	7.9	11.4	5.8	(2.9)
1985	2,438,270	180,742	455,329	127,441	1,650,782	23,976
	3.9	10.7	10.8	0.3	2	(11.3)
1986	2,818,092	203,518	552,148	113,004	1,904,554	24,868
	15.6	12.6	21.3	(11.3)	15.4	3.7
1987	3,482,958	261,162	719,871	140,921	2,117,100	18,209
	23.6	28.3	30.4	24.7	11.2	(26.8)
1988	4,230,737	299,762	905,611	144,025	2,856,473	24,866
	21.5	14.8	25.8	2.2	34.9	36.6
1989	4,809,508	340,011	1,107,439	130,751	3,205,734	25,573
	13.7	13.4	22.3		12.2	2.8
1990	5,298,860	367,778	1,229,957	94,921	3,306,414	299,790
	10.2	8.2	11.1	(27.0)	3.1	172.3

Source: TAT

Note: Figures in parentheses are negative values.

Table 26 Percentage of International Tourist Arrivals at Accommodation Establishments in Pattaya 1985-1990

Nationality	1985	1986	1987	1988	1989	1990
Grand Total	23.1	22.5	38.1	38.2	33.1	29.0
The Americas	18.8	20.1	22.4	21.0	23.0	22.5
Europe	48.9	47.8	55.4	48.8	48.0	45.7
Middle East	100.0	78.7	80.9	100.0	100.0	50.4
Asia & Pacific	8.9	10.4	27.6	28.4	17.4	17.1

Note: Calculate from the data in Tables 24 and 25.

An examination on changes in the number of Thai and international tourists in different income groups found results consistent with the hypothesis that environmental pollution in Pattaya is more likely to discourage visits by high income tourists than low income tourists. During the five year period under investigation, the percentage shares of high income tourists steadily decreased and that of low income tourist remained stable or increased. In the analysis, different categories of accommodation establishments were used as a proxy for tourist income groups. Tourist accommodation establishments in Thailand are classified by TAT into five groups (earlier they were classified into seven groups), based on the single-room rate charge per night, as follows:

Group 1 = 1,000 baht and higher,
Group 2 = 700 baht and higher,
Group 3 = 400 baht and higher,
Group 4 = 200 baht and higher,
Group 5 = less than 200 baht.

Table 27 Guest Arrivals at Various Group of Accommodation Establishments, Pattaya 1985-1990 (1,000 unit)

Year	Total	Group 1	Group 2	Group 3	Group 4	Group 5
1985	796,047	-	407,856	176,843	70,525	14,083
(%)	100.0	-	51.2	22.2	8.8	17.7
1986	933,975	-	520,330	163,588	81,075	168,799
	100.0	-	55.7	17.5	8.7	18.1
1987	1,417,441	-	746,103	275,155	81,926	284,257
	100.0	-	52.6	19.4	5.8	20.1
1988	1,727,025	184,036	759,844	294,310	197,690	2,941,145
	100.0	10.6	43.9	17.0	11.4	16.8
1989	1,672,201	126,750	648,761	341,189	228,738	346,763
	100.0	7.6	38.8	20.4	13.7	20.7
1990	1,581,303	99,621	557,978	368,227	198,531	356,946
	100.0	6.3	35.3	23.3	12.5	22.6

Note: Prior to 1988 there were no Group 1 hotels in Pattaya.

The number of foreign guest arrivals at the five groups of accommodation establishments for the period 1985-1990 are presented in Table 27 and Figure 8. The tourist share for Groups 1 and 2, representing the high income tourist group, decreased over the period 1986-1990, from 65 percent in 1986 to 39 percent in 1990. The share for groups 4 and

5, which represent the low income tourist group increased from 9 percent in 1985 to 13 percent in 1990. Group 3's, which represents the middle income tourist group, share remained stable at around 20 percent for the period.

The data in Table 27 was further disaggregated by tourist origin: Thai, North America (USA and Canada), Europe, the Middle East, and Asia and Pacific (Tables 28-32). This analysis investigates whether the phenomena of high income tourists decline is also true for tourists from the various regions.

The Thai tourist share (Table 28) for Group 1 decreased over time, from 40 percent in 1985 to 30 percent in 1990. The share for Groups 4 and 5 increased from 43 percent in 1985 to 62 percent in 1989 and then decreased to 46 percent in 1990. The share for Group 3 had no definite trend, fluctuating around 17 percent for the period under examination.

Table 28 Thai Guest Arrivals at Various Group Accommodation Establishments in Pattaya 1985-1990

Year	Total	Group 1	Group 2	Group 3	Group 4	Group 5
1985	233,613	-	92,057	39,506	21,798	80,153
(%)	100.0	-	39.4	16.9	9.3	34.3
1986	300,343	-	109,089	41,208	26,311	123,735
	100.0	-	36.0	14.0	8.8	41.0
1987	405,270	-	126,785	95,221	30,999	152,265
	100.0	-	31.3	23.5	7.7	37.6
1988	471,508	28,960	100,180	71,750	36,730	233,888
	100.0	6.1	21.2	15.2	7.8	49.6
1989	378,354	20,665	103,375	40,271	83,430	150,613
	100.0	5.5	27.3	10.6	22.1	39.8
1990	329,322	23,238	75,270	78,526	38,288	114,000
	100.0	7.1	22.9	23.8	11.6	34.6

Source: TAT

Note: There were no Group 1 hotel in Pattaya prior to 1988.

Table 29 The American Arrivals at Various Group of Accommodation Establishments in Pattaya 1985-1990

Year	Total	Group 1	Group 2	Group 3	Group 4	Group 5
1985	36,249	-	16,004	9,802	4,953	5,490
(%)	100.0	-	44.2	27.0	13.7	15.1
1986	42,876	-	24,821	11,256	4,174	2,626
	100.0	-	57.9	26.3	9.7	6.1
1987	62,824	-	31,961	17,971	3,817	9,075
	100.0	-	50.9	28.6	6.1	14.4
1988	65,889	9,839	23,680	16,707	11,612	4,051
	100.0	14.9	35.9	25.4	17.6	6.2
1989	80,610	5,560	24,777	16,853	15,590	17,830
	100.0	6.9	30.7	20.9	19.3	22.1
1990	82,200	3,498	20,604	20,097	13,355	23,015
	100.0	4.3	25.1	24.4	16.2	28.0

Source: TAT

Table 30 European Arrivals at Various Group of Accommodation Establishments in Pattaya 1985-1990

Year	Total	Group I	Group 2	Group 3	Group 4	Group 5
1985	222,437	-	114,737	48,545	22,356	36,794
(%)	100.0	-	51.6	21.8	10.1	16.5
1986	263,825	-	147,874	64,851	22,751	23,134
	100.0	-	56.1	24.6	8.6	8.8
1987	424,438	-	233,561	107,129	22,135	61,771
	100.0	-	55.0	25.2	5.2	14.4
1988	502,143	80,534	225,595	103,446	70,720	21,848
	100.0	16.0	44.9	20.6	14.1	4.4
1989	573,999	48,093	208,236	91,334	92,111	134,226
	100.0	8.4	36.3	15.9	16.1	23.4
1990	578,808	31,232	122,655	178,346	100,815	155,761
	100.0	5.4	21.2	30.8	17.4	26.9

Source: TAT

Table 31 Middle East Arrivals at Various Group of Accommodation Establishments in Pattaya 1985-1990

Year	Total	Group I	Group 2	Group 3	Group 4	Group 5
1985	128,112	-	37,721	65,199	15,321	9,871
(%)	100.0	-	29.4	50.9	12.0	7.7
1986	104,725	-	58,025	24,635	19,183	2,882
	100.0	-	55.4	23.5	18.3	2.8
1987	94,522	-	18,142	52,326	16,139	7,915
	100.0	-	19.2	55.4	17.1	8.4
1988	136,516	1,086	25,913	56,329	36,151	17,037
	100.0	0.8	19.0	41.3	26.5	12.5
1989	122,491	574	25,275	71,332	12,753	12,552
	100.0	0.5	20.6	58.2	10.4	10.0
1990	38,083	250	9,849	13,233	9,447	5,305
	100.0	0.7	25.9	34.8	24.8	13.9

Source: TAT

Table 32 Asia & Pacific Arrivals at Various Group of Accommodation Establishments in Pattaya 1985-1990

Year	Total	Group I	Group 2	Group 3	Group 4	Group 5
1985	138,151	-	118,740	8,918	4,387	6,106
(%)	100.0	-	85.9	6.5	3.2	4.4
1986	171,161	-	128,481	11,136	7,445	13,101
	100.0	-	75.1	6.5	4.4	7.7
1987	348,036	-	288,076	3,024	6,989	28,016
	100.0	-	82.8	0.9	2.0	8.0
1988	435,261	44,776	324,178	3,402	25,313	7,349
	100.0	10.3	74.5	0.8	5.8	1.7
1989	392,849	27,485	235,952	88,921	14,171	26,356
	100.0	7.0	60.1	22.6	3.6	6.7
1990	441,823	28,245	275,892	79,401	24,863	33,333
	100.0	6.4	62.4	18.0	5.6	7.5

Source: TAT

The share for tourists from North America (Table 29), for Group 3 also showed little change over the period. The share for Groups 1 and 2 fell from 44 percent in 1985, and 58 percent in 1986 to 29 percent in 1990. Groups 4 and 5 share increased every year from 29 percent in 1985 to 44 percent in 1990.

Tourists from the European countries (Table 30) showed similar patterns to those from North America. Over the period, the shares for Groups 1 and 2 declined from 52 percent in 1985 to 27 percent in 1990, while the share for Groups 4 and 5 increased from 22 percent in 1988 to 44 percent in 1990. Group 3 showed little change.

The effect of environmental degradation on tourist visits from the Middle East is rather difficult to analyze because a number of political issues took precedence during the period. Thai officials were accused by Saudi Arabian officials of being involved or negligent in their handling of a diamond robbery and murder case in 1989. In 1990 the Iraqi war in the Middle East began. These incidents may have effected many Middle Easterner decisions to visit Thailand.

The last region of countries to be analyzed is the Asia-Pacific countries. Table 32 shows that more than two-thirds of tourists in this group of countries were high income tourists. Only a small percentage of tourists were from Groups 4 and 5. Changes in the number of tourists for this group are similar to the regional groups already analyzed. The tourist share for Groups 1 and 2 declined from a share of 86 percent in 1985, to 69 percent in 1990. There are no definite trend for Groups 4 and 5. The percentage figures fluctuated around a small share of 10 percent. For Group 3, there was an upward jump in 1989 and 1990.

It is evident that high income tourists made up the largest proportion of the total tourist declines. There was also an increase in the number of low income tourists over this period, which compensated for the decrease in high income tourists arrivals. Therefore, the amount of potential revenues lost estimated in the previous section was too low (i.e., revenue loses should be adjusted upward), as the economic status of the "potential" tourists also changed. A survey conducted by TAT in 1982 indicated that the average expenditure/person/day for tourists in the highest three (of 7 groups, representing high income tourists) was about two times higher than tourists in Groups 4-7, which represented low income tourists (TAT 1982).

The analysis in this section is meant to increase the awareness of the relationship between tourism and environmental pollution. A clean environment attracts high income tourists, and pollution discourages high income tourists. The quality of the environment is important to both tourism growth and for quality growth. An analysis of tourism's decline based only on the number of tourists, will not show the true opportunity costs to the economy.

4.2.2 Cost of Coral Damage

The costs of coral reef damage may be enormous in terms of the irreversible damage to the ecosystem. Coral reefs are distinctive shallow-water marine communities that only exist in tropical and subtropical waters and serve as feeding grounds for many forms of marine life. The cost of coral reef rehabilitation can be used as a proxy for the costs of coral reef damage but an estimation of this cost is beyond the scope of this paper. In Pattaya's waters, a preliminary study on coral rehabilitation is currently being conducted. Initial results have found that high sedimentation rates in the area have caused serious coral damage and are the major limiting factor for coral growth. Other findings were that, coral fragments are frequently loose and the size of the remaining coral is not increasing. Current technological capabilities for coral rehabilitation are not yet economical (Pattaya Town Council 1992, Alan 1990).

4.2.3 Costs of Beach Loss and Coastal Erosion

JICA conducted a study plan in 1990, for Pattaya beach restoration for tourism enhancement (JICA 1990). The study proposed 120.3 million baht be spent for beach restoration (p. 648). As beach restoration or beach nourishment is considered by many countries as an effective method for protecting coastlines and countering the effects of coastal erosion, this cost may be used as a reference cost for beach loss and coastal erosion costs in Pattaya. The study proposed that coral sand be placed on existing eroded beaches to replace lost materials and allow the natural equilibrium to be restored.

4.3 Costs of Environmental Policy

The costs of the existing tourism development policy and the costs of environmental protection for Pattaya's tourist economy were estimated in the previous sections. The amount of revenue lost due to tourism decline from 1988 to 1990 was estimated and used as a proxy for the costs of the existing tourism policy. This estimation was a loss of 1,367 million baht

for the three year period, 1988-1990, or an average of 455.7 million baht per year. However, fewer high income tourists are visiting Pattaya. In addition, while low income tourists may initially increase during the early periods of environmental degradation, eventually they will also refrain from visiting critically polluted resorts. Apart from the revenue loss and beach loss, coastal pollution may be irreversible in terms of ecological costs. Governmental budgetary allocations to restore Pattaya serve as another reference for the costs of restoring Pattaya's environment.

According to official documents, the government has approved a total budget of 3,600 million baht to improve the condition of Pattaya. Details of 3151.1 million baht of this allocation are shown below.

	(million baht)
1. Sewage projects	133.1
2. Solid waste disposal	176.6
3. Water supply	920.8
4. Waterfront improvements	1,178.5
5. Roads	742.1
Total	3,151.1

Estimates of environmental protection costs for 1990, which include sewage treatment and solid waste disposal costs for Pattaya City, amount to an annual sewage treatment cost of 50.5 million baht or a unit cost of 1.9 baht per cubic meter, (of which 23 percent was for land cost, 63 percent for construction cost and 14 percent for operation and maintenance costs); and solid waste disposal costs of 16.2 million baht or a unit cost of 348 baht per ton. In sum, the annual cost of maintaining Pattaya's environment at a satisfactory level for both tourists and the local community was 66.7 million baht for 1990. This amount is approximately 0.4 percent of the total revenue generated by the tourism sector. If we assume that the profit earned in the tourism industry is 20 percent of tourism revenue and the government is able to effectively collect a 30 percent corporate tax from the tourism sector, the annual cost of environmental protection will be 1.9 percent of profits earned, or 6.4 percent of collected tourism taxes. Figures of Pattaya's environmental protection costs and tourism revenues for the period 1986-1990 are presented in Table 33. Figures of Pattaya's environmental protection costs as proportions of tourism revenues, corporate profit and tax revenues for the same period are shown in Table 34.

The costs of environmental protection, in general, are incurred up front and as a lump sum. This poses a problem that may be solved, as is practiced in other countries, by granting long-term loans to local authorities, who are later recovered from system users. Other costs of environmental protection include investments for a pier at Ko Lan to prevent coral from tourist boat anchorings.

Table 33 Pattaya Environmental Protection Costs and Tourism Revenues 1986-1990 (million baht/year)

Year	Tourism revenues	Tourism profits	Tax revenues	Env. cost
1986	4,558.9	911.8	273.5	24.5
1987	8,100.4	1,620.1	486.0	35.5
1988	14,682.0	2,936.4	880.9	46.7
1989	16,740.4	3,348.1	1,004.4	51.1
1990	17,285.7	3,457.1	1,037.1	66.7

Table 34 Environmental Costs as Proportions of Tourism Revenues, Corporate Profit and Tax Revenues 1986-1990 (million baht/year)

Year	Env. cost	Cost as % of Revenue	Cost as % of Profit	Cost as % Tax Income
1986	24.5	0.54	2.7	8.9
1987	35.5	0.44	2.2	7.3
1988	46.7	0.32	1.6	5.3
1989	51.6	0.31	1.5	5.1
1990	66.7	0.39	1.9	6.4

5. POLICY IMPLICATIONS AND CONCLUSIONS

5.1 Policy Implications

The analysis of the costs of environmental protection provided in section 4 clearly indicates that the alternative policy is much more beneficial to the economy, both in terms of potential economic opportunities and in terms of cost savings, than the current policy. In 1990, the annual costs of environmental protection for the alternative policy is approximately

66.7 million baht which is only 0.4 percent of 1990 tourism revenues or 6.4 percent of the tax collected from Pattaya's tourism sector. In addition, the existing policy has led to losses of invaluable natural resource and more than 455 million baht annually of potential revenues for the three years that were estimated. A substantial proportion of all future tourism revenues and economic opportunities are jeopardized by the sustained high pollution levels and their accompanying environmental degradation. Tourism development without environmental protection is costly and sacrifices valuable economic opportunities based on the future use of the area's natural resources.

This paper and its analysis describes how tourism development with advanced planning and environmental protection provides both substantial cost savings and increased benefits, as planning provides for other natural resource based industries. The amount of budget currently allocated to Pattaya serves as a good indicator of the value of maintaining environmental resources. In addition, information on seasonal tourist flows, rainfall patterns and the carrying capacity of the marine ecosystem suggests that policies and strategies that are designed to disperse visitors seasonally will lead to a more efficient use of infrastructure facilities, for instance sewage treatment plants. This is because a peak loads determine plant designs and cost analysis. In addition a policy that promotes eco-tourism, currently adopted by many countries, could also reduce the costs of environmental protection.

5.2. Conclusions

It is evident that the existing tourism development policy has resulted in a rapid but unhealthy growth of tourism in Pattaya. Tourism development in Pattaya has been demand led, without proper planning and effective control of tourism's impacts. As a result, environmental quality has been deteriorating as natural resources, one of the most important tourism inputs, are improperly used, exploited or treated as being of an unlimited supply.

Pattaya is now suffering from a number of problems. The adverse effects are shared by all parties as the economy of Pattaya is almost totally dependent on tourism. The strategy of mining environmental amenities for revenue and foreign exchange earnings without or with little maintenance efforts have brought about serious marine pollution, solid waste contamination, coastal erosion and coral reefs damage. In response, tourism has declined, resulting in the loss of potential revenues.

This papers' findings confirm that environmental maintenance is indispensable and indeed essential for further tourism growth. Moreover, since the environment is a luxury

good, environmental maintenance attracts high income tourists and enhances quality growth. As shown in this study, it is costly for a tourist economy to over-exploit (i.e., exceed its carrying capacity) its environmental resources. A tourism policy that protects the environment will provide more benefits than costs. Tourism development without environmental protection, in the long run, will not only deplete its foundation but deprives the country of its true tourism potential. Pattaya's tourism growth typifies the problems of environmental degradation and the impacts n the tourism sector. As shown, the existing tourism policy has denied Pattaya the opportunity to profit from truly sustainable management and exploitation of its considerable wealth in tourism resources.

Appendix A

REVENUE ESTIMATION

Tourist and traveler revenues were estimated by taking the differences in the levels of average expenditures and average lengths of stay between Thai and international tourists, and between Thai and international travelers. The equations used in this study to estimate the annual revenue from the tourist sector are as follows:

$$TR = RTO + RTV$$

$$RTO = NTO * L * TOE$$

$$RTV = NTV * TVE$$

where:

TR = Total revenue per year from the tourism sector

RTO = Revenue per year from tourists

RTV = Revenue per year from travelers

NTO = Number of tourists visiting Pattaya per year

NTV = Number of travelers visiting Pattaya per year

L = Tourist length of stay

TOE = Tourist average expenditure per day (for local transportation, guides, entertainment, food, accommodations, and souvenirs)

TVE = Traveler expenditure per day

Data on the levels of average expenditures and average lengths of stay are provided by TAT and are presented below.

	Tourist Avg. Length of Stay (day)		Tourist Avg. Expenditure (baht/day)			
			Tourist		Traveler	
Year	Thai	Foreign	Thai	Foreign	Thai	Foreign
1986	1.6	4.1	641.2	1,444.1	423.2	1,877.4
1987	2.1	4.5	680.4	1,532.6	452.8	2,021.7
1988	2.0	5.6	853.3	1,791.0	563.2	1,414.9
1989	2.5	6.1	885.0	1,857.5	552.9	1,473.0
1990	2.1	6.2	1,092.2	1,980.2	765.4	1,395.2

Appendix B

WASTEWATER VOLUME ESTIMATION

In general, the quantity of wastewater generated is a function of water consumption. Wastewater characteristics are dependent on the quality of water supplied and the way the water is used.

In Pattaya, the main source of water supply is the Mabprachan reservoir. This water is treated and supplied as piped water by the Provincial Water Authority (PWA) to Na Klua, Pattaya, and Chomtien areas. It serves virtually all hotels, public and commercial developments and approximately 50 percent of the residential households in Pattaya City and Bang Lamung. Rain and shallow wells are supplementary water sources in Pattaya. Piped water supply has only expanded slowly, while water demand in Pattaya has risen rapidly in recent years due to the increase numbers of tourist and rising standards of living. In 1989, there is a problem of water supply shortages began in Pattaya. Many hotels and commercial users have supplemented their PWA supply from other sources, i.e., water from venders.

On Ko Lan, the main water supply source is rain water, shallow wells, and a small number of tankers provided by the Royal Thai Navy.

Based on the 1990 PWA's Pattaya water demand data, the unit daily sewage volumes and strengths are estimated for five principal water users in Pattaya:

(1) domestic,

(2) public,

(3) tourist (hotels and condominiums),

(4) commercial and

(5) industrial.

Although water consumption can be expected to increase over time due to improvements in living standards and changing lifestyles, this study used fixed rates for all water users because the time period under study is relatively short.

(1) Domestic

For the purpose of sewer/sewage treatment works, design and cost estimation, the unit daily volume of sewage is assumed to be equal to water consumption, which is 230 liters per capita per day (PWA 1989). This also allows for sewer infiltration and background flows in the street drainage system. Domestic sewage strength is estimated at 150 mg/l BOD and 120 mg/l S.S. These estimates are based on existing sewage treatment works and data from ONEB's Report on Domestic Wastewaters and Pollution Problems in Bangkok and Its Vicinity, 1987. This is equivalent to BOD loads of approximately 48 gm/cap/day.

Although BOD loads and suspended solids can be expected to increase over time due to improvements in living standards and changing lifestyles, this study used a fixed rate for both loads because the time period under study is relatively short.

(2) Public

Sewage flows from public premises e.g., schools, hospitals, police stations, etc., are assumed to be equal to water consumption volumes, which are 15 percent of the total domestic demand, and are assumed to have the same characteristics as domestic sewage.

(3) Tourist

Wastewater generated by tourists is considered for two categories: per hotel room and per condominium unit.

The daily unit volume of sewage per occupied hotel room for the peak season is assumed to be equal to water demand (in liter per guest-day less allowance for swimming pool

replenishment and air conditioning of 340 l/guest-day, with an average room occupancy 1.78 guests per room (JICA 1990)). Sewage flows for the peak season are, therefore, 800 l/room/day. This rate is close to the 770 l/room/day used by ONEB for Bangkok hotels. The strength of hotel-generated raw sewage is estimated at 200 mg/l BOD and 150 mg/l S.S. (the NEB Report is 190 mg/l BOD). For the average season, the flow is equal to peak flows, multiplied by the TAT's average occupancy rates for the year. It is noted that many hotels have their own sewage treatment facilities installed but information on their actual performance is difficult to assess.

The daily unit volume of sewage per tourist-occupied condominium unit is assumed equal to per capita domestic water consumption times the occupancy rate for the year. Tourist-occupied condominium unit volumes of sewage are, therefore, 1,150 l/unit/day. Occupancy rate for condominiums are assumed to be equal to 20 percent and 63 percent for average and peak seasons respectively (estimated by the author, based on information from four condominiums in Pattaya and six in Chomtien). The characteristics of the sewage is assumed to be the same as those for domestic sewage.

(4) Commercial

Sewage flows generated by commercial premises, e.g.,. shops, business, restaurants, etc., are assumed to be equal to water consumption volumes which are 52 percent of that generated by hotels and condominiums, and to have the same characteristics as domestic sewage.

(5) Industrial

Up to 1990, the tapioca industry discharged substantial sewage flows and pollution loads into Na Klua River. As of 1990, the flows and loads from major tapioca factories discharged into the Na Klua river are after treatment in stabilization ponds. Other industrial premises are small workshops and food factories spread through out Na Klua (about 65 percent) and Pattaya town (about 35 percent). The fishing industry in Na Klua, Bang Sare, and Ko Lan dispose of most of its liquid and solid wastes directly to the sea or offshore. Industrial flows are based on the estimates of the JICA study in 1989. Therefore, wastewater flows in Na Klua and Pattaya areas are 2,907 and 273 cu.m/day respectively. Both flows are assumed to have 300 mg/l BOD loads and 200 mg/l SS. The tapioca and fishing industries in Na Klua are expected to decline soon as investment and employment prospects in tourism-

related industries are becoming more attractive. New sources of industrial wastewater are, therefore, not expected to develop in the study area.

The database used for estimating sewage treatment costs are presented below.

Year	Population	# Hotel Room	Hotel Occ. Rate	# Condo Room
1986	71,876	10,696	55.2	1,158
1987	105,124	11,262	61.9	1,158
1988	112,540	14,297	62.9	1,259
1989	105,706	18,097	58.3	1,263
1990	113,322	19,433	53.6	16,862

The population data were taken from Thailand Annual Statistics. The data on number of hotel rooms, number of condominium rooms, and hotel occupancy rates were provided by TAT. A large increase in the number of condominium rooms in 1990 is a result of the 1987's Visit Thailand Year campaign. Most condominium construction projects during 1987-1988 are of high rise type, with at least 200 rooms per condominium.

Appendix C

SOLID WASTE VOLUME ESTIMATION

The total quantity of solid waste disposed in Pattaya is the sum of the quantity of solid waste disposed from the residential sector and the tourism sector in Pattaya. The estimation procedure for the total quantities of solid waste disposed in Pattaya per year for the period 1986-1990 is as follows:

1. Estimate the quantity of solid waste disposed by the domestic sector (DSW) by multiplying the population in Pattaya by the population disposal rate per year (0.7 * 365 kg/y).

2. Estimate the quantity of solid waste disposed by residents engaged in the tourism sector of Pattaya (RSW) by multiplying DSW by 49 percent (= percentage of employed population in Pattaya) and 75.2 percent (= percentage of employed population in the tourist sector) respectively.

3. Estimate the quantity of solid waste disposed by tourists (TRSW) in Pattaya by multiplying the number of Thai and foreign tourists with Thai and foreign tourist length of stays, respectively, and then add the two figures to obtain the total number of days that tourists stayed in Pattaya for the year. The number of days is further divided by 365 to obtain the number of tourist-population equivalent for that year, and then multiplied by the visitor disposal rate per year (2.1 * 365 kg/y).

4. Estimate the quantity of solid waste disposed by the travellers (TVSW) in Pattaya by dividing the total number of travellers in Pattaya by 365 to obtain the number of traveller-population equivalent for that year and further multiply the outcome by the visitor disposal rate per year (2.1 * 365 kg/y).

5. Finally, the total quantity of solid waste disposed by the tourism sector of Pattaya is equal to the sum of the quantity of solid waste calculated in (2), (3) and (4), while the quantity of solid waste disposed by the residential sector of Pattaya is equal to the quantity of solid waste calculated in (1) minus the quantity calculated in (2).

The quantities of solid waste in tons per year disposed by the population, tourists, and travellers from 1986-1990 are presented below.

Year	Total	Population	Tourist	Traveller
1986	25,262	17,000	7,066	1,195
1987	38,631	24,863	12,295	14,724
1988	46,488	26,688	17,543	22,561
1989	46,395	25,001	19,611	17,455
1990	46,565	26,802	18,321	14,411

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