Fathi Habashi

My trips to

Australia & Southeast Asia

2015

My Trips to Australia and Southeast Asia

Volume derived from

Fathi Habashi

Department of Mining, Metallurgy, and Materials Engineering
Laval University, Quebec City, Canada

2015

The Book

The present volume is derived from *De Re Metallica. A Metallurgist on the Move*, which is a diary of the trips the author has undertaken during his professional career. He visited many industries, universities, research centres, and museums and participated in many conferences. The book therefore reflects the state of extractive metallurgy since he left his home country Egypt and went to study in Vienna. *De Re Metallica* is in seven volumes fully illustrated mainly by coloured photographs. It includes a short history of the place visited and its main sightseeing sites. Volume 1 Egypt, Volume 2 Canada, Volume 3 United States, Volume 4 Latin America, Volume 5 Asia [in two parts], Volume 6 Europe [in two parts], and Volume 7 Russia & other countries. Total number of pages was 5500.

Since these volumes could not be separated and therefore they will not be available to many readers, I decided to split the book into selected 29 small units, each representing one country or a group of countries closely related geographically. The present volume is one of these volumes.

The Author

Fathi Habashi, Professor Emeritus at Laval University in Quebec City. He holds a B.Sc. degree in Chemical Engineering from the University of Cairo, Dr. techn. degree in Inorganic Chemical Technology from the University of Technology in Vienna, Dr. Sc. *honoris causa* from the Saint Petersburg Mining Institute, Dr. *h.c.* from National Technical University in Lima, and Dr. *h.c.* from San Marcos University also in Lima. He held the Canadian Government scholarship at the Mines Branch in Ottawa, taught at Montana College of Mineral Science & Technology, then worked at the Extractive Metallurgical Research Division of Anaconda Company in Tucson, Arizona, before joining Laval in 1970. His research was mainly directed towards organizing the unit operations in extractive metallurgy and putting them into a historical perspective.

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To Nadia,
Hani, and Hatem
with love

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Preface

De Re Metallica. A Metallurgist on the Move is a diary of the trips the author has undertaken during his professional career. He visited many industries, universities, research centres, and museums and participated in many conferences. The book therefore reflects the state of extractive metallurgy since he left his home country Egypt and went to study in Vienna. The book is in seven volumes fully illustrated mainly by coloured photographs. It includes a short history of the place visited and its main sightseeing sites. Volume 1 Egypt, Volume 2 Canada, Volume 3 United States, Volume 4 Latin America, Volume 5 Asia [in two parts], Volume 6 Europe [in two parts], and Volume 7 Russia & other countries. Total number of pages was 5500.

Since these volumes could not be separated and therefore they will not be available to many readers, I decided to split the book into selected 28 small units each representing one country or a group of countries closely related geographically as shown below.

1	Arab Countries	Jordan, Kuwait, Morocco, Syria, Tunis
2	Austria	
3	Australia & Southeast Asia	Australia, Cambodia, Indonesia, Malaysia, Philippines, Thailand, Vietnam
4	Balkans	Albania, Bosnia, Bulgaria, Croatia, Greece, Romania, Serbia, Slovenia
5	Baltic Countries	Latvia, Lithuania, Poland
6	Brazil	
7	Canada	
8	Caribbean	Cuba, Puerto Rico, Venezuela
9	Caucasus	Armenia, Azerbaijan, Georgia
10	Central Asia	Afghanistan, Kazakhstan, Mongolia, Uzbekistan
11	Central Europe	Czech Republic, Slovakia, Hungary, Switzerland
12	Chile and Argentina	
13	China	
14	Egypt	
15	England and France	
16	Germany	
17	Iberian Peninsula	
18	India	
19	Italy and Vatican	
20	Japan and Korea	
21	Low Countries	

22	Mexico	
23	Middle East	Iran, Turkey
24	Peru and Bolivia	
25	Russia	
26	Scandinavia	
27	South Africa	
28	USA	

I hope in this way the book will available to a large number of readers.

Fathi Habashi
Fathi.Habashi@arul.ulaval.ca

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Chapter 1

Australia

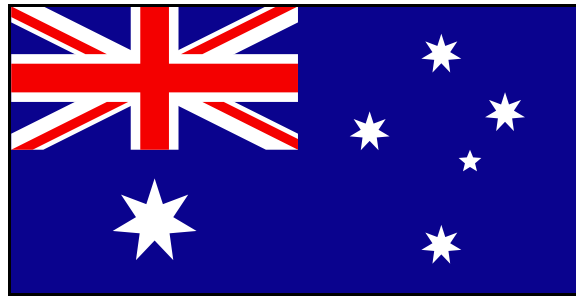


Figure 1.1: Flag of Australia.

INTRODUCTION

The International Mineral Processing Congress was held twice in Australia: in June 1993 in Sydney and in September 2010 in Brisbane. After participating in both conferences visits to nearby organizations were undertaken.

INTERNATIONAL MINERAL PROCESSING CONGRESS 1993

The Congress was organized in Sydney (Figures 1.4–1.5) by the Australasian Institute of Mining and Metallurgy on the occasion of its Centenary year. Five hundred delegates and 100 companions attended from 31 countries. Two hundred and twenty papers were presented in 5 parallel meetings during 4 days. Six sessions were devoted to hydrometallurgy with a total of 30 papers. Proceedings were published in 5 hard-cover volumes, total pages 1 500.

Figure 1.2: Globe map showing the location of Australia.

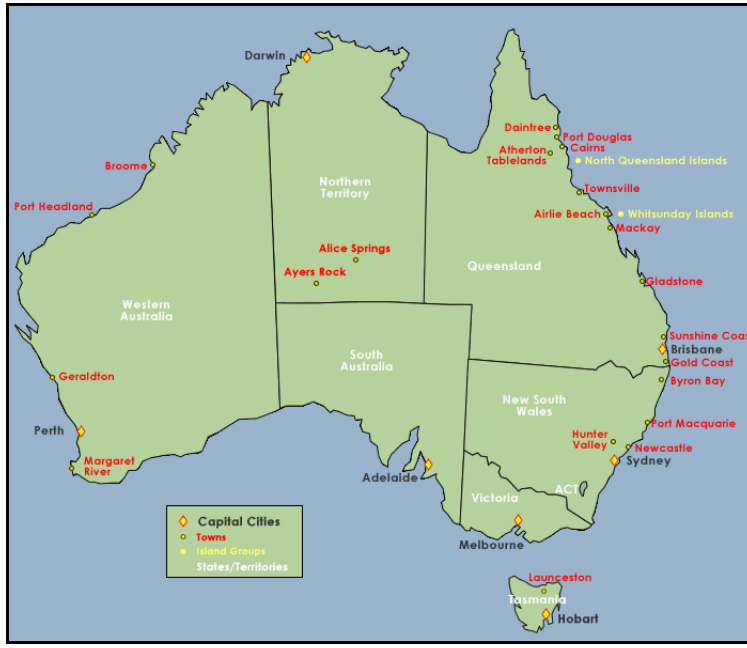


Figure 1.3: Map of Australia showing places visited: Sydney, Melbourne, Brisbane, and Townsville.

Figure 1.4: A view of Sydney.

Figure 1.5: IMPC banquet with Ana María Celeda from Argentina.

CSIRO, Melbourne

CSIRO is acronym for Commonwealth Scientific & Industrial Research Organization. This is Australia's national scientific research and development agency. CSIRO began life in 1926 as the Council for Scientific and Industrial Research. Today CSIRO's primary functions are to carry out scientific research to assist industry, to contribute to national and international objectives and responsibilities of the Australian Government, and to facilitate the application of the results of its own and other scientific research.

The organization is composed of 6 research institutes (Figures 1.6–1.7) and a corporate support group. Each institute directs its research towards a major sector or sectors of industry, and each contains a set of divisions specialized to a particular industrial or environmental subsector. There are 35 divisions or research units in all, employing 7 000 people at over 75 locations, both in Australia and overseas.

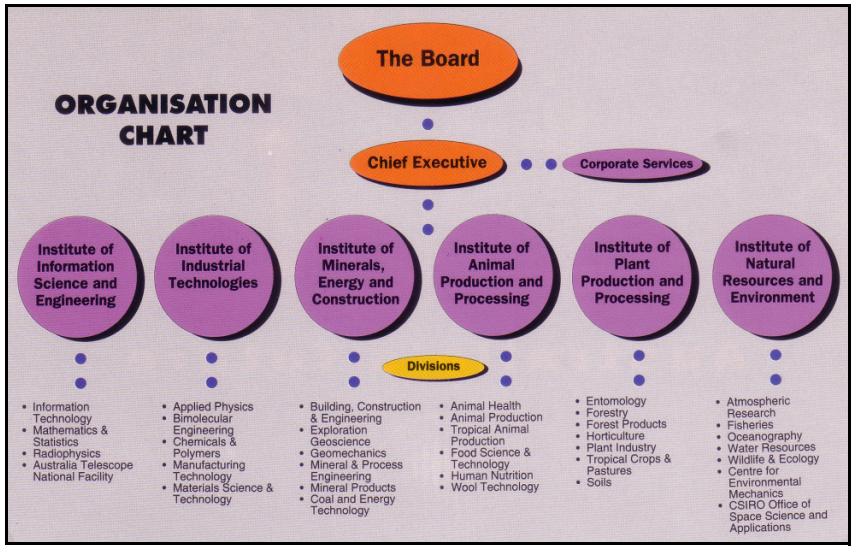


Figure 1.6: CSIRO 1993.

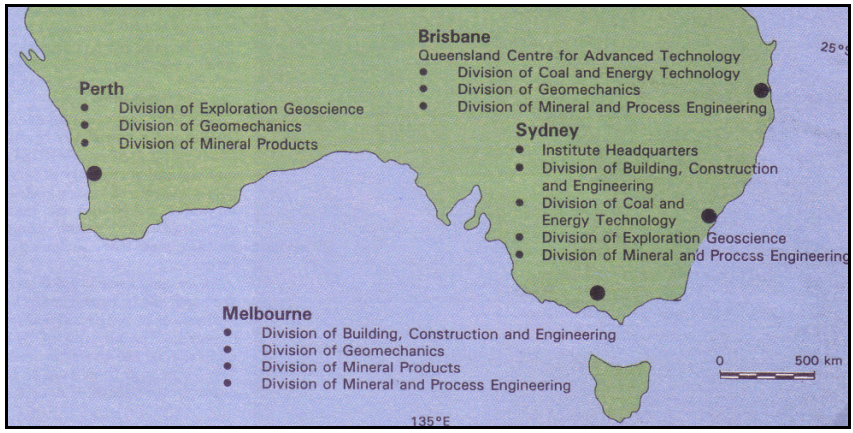


Figure 1.7: CSIRO in Australia, 1993.

CSIRO has research agreements with the University of Melbourne, and the Australian Mineral Industries Research Association and Parker Cooper-

ative Research Centre for Hydrometallurgy. CSIRO has also developed close relations with the Julius Kruttschnitt Mineral Research Centre of the University of Queensland near Brisbane (founded in 1970). The Centre's main research activity is in the simulation of mineral treatment processes.

A visit was made to the Division of Mineral Products in North Melbourne, and meetings were held with Chief of Division Tom Biegler (Figure 1.8) and his Deputy Hari Sinha (Figure 1.9), and Jeff Wunderlich, Manager of Scientific Services (Figure 1.10) and others. Biegler Visited Laval University in summer 1971 when he was active in hydro-electrometallurgy research.

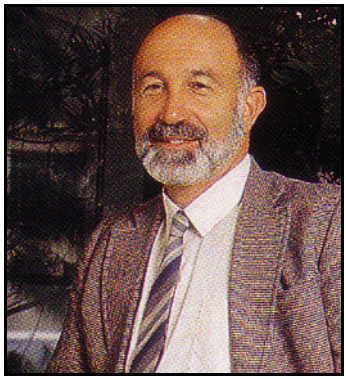


Figure 1.8: Tom Biegler.

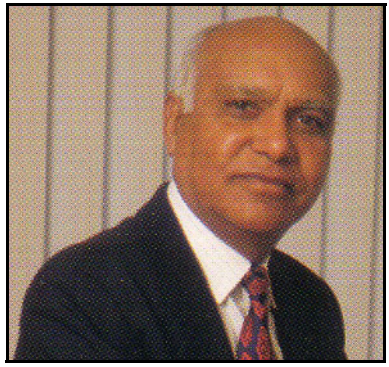


Figure 1.9: Hari Sinha.

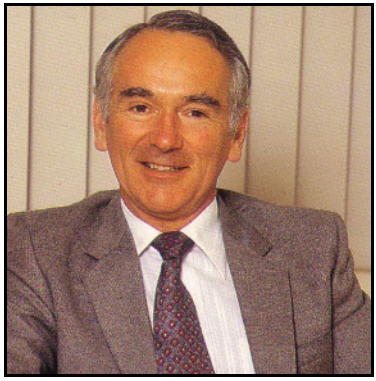


Figure 1.10: Jeff Wunderlich.

INTERNATIONAL MINERAL PROCESSING CONGRESS 2010

Brisbane (Figure 1.11) is the third most populous city in Australia. It was named after Sir Thomas Brisbane, the Governor of New South Wales from 1821 to 1825.

Figure 1.11: Brisbane.

Figure 1.12: IMPC Council from left: Robin Batterham [Australia], Cyril O'Conner [South Africa], Wang [China], award winner Alban Lynch [Australia], and Eric Forssberg [Sweden].

Figure 1.13: Congress badge.

Figure 1.14: IMPC 2010.

Figure 1.15: Philippine delegation.

Certificate of Attendance

This certificate of attendance is presented to

Fathi Habashi

Laval University

In recognition of attendance and participation at the

XXV International Mineral Processing Congress - IMPC 2010

"Smarter Processing for the Future"

6 - 10 September 2010, Brisbane, Australia

Dr Ralph Holmes, Congress Chair
XXV International Mineral Processing
Congress 2010 - IMPC 2010

XXV impc 2010 brisbane australia
silver jubilee

IMPC
INTERNATIONAL MINERAL PROCESSING COUNCIL

Figure 1.16: Certificate of attendance.

Figure 1.17: With Ersin Yazıcı from Turkey.

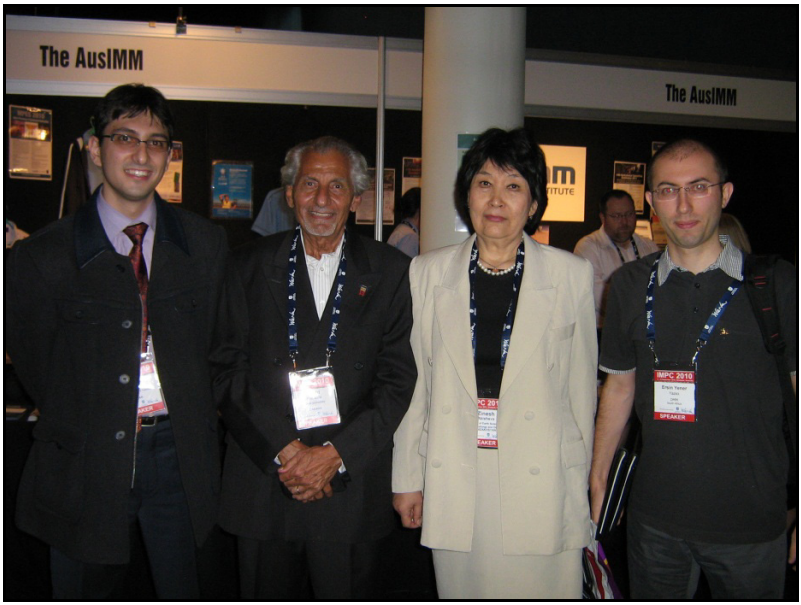


Figure 1.18: With Zinesh Abisheva from Kazakhstan.

Figure 1.19: With Amanda and Barry Wills, and others.

Figure 1.20: Ivan and Irena from Bulgaria.

Figure 1.21: Russian friends from Irkutsk.

Figure 1.22: With John Adi from Nigeria.

Russell Re-lining Equipment

Russell Re-lining Equipment is located in Toowoomba, which is 127 km west of Brisbane. George Russell (Figure 1.23) invited participants to visit his plant for re-lining of grinding mills (Figure 1.24). Mill liners are designed to be sacrificial linings to protect grinding mill shells. A Mill Relining Machine is designed to remove and place liners in grinding mills.

Figure 1.23: George Russell.

Figure 1.24: Russell technology for re-lining grinding mills.

Townsville

Adjacent to the central section of the Great Barrier Reef, it is in the dry tropics region of Queensland. The city is famous for its Strand, a long tropical beach and garden strip, a large number of native flora and fauna.

Figure 1.25: Townsville.

Figure 1.26: Townsville.

James Cook University

The university is named after the British sea captain James Cook whose exploratory vessel HM Bark Endeavour ran aground for repairs in North Queensland. The University was founded in 1970 and officially opened by Queen Elizabeth II.

Figure 1.27: James Cook University.

Figure 1.28: From left: host Professor Yinghe He [originally from Changa in China] and his graduate student Reza Al-Shakarji [originally from Iraq].

Aboriginals

Aboriginals are quite visible in Townsville (Figure 1.29). Their distribution seems to be well studied in Australia (Figure 1.30). Their art is also frequently displayed in hotels and public places (Figures 1.31–1.39).

Figure 1.29: Aboriginals in Australia.

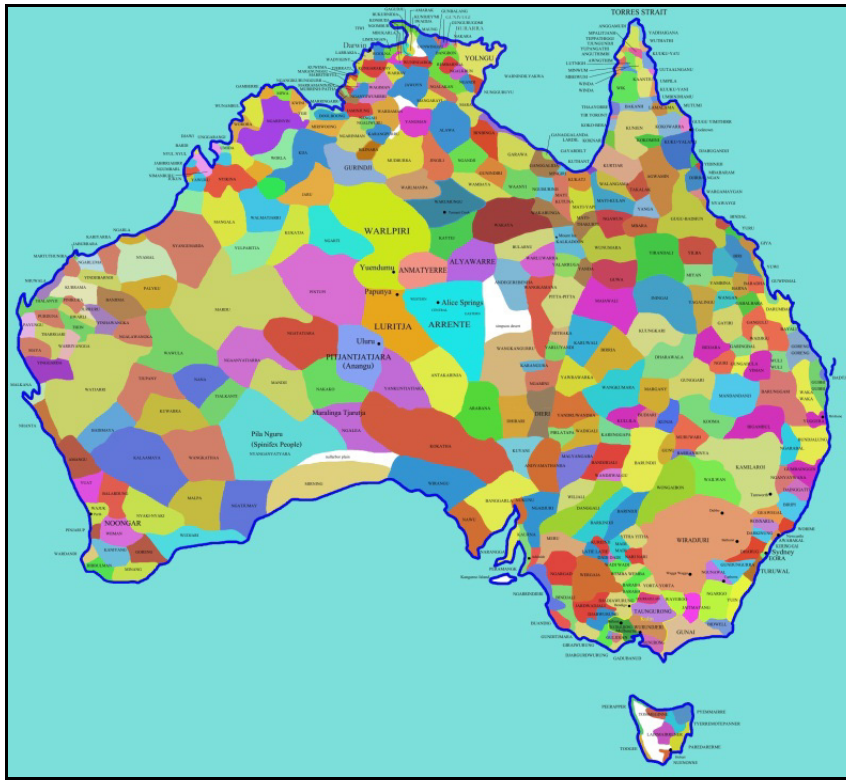


Figure 1.30: Different aboriginal groups in Australia.

Figure 1.31: Aboriginal art.

Figure 1.32: Aboriginal art.

Figure 1.33: Aboriginal art.

Figure 1.34: Aboriginal art.

Figure 1.35: Aboriginal art.

Figure 1.36: Aboriginal art.

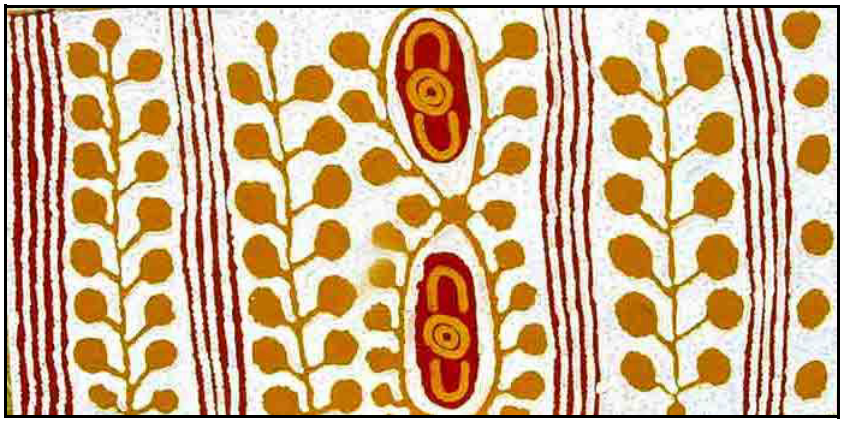


Figure 1.37: Aboriginal art.

Figure 1.38: Aboriginal art.

Figure 1.39: Aboriginal art.

More about Australia

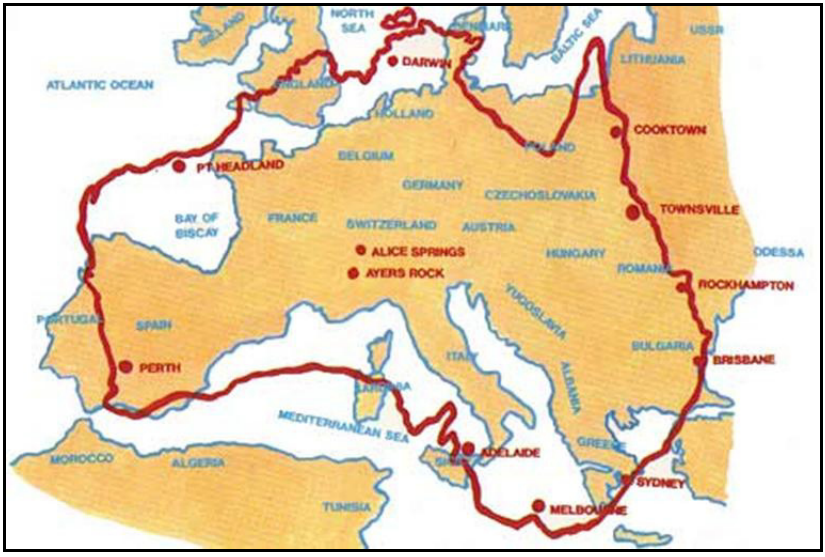
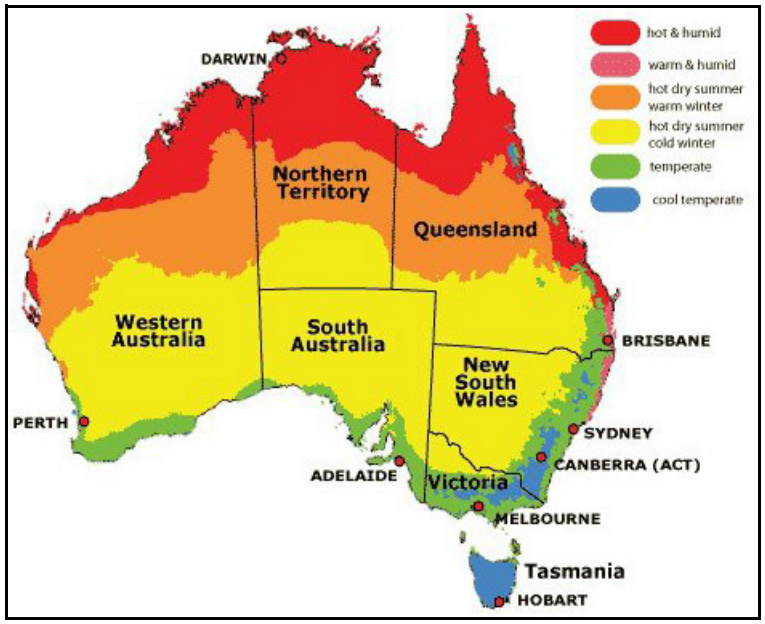


Figure 1.40: As big as Europe.



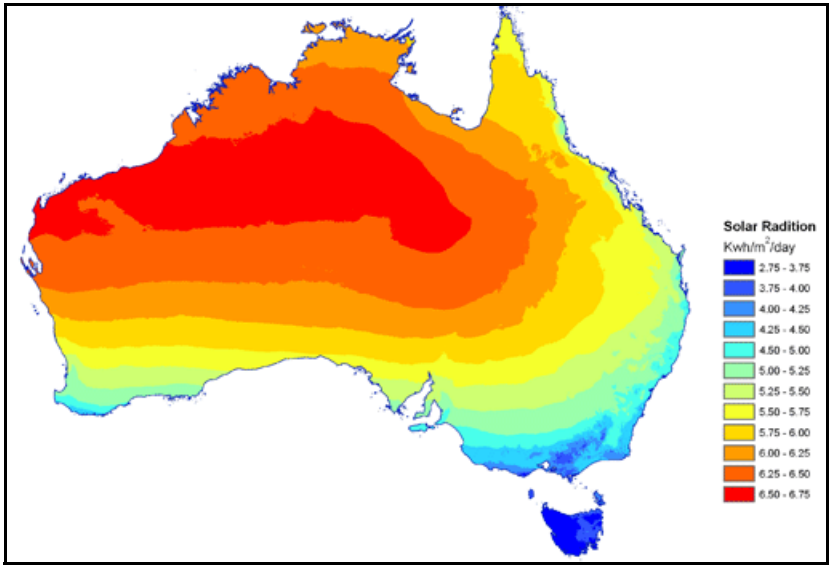


Figure 1.41: Solar radiation.

Figure 1.42: Summary according to some people.

Chapter 2

Cambodia

Figure 2.1: Flag of Cambodia.

INTRODUCTION

In October 2003, during a scientific mission to Japan and Vietnam, I took few days off to visit the vanished Khmer Empire in Cambodia (Figures 2.2–2.4).

KHMER EMPIRE

Angkor served as the seat of the Khmer Empire that flourished when the Khmer Hindu monarch Jayavarman II (reigned 1113–1150) declared himself "god-king" of Cambodia. In 1431, Thai invaders sacked the Khmer capital, causing its population to migrate south to the area of Phnom Penh. The ruins of Angkor are located amid forests and farmland near modern town Siem Reap. The temples of the Angkor area number over one thousand said to be the world's largest single religious monument, richly decorated and very impressive (Figures 2.5–2.9).

Figure 2.2: Cambodia and her neighbours.

Figure 2.3: Location map of Siem Reap in Cambodia.

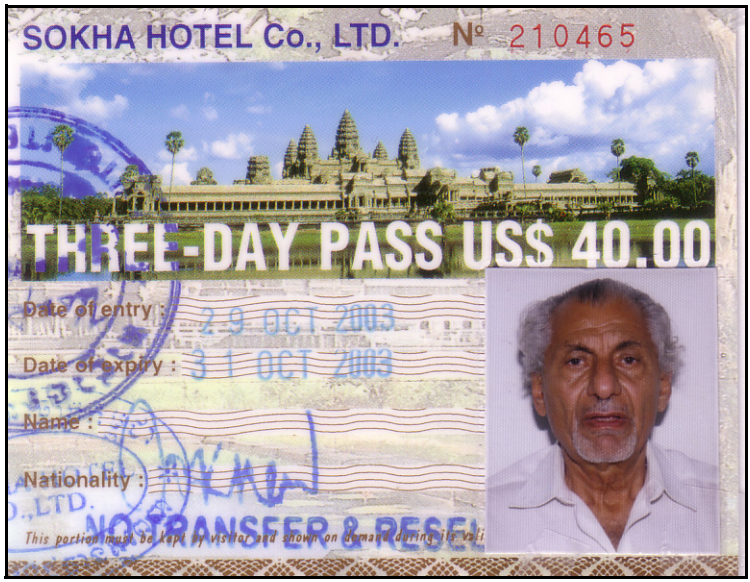


Figure 2.4: Pass to visit the remains of the Empire.

Figure 2.5: In front of the temple complex.

Figure 2.6: Temple complex of Angkor the largest religious temple complex in the world showing the location of Neak Paon [16] at the top.

Figure 2.7: One of the largest temples at Angkor.

Figure 2.8: The temple complex.

Figure 2.9: The temple complex.

The temples are build from sandstone blocks quarried from Kulen Hills 30 km north-east of Angkor. The blocks were floated along the Siem Reap River then transported by elephant or ox carts to Angkor. The blocks could then be hoisted into place using tripods, levers, and pulleys. No mortar was used between the stones. Once in place, the structure was then decorated by

hundreds of stone carvers. At the centre of Angkor Thum remains is a stepped central temple the Bayon with a 45-m high pyramidal tower at its centre. The tower has four massive heads carved into its top. Each head, representing both the Buddha and King Jayavarman VII (reigned 1181–1219) as the Buddha's reincarnation, faces one of the four directions (Figures 2.10–2.12).

Fifty-one smaller towers surrounded the central tower, each likewise ornamented with four carved heads facing the four directions. The two walls enclosing the Bayon were decorated numerous with bas-relief carvings. The exterior of the outer walls included bas-reliefs depicting historical events, and the bas-reliefs on the exterior of the inner walls depicted legendary scenes (Figures 2.14–2.20).

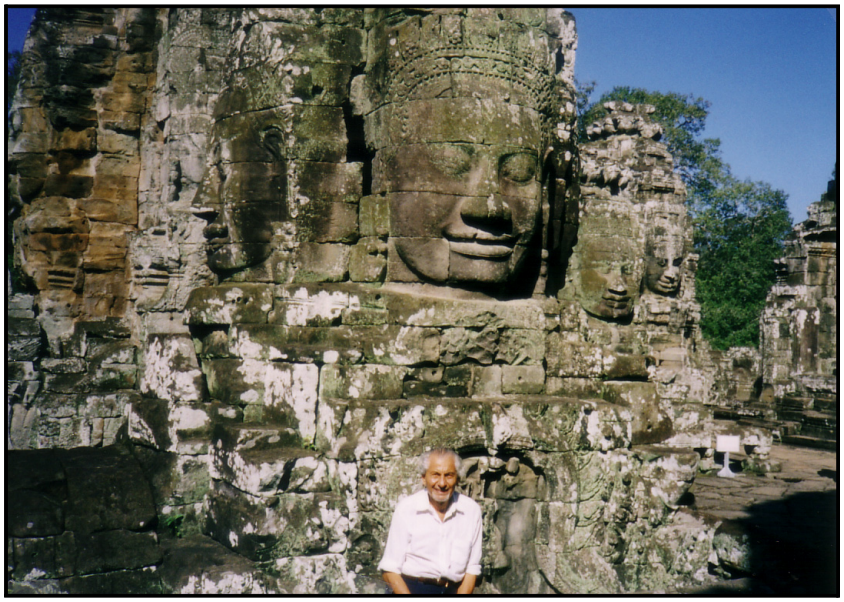


Figure 2.10: Sand stone religious figures.

After his death, the Khmer kingdom began to shrink under pressure from the Thai Kingdom of Sukhothai, but retained power and splendour throughout the 13th century. Angkor was abandoned as the Cambodian capital in 1431, but Angkor Wat was turned into a Buddhist temple and remained in use. French archaeologists began uncovering the Angkor site in 1863, and for nearly a century thereafter the French conducted an extensive project of reconstruction and research.

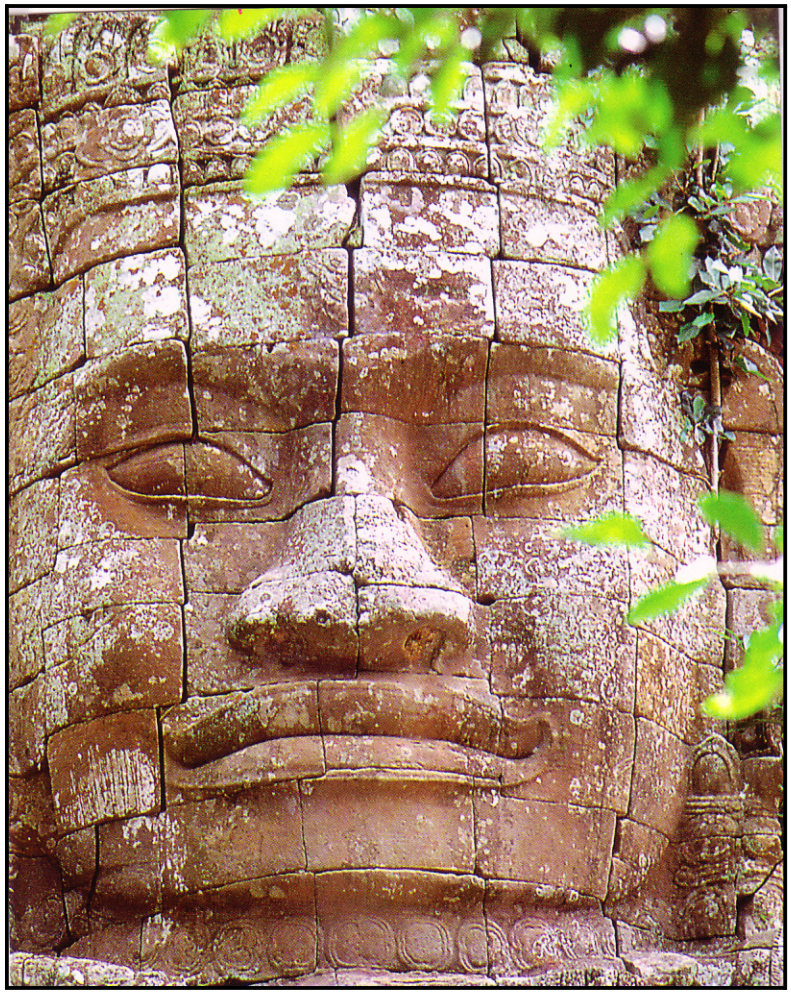


Figure 2.11: Sand stone religious figure.

Figure 2.12: Sand stone religious figure.

Figure 2.13: Sand stone religious figures.

Figure 2.14: In one of the temples.

Figure 2.15: In one of the temples.

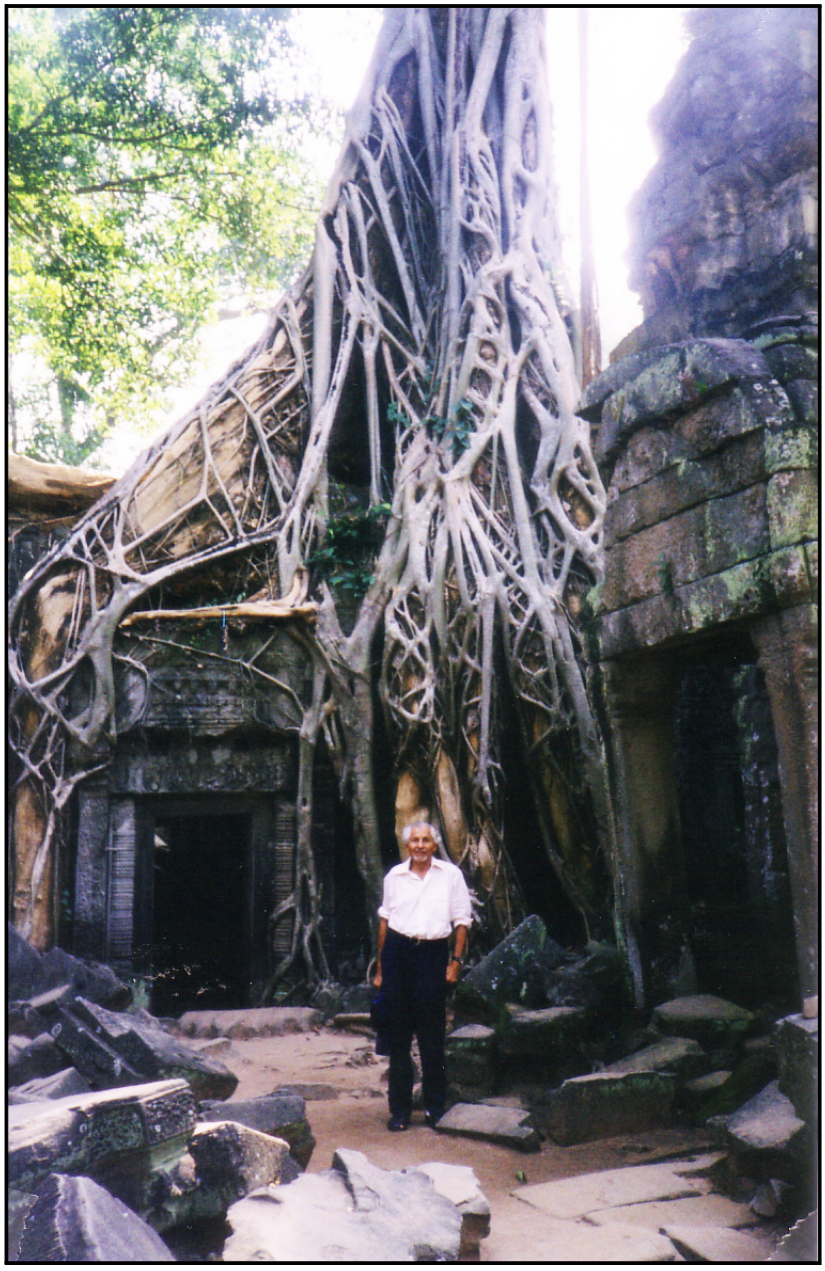


Figure 2.16: In one of the temples.

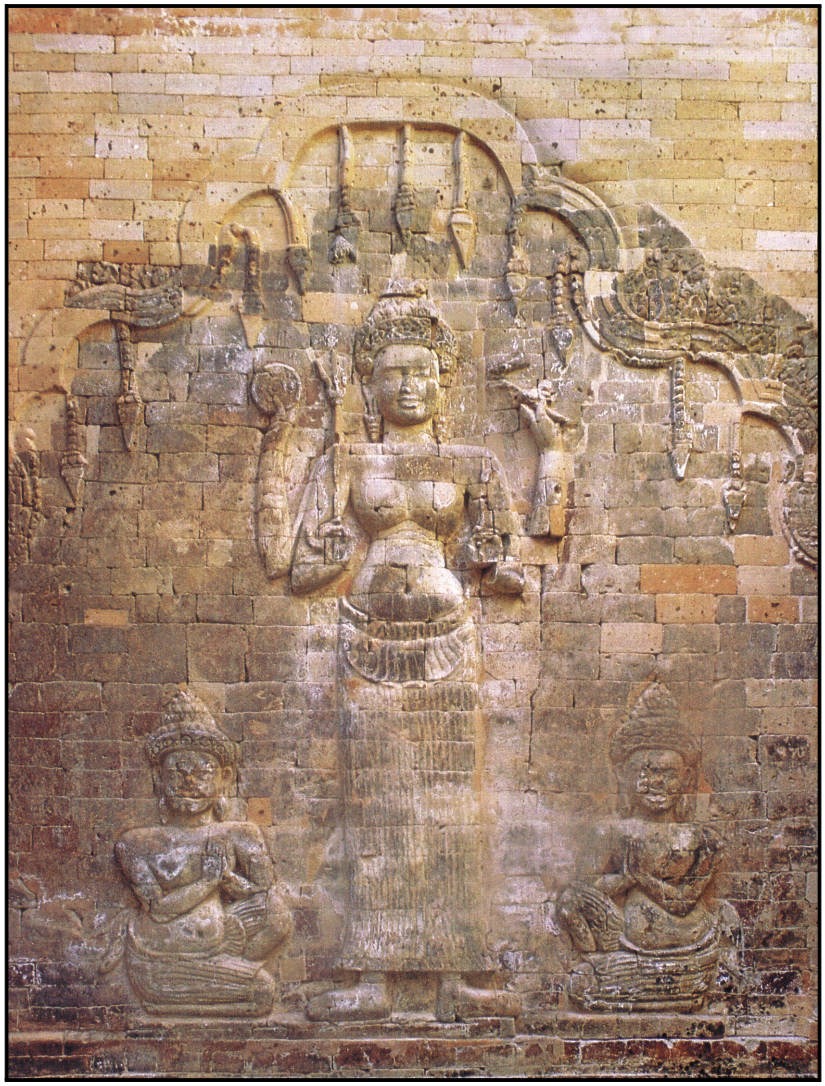


Figure 2.17: A carved wall built from sandstone at Angkor showing an Apsara [a celestial nymph].

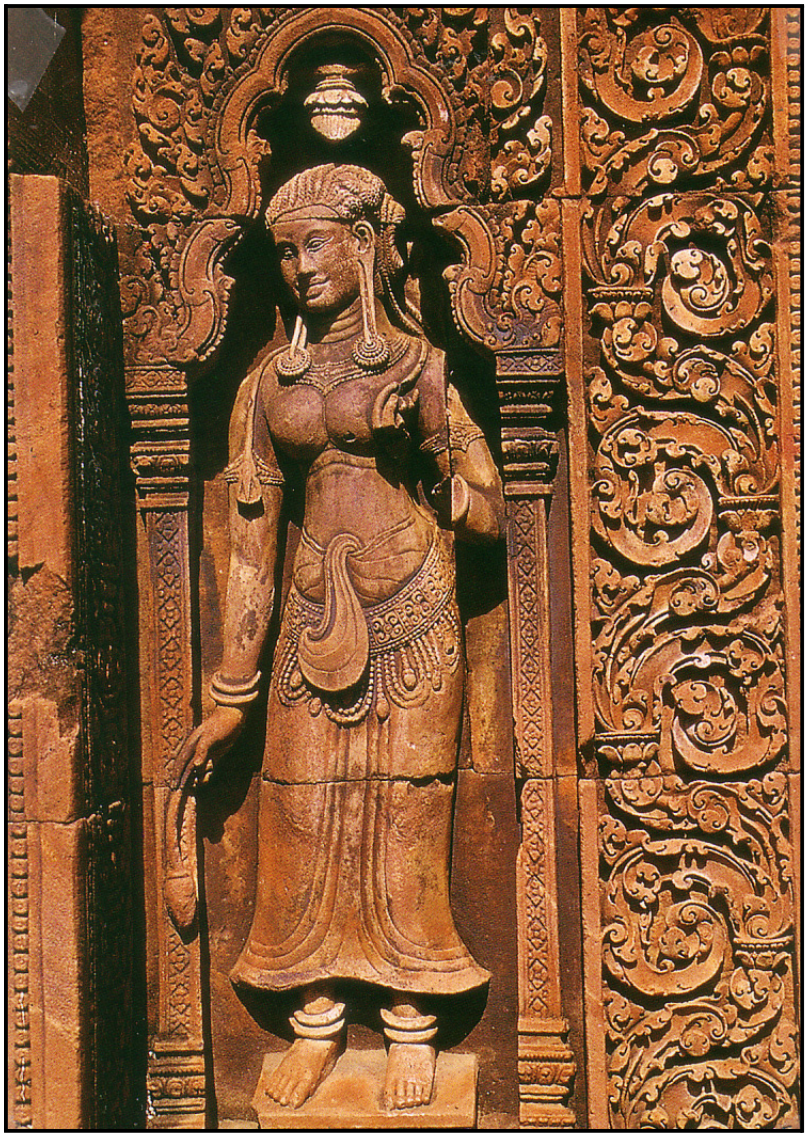


Figure 2.18: A celestial nymph.

Figure 2.19: A celestial nymph.

Figure 2.20: Celestial nymphs.

The Four Elements in Cambodia

At Angkor there are a large number of temples mainly in square or rectangular form. One of these known is the Four Elements Temple, known locally as "Neak Pean," founded by Buddhist King Jayavarman VII who reigned from 1181 to 1220. The temple seems to have served as a place where pilgrims could go and take the sacred water. The temple is set in a large man-made square lake surrounded by four smaller square ponds (Figure 2.21).

Each pond has a vaulted roof and is connected to the lake. The four buildings served a ceremonial function where pilgrims could meditate. Each water-spout is different: the elephant's head symbolizes Water, the human head symbolizes Earth, the horse's head for Air, and the lion's head for Fire. The Cambodian four elements is said to be described in the Sanskrit books and is well known to the people. They also believe that on cremation, fire and air transform the body to water (vapour) and earth (ash).

The fact that water, earth, air, and fire are the essential religious components of the temple recalls to the historians of chemistry the Theory of Four Elements. The fact that Cambodian rulers were also familiar with these ideas suggests that the theory may have reached the Khmer kings from Persia via India by Buddhist monks who migrated to Cambodia to preach the new faith. In India, during Buddha's time (563–483 BC), the universe was thought to be composed of four elements: earth, water, air, and fire.

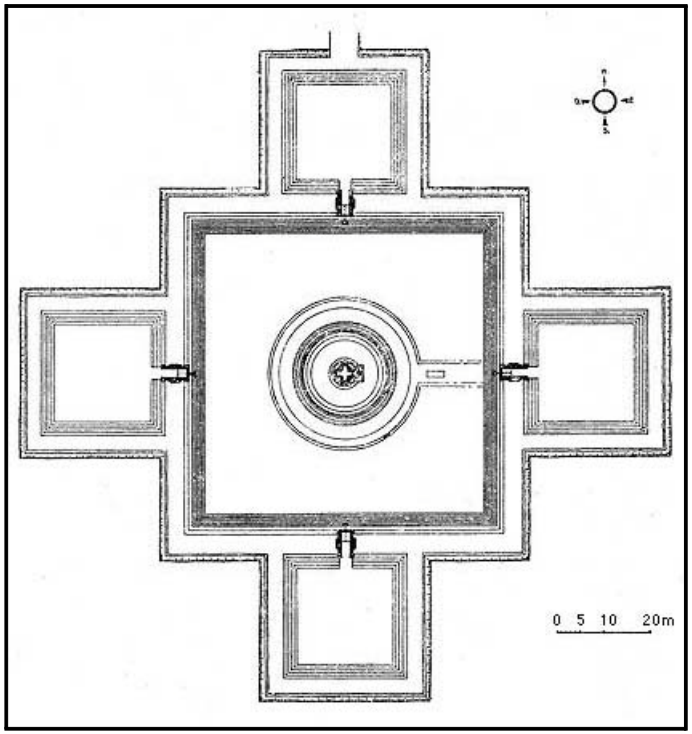


Figure 2.21: Plan of the Temple Neak Pean showing the central island and the four small lakes symbolizing the Four Elements: water, air, earth, and fire.

Chapter 3

Indonesia

Figure 3.1: Indonesian flag.

Figure 3.2: Map of Indonesia.

HISTORICAL BACKGROUND

The last significant Hindu kingdom in Indonesia flourished in the late 13th century, and its influence stretched over much of the country. Islam came through trade from the 13th century in northern Sumatra. It became the dominant religion in Java and Sumatra by the end of the 16th century. Europeans arrived in the 16th century seeking to monopolize the sources of spices. In 1602 the Dutch established the Dutch East India Company and became the dominant European power. Following bankruptcy, the Company was dissolved in 1800, and the Government of the Netherlands established the Dutch East Indies as a colony. During the 19th century, the Dutch began sugar and coffee cultivation on Java. By the early 20th century Dutch dominance extended to what was to become Indonesia's current boundaries.

The Japanese invasion and subsequent occupation during World War II ended Dutch rule, and encouraged the previously suppressed Indonesian independence movement. Two days after the surrender of Japan in August 1945, nationalist leader Sukarno (1901–1970) (Figure 3.3) declared independence and was appointed president. The Netherlands tried to re-establish their rule, but an armed struggle ended the occupation in December 1949.

Figure 3.3: General Sukarno (1901–1970).

Figure 3.4: General Suharto (1921–2008).

An attempted coup in 1965 led to a violent army-led anti-communist purge in which over half a million people were killed. General Suharto (1921–2008) (Figure 3.4) was appointed president in 1968. Indonesia was hardly hit by the Financial Crisis which led to popular protests and Suharto's resignation in 1998. Political and economic instability, social unrest, corruption, natural disasters, and terrorism have slowed progress.

Culture of Indonesia

Indonesia is an archipelagic country of 17 508 islands of which 6 000 are inhabited, stretching along the equator. The country is populated by peoples of various migrations, creating a diversity of cultures, ethnicities, and languages. The culture of Indonesia has been shaped by long interaction between original indigenous customs and multiple foreign influences.

Indonesia is centrally located along ancient trading routes between the Far East and the Middle East, resulting in many cultural practices being strongly influenced by a multitude of religions, including Hinduism, Buddhism, Confucianism and Islam. Puppet shows were a medium in the spread of Hinduism and Islam amongst Javan villagers. Both Javanese and Balinese dances have stories about ancient Buddhist and Hindu kingdoms, while Islamic art forms and architecture are present in Sumatra. Western culture has greatly influenced Indonesia in modern entertainment. Some indigenous ethnic groups are still practicing their ethnic rituals, customs, and wearing traditional clothes.

The official language of Indonesia is Indonesian spoken by nearly every Indonesian in business, politics, national media, education and academia. The Indonesians also speak several hundreds of local languages as their first language. Javanese is also widely used besides other Papuan or Austronesian. The largest religious group in Indonesia is Islam with almost 86% of Indonesians being Muslims.

Table 3.1: Visits to Indonesia

Dates	City	Purpose of visit
May 1993	Bandung	Seminar at Bandung Institute of Technology
	Jakarta	Visiting Precious Metal Refinery
		Miniature Park
September 2010	Jakarta	Seminar at Technical University of Indonesia
		Exhibition Park
		National Museum
		Jakarta City Museum
June 2011	Jakarta	Short courses for NeoEdge Consultants in Singapore

BANDUNG 1993

Bandung is the capital of West Java province the country's third largest city. Located 768 metres above sea level, approximately 140 km south eastern of Jakarta (Figure 3.5). The Dutch East Indies Company established tea plantations around the mountains in the 18th century. The city gradually developed into a resort area for plantation owners with luxurious hotels, restaurants, and European boutiques. Since Indonesian Declaration of Independence in 1945, the city has experienced rapid development and urbanization.

Bandung Institute of Technology

In 1920, a Technische Hogeschool was established in Bandung, which for a short time, in the middle forties, became Kogyo Daigaku. Not long after the birth of the Republic of Indonesia in 1945, the campus housed the Technical Faculty of Universitas Indonesia, with the head office in Jakarta. In the early fifties, a Faculty of Mathematics and Natural Sciences, also part of Universitas Indonesia, was established on the campus (Figures 3.6–3.7).

Figure 3.5: Location of Bandung.

Figure 3.6: Institut Teknologi Bandung.

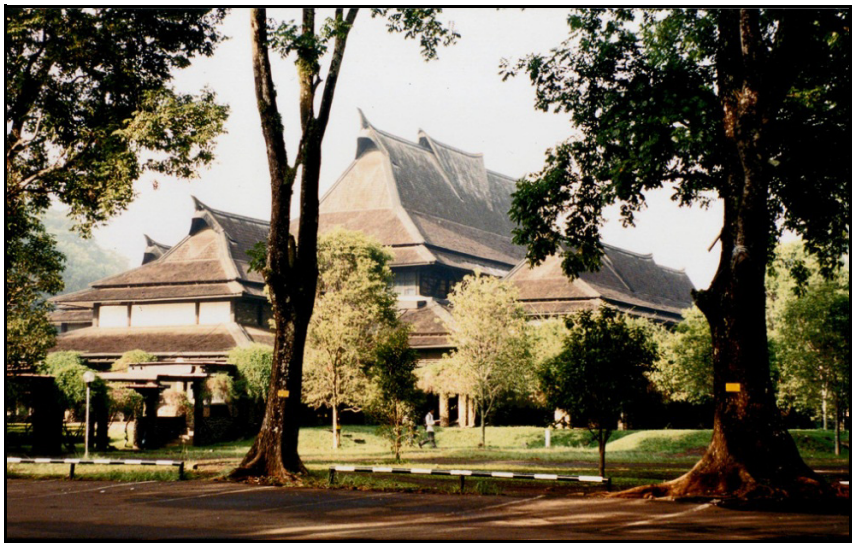


Figure 3.7: Institut Teknologi Bandung.

Ganesha is the logo of the Institute (Figures 3.8–3.9). The broken tusk is the symbol of self-sacrifice in pursuit of scientific progress; the bowl is the symbol of the source of inexhaustible knowledge. The rosary, the string of beads, symbolizes wisdom, the axe is for courage and virtue, and the book represents the book of knowledge.

Figure 3.8: Logo of Institut Teknologi Bandung.

The Department of Mining Engineering was founded in 1948 as a part of the Faculty of Engineering of the University of Indonesia. Since 1959 the Mining Engineering Department has been put under the Faculty of Mineral Technology (Figures 3.10–3.11).

Figure 3.9: A souvenir from the Institut Teknologi Bandung.

Figure 3.10: Institut Teknologi Bandung, 1993. Prof. Faraz Umar [left] and Dr. Syoni [right].

Figure 3.11: Institute of Technology residence.

Meetings were held with the Rector Wiranto Arismunandav (Professor of space science and engineering) (Figure 3.12). The program of the visit is shown in Figures 3.13–3.15.

Figure 3.12: Rector Wiranto Arismunandar.

Soon after World War II the Netherlands Colonial Government re-opened the institute as Fakultas Teknik, Universitet Indonesia. Later on, University of Indonesia was taken over by the Indonesian government, and in the year 1959, the two faculties in Bandung were merged into the Institut Teknologi Bandung. Until 1959, most of the book collections in the library were in the Dutch language; a small number was in German, French, and English. After that year, English documents began to be introduced. Books in the Indonesian language are still few due to the scarcity of university books publications in the country, especially in science and engineering. Host: Dr. Faraz Umar (Figure 3.16), a graduate from the Technische Hochschule in Aachen.

JADWAL ACARA (TENTATIF) PROF. HABASHI

DI ITB DAN P.T. ANEKA TAMBANG UPP - LOGAM MULIA

1. Tuesday, 18 May : 16.30 - Arrival (KLM 837) at Jakarta International Airport (Sukarno-Hatta)
17.30 - to Railway Station of Jakarta/Gambir (accompanied by Faraz and or Syoni)
18.30 or 20.30 - to Bandung by train
21.30 or 23.30 - arrival at Bandung/Guest House

2. Wednesday,19 May : 09.00 - Audiency to the Rector/Vice Rector for Academic Affair/ Dean of Faculty
10.00 - 11.30 Lecture and Discussions on "Leaching &Recovery"
12.30 - 13.30 Lunch with the Chairman of Department, all staff members and guests
19.00 - Dinner with Family Faraz Umar

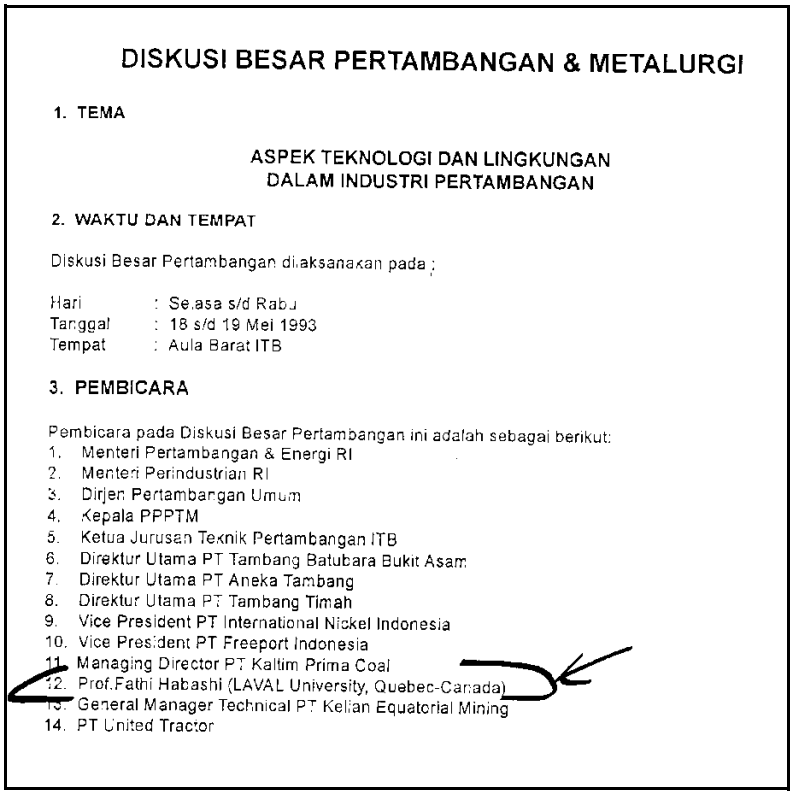
3. Thursday, 20 May : 09.00 - 16.00 Sightseeing to Tangkuban Perahu crater (active crater), hot springs located at Ciater etc. (accompanied by Syoni & Wife & Eddy S.)
(national holiday)

4. Friday, 21 May : 08.00-11.00 Discussion on Anodic Slime Processing (ITB, Metallgesschaft, PPTM, LMN,LPGN, Aneka Tambang, etc)
14.00-16.00 Lecture and Discussion on "Periodic Table Use" (Students)

5. Saturday, 22 May : 08.00 - to Jakarta via Bandung Airport (domestic)
08.30 - arrival at Jakarta domestic Airport (Halim)
10.00 - visit and discussion (1) at Precious Metal Refinery (State owned)
12.30 - Lunch
13.30 - Sightseeing in Jakarta
17.00 - to Jakarta International Airport (Sukarno-Hatta)
21.35 - leave Jakarta (by Quantas) to Sydney, Australia.

Bandung, 17 Mei 1993

Figure 3.13: Program of visit to Indonesia, May 1993.



DISKUSI BESAR PERTAMBANGAN & METALURGI

1. TEMA

ASPEK TEKNOLOGI DAN LINGKUNGAN
DALAM INDUSTRI PERTAMBANGAN

2. WAKTU DAN TEMPAT

Diskusi Besar Pertambangan dilaksanakan pada :

Hari : Selasa s/d Rabu
Tanggal : 18 s/d 19 Mei 1993
Tempat : Aula Barat ITB

3. PEMBICARA

Pembicara pada Diskusi Besar Pertambangan ini adalah sebagai berikut:
1. Menteri Pertambangan & Energi RI
2. Menteri Perindustrian RI
3. Dirjen Pertambangan Umum
4. Kepala PPPTM
5. Ketua Jurusan Teknik Pertambangan ITB
6. Direktur Utama PT Tambang Batubara Bukit Asam
7. Direktur Utama PT Aneka Tambang
8. Direktur Utama PT Tambang Timah
9. Vice President PT International Nickel Indonesia
10. Vice President PT Freeport Indonesia
11. Managing Director PT Kaltim Prima Coal
12. Prof.Fathi Habashi (LAVAL University, Quebec-Canada)
13. General Manager Technical PT Kelian Equatorial Mining
14. PT United Tractor

Figure 3.14: Participating in the seminar.

Figure 3.15: Participating in the seminar.

Figure 3.16: At home with Prof. Faraz Umar, 1993.

Jakarta 1993

Jakarta was formerly known as Batavia during the Dutch colonial time. Today it is a large city with many modern buildings.

Precious Metals Refinery Logam Mulia, 1993

This refinery belongs to Aneka Tambang, which is one out of the six-owned companies under the Department of Mines & Energy. In addition, Aneka Tambang is supported by the Geological Unit, Bogor, West Java. The refinery was established in 1930 and is presently the only precious metal refinery in Indonesia. Since 1989, the capacity of the plant increased from 30 to 50 tons of gold and from 70 to 120 tons of silver annually. Meetings were held with General Manager Samuel Hermawan and a group of his engineers (Figure 3.17).

Figure 3.17: Precious Metals Refinery Logam Mulia.

Miniature Park

This is a large park having many pavilions representing the different provinces in Indonesia and their different cultures. A large map showing the many islands composing Indonesia surrounded by water.

JAKARTA 2010

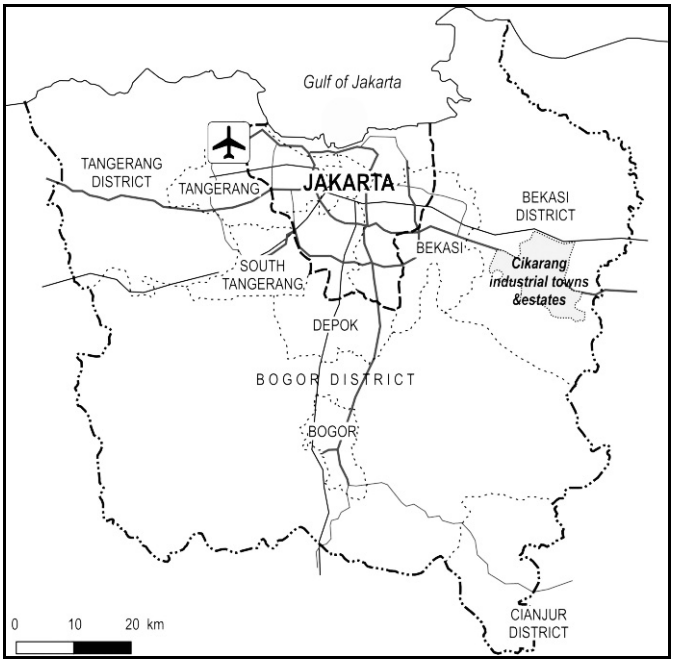


Figure 3.18: Map of Jakarta showing the City of Depok in the south.

Figure 3.19: Hotel Bumi Wiyota in Depok.

Figure 3.20: View from Hotel room. Photo by Fathi Habashi 2010.

University of Indonesia

The Universitas Indonesia is a state university established by the Dutch in 1851 as a school to train medical assistants. The next step came in 1898, when the Dutch East Indies government established a completely new school to train medical doctors. In 1924, the colonial government again decided to open a new educational facility to train civilian officers and servants. After Indonesia gained independence, the Indonesian Institute for Higher Education was established in Jakarta consisting of three faculties: Medicine and Pharmacy, Letters, and Law. Following the Indonesian National Revolution, the government established a state university in 1950 combining the previous institutions.

By 1950, the university was a multi-campus establishment, with faculties in Jakarta (Medicine, Law, and Letters), Bogor (Agronomy and Veterinary Medicine), Bandung (Engineering, Mathematics and Natural Sciences), Surabaya (Medicine and Dentistry), and Makassar (Economics). The Surabaya campus became the University of Airlangga in 1954, and in the following year, the Makassar campus became the University of Hasanuddin. In 1959, the Bandung campus became the Bandung Institute of Technology. In 1987, several faculties from Salemba campus and Rawamangun campus moved to a newly built campus in the outskirts of Jakarta. The campus in southern Jakarta is known as the Depok campus, since it is situated in the city of Depok.

Figure 3.21: Entrance to University of Indonesia at Depok.

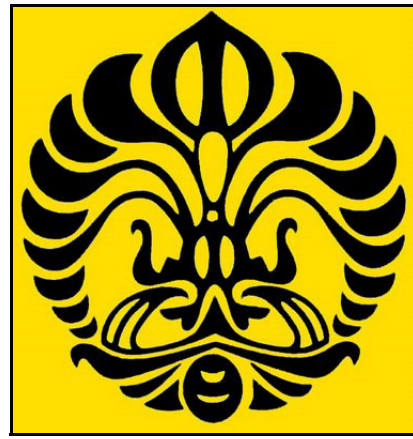


Figure 3.22: Logo of the University of Indonesia.

Figure 3.23: University of Jakarta at Depok.

Figure 3.24: Administrative Building University of Indonesia in Depok.

Figure 3.25: Faculty members at the Department of Metallurgy & Materials.

Figure 3.26: Metallurgy Students at University of Jakarta.

Mini Indonesia Park

A large park with many museums describing recent advances in technology and souvenir shops. Guide Prof. Sri Harijanto.

National Museum

National Museum (Figure 3.28) is situated in Old Jakarta and is witness of Dutch colonization. This museum contains collections related to prehistoric artefacts, geography, ethnography, earthenware, historical remnants and archaeology.

Figure 3.27: Dr. Dwi Marta Nurjaya (Mas Jaya) [left], Prof. Johny Wahyuadi Soedarsono [right].

Figure 3.28: National Museum.

Historical Museum

The building was originally the City Hall of Jakarta during the Dutch regime, now transformed into museum telling the history of the city (Figure 3.29).

Figure 3.29: Historical Museum.

Figure 3.30: Marriott Hotel.

JAKARTA 2011

A 5-day workshop devoted to extractive metallurgy (Figures 3.30–3.39) was organized by NeuEdge Consultants from Singapore. It took place at

Marriot Hotel in Jakarta. Incidentally a bomb exploded in the restaurant in 2009 that is why severe security measures are taken.

Figure 3.31: Participants of the Workshop.

Figure 3.32: Marriot Hotel.

Figure 3.33: View from the window of my hotel room [photo by Nadia Habashi].

Figure 3.34: View from the window of my hotel room [photo by Nadia Habashi].

Figure 3.35: Modern Jakarta.

Figure 3.36: Modern Jakarta.

Figure 3.37: Modern Jakarta.

Figure 3.38: Modern Jakarta.

Figure 3.39: Modern buildings in Jakarta.

Arjuna Wijaya chariot statue

The Arjuna Wijaya Statue (Figure 3.40) is made of ceramic and has been donated by a private ceramic industry in 1987. The statue depicts Arjuna going to war in a chariot driven by God Krishna. The chariot is driven by eight strong horses. It recalls the Sanskrit poem "Song of the Lord." It consists of a long dialogue between the God Krishna and Arjuna just before the great battle of Kurukshetra. The battle is going on every day within us; this is the fight between our demonic and divine qualities. In this conflict between opposing forces, Krishna (Self, Atma, Higher Intellect) is ever on the side of Dharma (Righteousness). The Lord is where Dharma is. This chariot is to be driven right to the Destination which is Perfection.

Figure 3.40: Arjuna Wijaya chariot statue.

Figure 3.41: Jakarta Airport.

Figure 3.42: Jakarta Airport.

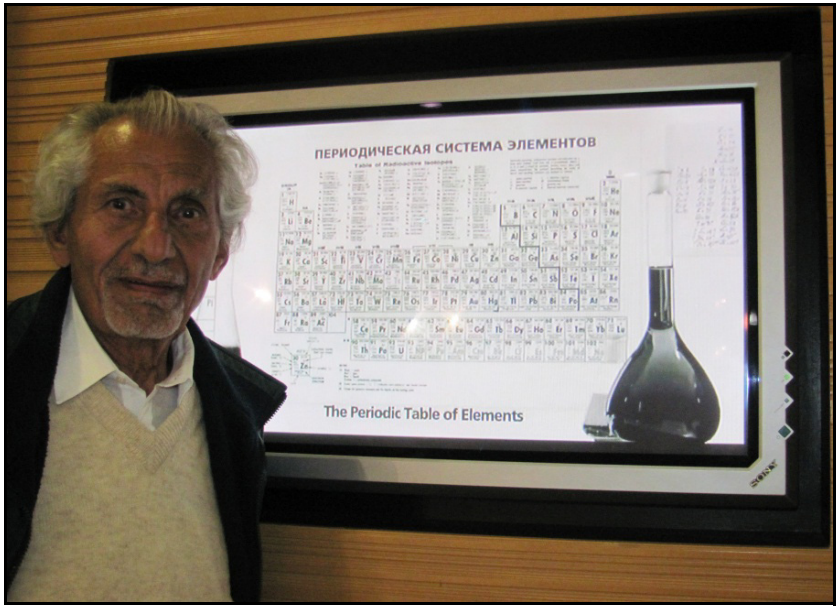


Figure 3.43: Outside a Russian Vodka store in Jakarta Airport.

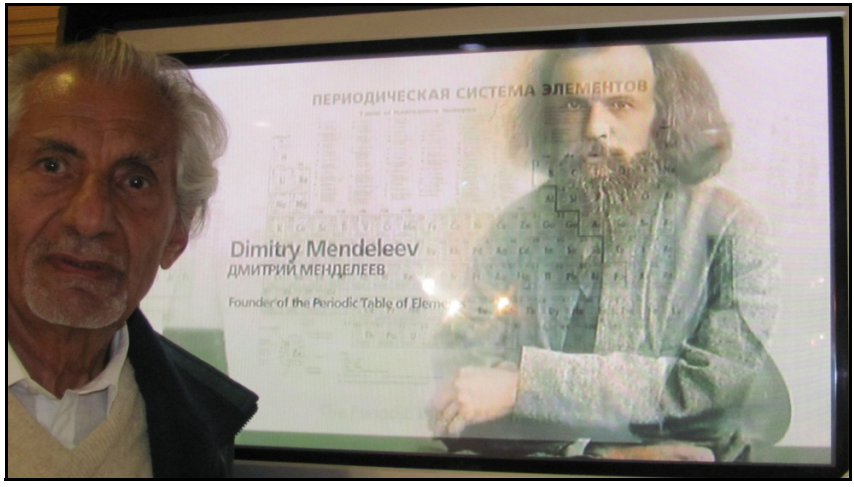


Figure 3.44: Outside a Russian Vodka store in Jakarta Airport.

Chapter 4

Malaysia

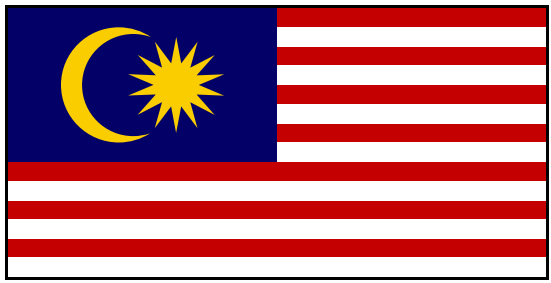


Figure 4.1: Flag of Malaysia.

HISTORICAL INTRODUCTION

Traders and settlers from India and China arrived in the Malay Peninsula as early as the 1st century AD establishing trading ports and coastal towns in the 2nd and 3rd centuries. Their presence resulted in strong influence on the local cultures, and the people of the Malay Peninsula adopted the religions of Hinduism and Buddhism.

Malacca was founded in 1400 by a prince from Sumatra. Within few years it became the most influential port in Southeast Asia. With traders came Islam, and Malacca's rulers now referred to themselves as sultans whose purpose was to facilitate trade. They were able to control pirates and came to control the entire west coast of the peninsula, the kingdom of Pahang, and much of Sumatra.

China exported silk, porcelain and perfumes. India offered hardwoods, carvings, precious stones, cotton, sugar, livestock and weapons. From the interior of Malaya came tin, camphor, ebony and gold. Sumatra provided

rice, gold, black pepper and mace. Java was the source of dyes, spices and perfumes. Cloves were exported from Malacca and sandalwood came from Timor. Muslim merchants dominated international trade in the Arabian Sea, the Bay of Bengal, and the East China Sea.

The sultans invited Muslim scholars from Mecca, honoured them and encouraged the spread of Islam. Malacca became not only the centre of international trade but also a centre for Islamic learning. The spread of Islam brought the Hindu–Buddhist era to an end by the 13th century.

European colonization

In 1511, a Portuguese fleet led by Alfonso de Albuquerque sailed into Malacca's harbour and captured the city. The Portuguese constructed a massive fort which the Dutch captured in 1641. This would give the Dutch an exclusive control on the spice trade until 1785, when the British East India Company convinced the Sultan of Kedah to allow them to build a fort on the island of Penang. The British were mainly interested in having a safe port for ships on their way to China, but when France captured the Netherlands in 1795, the Dutch Government in exile agreed to let England temporarily oversee the port.

The British returned the city to the Dutch in 1808, but it was soon handed back to the British in a trade for the Province of Bencoolen in Sumatra. From their new bases in Malacca, Penang, and Singapore, collectively known as the Straits Settlements, the British, began the process of political integration of the Malay states. In the early 20th century they brought in Chinese and Indians, which radically changed the country's racial make-up. Britain ruled over what was then called Malaya.

Penang

Penang was originally part of the Malay Sultanate of Kedah. In 1786, Captain Francis Light (1740–1794) of the British East India Company landed in Penang and re-named it Prince of Wales Island in honour of heir to the British throne. Light then received it as a portion on his marriage to the daughter of the Sultan of Kedah. Light ceded Penang to the Government of India and promised the Sultan military protection from Siamese and Burmese armies who were threatening Kedah. In 1946 Peneng became part of the Malayan Union.

Singapore

In 1819 the British occupied Singapore and this led to political tension between the British and the Dutch. This was solved through a treaty signed

in 1824. The British controls the North, while the Dutch is in the South (known as today's Indonesia).

British North Borneo: Sarawak-Sabah

In 1838 James Brooke, a British adventurer, arrived to Brunei Sultanate to find the inland tribes in rebellion. He was able to suppress it and in reward the Sultan granted him power over part of Sarawak. Appointing himself Raja Brooke, he founded a dynasty that lasted 100 years. In the late 1860s, a number of Malay kingdoms began fighting each other causing Britain to intervene and force the Malay rulers to sign a peace treaty in 1874 that gave Britain a greater role in the region needed to maintain its monopoly on the vast tin mines in the peninsula. By 1881 Sabah was controlled by the British.

Figure 4.2: Map of Malaysia showing Penang Island on the top left [capital George Town]. Singapore at the lower end of the peninsula is no longer part of Malaysia. Brunei in north Borneo is an independent sultanate.

Modern Malaysia

During World War II, the Japanese occupied Malay 1941–1945. When the war ended, Britain resumed control again and eventually acquired

Sarawak. In the meantime Malaya's independence movement had matured and organized itself in an alliance under Tunku Abdul Rahman. When the British flag was finally lowered in Kuala Lumpur in 1957, Tunku became the first prime minister of Malaya. This was followed by a period of instability due to an internal Communist uprising and an external confrontation with neighbouring Indonesia. In 1963 the north Borneo states of Sabah and Sarawak, along with Singapore, joined Malaya to create Malaysia. In 1969 violent interracial riots broke out, particularly in Kuala Lumpur.

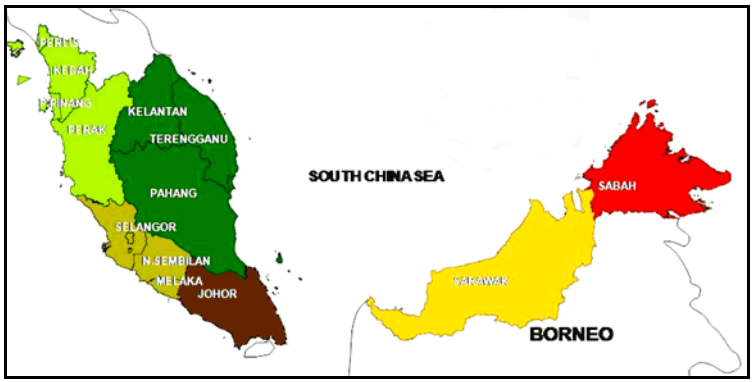


Figure 4.3: The Regions of Malaysia.

Figure 4.4: Penang Island showing location of the the Universiti Sains Malaysia [UBM], Penang Hill, and the bridge.

Figure 4.5: Penang Bridge is 13.5 km long opened in 1985.

Figure 4.6: On top of Penang Hill.

Figure 4.7: View of Penang from the Hill.

Figure 4.8: Tropical birds.

The government moved to dissipate the tensions, which existed mainly between the Malays and the Chinese. Led from 1981 by Prime Minister

Mahathir Mohamed, Malaysia's economy grew until mid-1997, when a currency crisis in neighbouring Thailand plunged the whole of Southeast Asia into recession. Mahathir Mohamed retired in 2003. He handed power to Abdullah bin Ahmad Badawi.

Head of State

Malaysia is a constitutional monarchy (Figure 4.9) and member of the Commonwealth. It is composed of 13 states. Nine of these are headed by Malay rulers. Seven are hereditary monarchies. These are Kedah, Kelantan, Johor, Perlis, Pahang, Selangor and Terengganu. The sovereign is a ceremonial head of state, and is elected every 5 years by and from the 9 hereditary rulers.

Figure 4.9: The sovereign shown in the poster is the Head of State.

One state, Negeri Sembilan, is an elective monarchy; the ruler is elected from male members of the royal family by hereditary chiefs. All rulers except those of Perlis and Negeri Sembilan use the title Sultan. The ruler of Perlis is styled Raja, while the ruler of Negeri Sembilan is known as Yamtuan Besar. Every five years or when a vacancy occurs, the rulers convene in the Conference of Rulers to elect among themselves the federal constitutional monarch and head of state of Malaysia.

Ethnic composition

The oldest inhabitants are its tribal peoples and account for about 5% of the population, and represent a majority in Sarawak and Sabah. The Chinese and Indians traded with Malay for centuries but in the early 20th century the British brought in Chinese and Indians. The Chinese are Malaysia's businessmen and form about 35% of the population while Indians form about 10%. Half the population is Muslims.

Tin in Malaya

As early as the 15th century, alluvial tin was readily accessible from many Malayan river valley floors. Employing simple methods, the Malay miners produced sufficient tin for local use as well as for export. The demand for Malayan tin increased with the development of the tin plate industry in the West. As shallow deposits were exhausted, new methods of mining deeper, requiring more capital and labour, were devised. The Malays failed to adapt to the changes, instead allowing emigrant Chinese to overtake them in the industry. The most important area is the Kinta Valley, which includes the towns of Ipoh.

Growing industrial demand for tin, coupled with the discovery of large and rich tin deposits in the state of Perak in the early 19th century led to the disputes among the Malay rulers, large scale immigration of Chinese labour, British intervention and domination and finally injection of British capital and dredging technology into the Peninsula. By 1883, Malaysia became the largest tin producer in the world. The downfall of the tin industry was a result of the price drop when large amount of tin was produced in Brazil in the 1980s.

Rubber

In 1876, the British smuggled out rubber-tree seeds from Amazonia to the Botanical Gardens in London. Through grafting, they developed more resistant varieties that were sent in 1900 to the Colonies in Asia where massive rubber plantations were established, particularly in Sabash in Malaysia, Ceylon and Singapore. The well-organized plantations of the Far East resulted in a significant increase in productivity, making them more competitive. The drop in natural rubber production in Brazil coincided with World War I triggered the need for steadier supplies in order to manufacture tires. The pressure prompted the development of synthetic rubber although its structure differed somewhat from its natural counterpart.

During World War II, three months after the attack on Pearl Harbor, the Japanese invaded Malaysia and the Dutch East Indies and took over natural rubber production from the Allies. The Rubber Research Institute of

Malaysia was founded in 1929 in Kuala Lumpur. The continued decline in rubber area since 1982 is due to conversion of rubber area to other crops. Malaysia today is the world's third largest producer and exporter of natural rubber.

Oil palm

The oil palm (Figure 4.10) is a tropical tree, originated in Guinea in Africa and was introduced to Java by the Dutch in 1848, and to Malaya in 1900 by British colonists. Palm Oil Research Institute of Malaysia was established in the same year in Kuala Lampur. The British Industrial Revolution created a demand for palm oil for candle making and as a lubricant for machinery. Malaysia produces about half of world palm oil from the fruit (Figures 4.11–4.12).

Figure 4.10: Palm trees.

Oil is extracted from both the pulp of the fruit (palm oil, an edible oil) and the kernel (palm kernel oil, used in foods and for soap manufacture). For every 100 kg of fruit bunches, typically 22 kg of palm oil and 1.6 kg of palm kernel oil can be extracted. Oil palm trees yield about 7 250 litres/hectare/year. The annual production averages 10 tonnes of fruit yielding 3 000 kg of palm oil and 750 kg of seed kernels yielding 250 kg of high quality palm kernel oil, as well as 500 kg of kernel meal. Palm fronds and kernel meal are processed for use as livestock feed.

Figure 4.11: Palm tree fruit.

Figure 4.12: Cross section of fruit.

Electronics

The state of Penang built up one of the largest electronics manufacturing bases in Asia, in the Free Trade Zone around the airport in the south of the island. Malaysia is the world's largest exporter of semiconductors and electrical and electronic products make up over 50% of total exports.

Komtar

Komtar (Figure 4.13) is acronym for Kompleks Tun Abdul Razak, named after Tun Abdul Razak Hussein, the second prime minister of Malaysia. It is 65-story tower, 232 m high, 12-sided geometric block, the administrative offices for the Penang State Government.

Figure 4.13: Komtar Tower.

Kek Lok Si Temple

The Kek Lok Si Temple (Figures 4.14–4.15), a Buddhist temple situated in Penang, is the largest Buddhist temple in Southeast Asia.

VISIT TO MALAYSIA

Visit to Malyasia took place in March 2012 to visit Universiti Sains Malaysia [Science University] in Penang. Host: Prof. Sheikh Abdul Rezan, School of Materials & Mineral Resources Engineering. Universiti Sains Malaysia (Figure 4.16) formerly known as the University of Penang, was established on Penang Island as the second university in the country in 1969. The Engineering campus is on the mainland.

Figure 4.14: Kek Lok Si Temple.

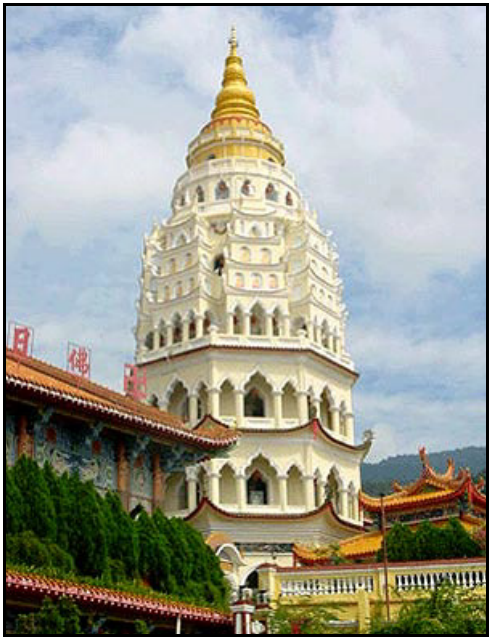


Figure 4.15: Kek Lok Si Temple.

Figure 4.16: Main entrance to Universiti Sains Malaysia.

Date	Time	Comment	Task	Additional Info
17/3/2012 **Saturday**	10.30 pm	Pick up Prof. Habashi at Airport Bring to Melor inn- book for 4 nights	Rezan	
18/3/2012 **Sunday**	10.00 am- 6 pm	Pick up from Melor Inn and bring for tour of Penang island	Rezan	
19/3/2012 **Monday**	8.30 am	Pick up from Melor inn	USM driver	
	9-10 am	Arrange room for Prof. Habashi during visit		Arrange with Puan Zalila
	10-12.00 am	School tour of facilities. Campus Tour	Rezan-Arrange visit of USM Engineering campus. Visit Prof Radzali and Prof. Rahman lab.	
	12 .15 noon	Lunch		
	1-2 pm	Rest		
	3.00 -4.30 pm	Prof. Habashi will give a talk at 3-4.30 pm. 1.5 hour talk + Q&A. @ seminar room	Title of talk "Extractive Metallurgy. Past, Present, and Future" Rezan will arrange poster & seminar room booking.	Rezan email school and campus on 20-3-2012
	5.30 pm	Drop Prof. Habashi at Melor Inn	USM driver	
	8.00 pm	Dinner	Rezan + Azmin + Prof. Habashi	
20/3/2012 **Tuesday**	4.00 am	Leave for airport at 4.00 am	USM driver will pick Prof. Habashi at Melor Inn	

Figure 4.17: Program of visit.

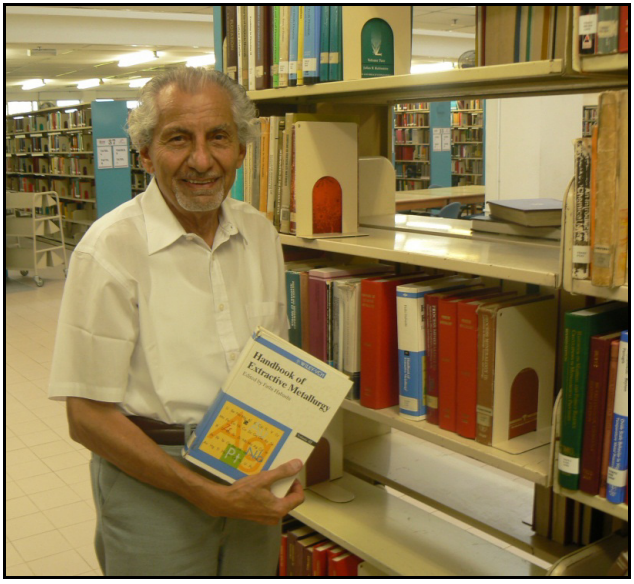


Figure 4.18: *Handbook of Extractive Metallurgy* at the Library of Universiti Sains Malaysia in Penang. Photo by Sheikh Abdul Rezan, March 2012.

Figure 4.19: Nano-tubes laboratory.

Figure 4.20: Lunch with graduate students.

Figure 4.21: Announcement for seminar.

Figure 4.22: Students and faculty members.

Figure 4.23: Students and faculty members, March 2012.

Figure 4.24: With Prof. Sheikh Abdul Rezan and family at home, March 2012.

KUALA LUMPUR AIRPORT

While on a trip to Southeastern Asia, I had to stop at Kuala Lumpur in transit. The magnificent airport was very impressive (Figure 4.25).

Figure 4.25: Transit at Kuala Lumpur Airport, photo by Nadia Habashi, June 2011.

SINGAPORE AIRPORT

While on a trip to the Philippines, I had to stop at Singapore Airport in transit. The magnificent airport was very impressive (Figures 4.26–4.28).

Figure 4.26: Transit at Singapore Airport, photo by Singapore Airlines, June 2011.

Figure 4.27: Transit at Singapore Airport, photo by Fathi Habashi 2011.

Figure 4.28: Transit at Singapore Airport, photo by Fathi Habashi 2011.

Chapter 5

Philippines

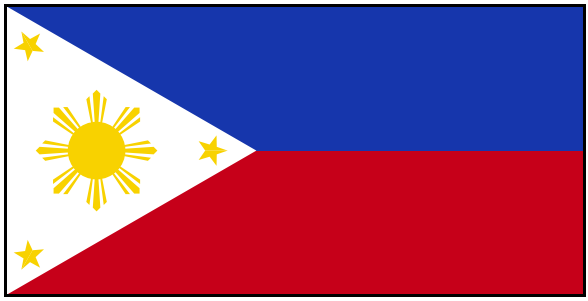


Figure 5.1: Flag of Philippines.

Historical Introduction

When the Portuguese explorer Ferdinand Magellan (1480–1521) (Figure 5.4) landed on Homonhon Island in 1521 there were tribes who roamed the islands and eventually grew into kingdoms, rajahnates, principalities, confederations, and sultanates. The country was named after King Philip II of Spain (1527–1598) (Figure 5.5), whose reign was the peak of Spain's world power.

These small states flourished from the 10th century AD and traded with neighbours. The multiple states that existed in the Philippines simplified Spanish colonization. Spanish settlement began in 1565 and the Spanish East Indies were ruled as a territory of the Viceroyalty of New Spain and administered from Mexico City until 1821 and directly from Madrid later on.

Figure 5.2: Philippines and her neighbours.

Spanish missionaries attempted to convert the population to Christianity. They founded schools, a university, and hospitals. Universal education was made free for all Filipinos in 1863. The advancing Islamic forces from the south created the first nation that was to be known as the Philippines. Islam was strengthened by the arrival of traders from Malaysia and Indonesia.

Britain declared war against Spain in 1762 and captured Manila but ended their occupation in 1764. However, a number of Indian soldiers known as Sepoys, deserted the British forces and settled down in Cainta,

Rizal. The opening of the Suez Canal in 1869 cut travel time to Spain, which facilitated the rise of an enlightened class of Filipinos that had been able to expand their studies in Spain and Europe.

Figure 5.3: Map of the Philippines.

Figure 5.4: Ferdinand Magellan (1480–1521).

Figure 5.5: King Philip II of Spain (1527–1598).

The Philippine Revolution against Spain began in 1896, but was unsuccessful until it received support from the United States. In 1898, the USS Maine, having been sent to Cuba because of U.S. concerns for the safety of its citizens during an ongoing Cuban revolution, exploded and sank in Havana harbour. This event precipitated the Spanish–American War. At the end of the war, the Philippines was annexed by the United States. The Philippinos resisted the US occupation, resulting in the Philippine–American War (1899–1913). Commonwealth status was granted in 1935.

The Japanese occupied of the islands during World War II. After the end of the war, the Philippine Republic became independent. In the late 1960s there was civil unrest against President Ferdinand Marcos (1917–1989) (Figure 5.6). The peaceful revolution of 1986 brought about the ousting of Marcos and a return to democracy.

Figure 5.6: Ferdinand Marcos (1917–1989).

Rizal

José Rizal (1861–1896) (Figure 5.7) was born to a wealthy family in Calamba, Laguna. He studied medicine at the University of Santo Tomás in Manila and at the Universidad Central de Madrid in Spain. He also attended the University of Paris and the University of Heidelberg. He was a prolific poet, essayist, and novelist. He founded La Liga Filipina, a civic organization that subsequently gave birth to the Katipunan a secret society which would start the Philippine Revolution against Spain. His execution by the Spanish government ignited the Philippine Revolution. He is now celebrated as Rizal Day, a national holiday in the country.

Figure 5.7: José Rizal (1861–1896).

THE COUNTRY

The archipelago comprises 7 107 islands, divided broadly into three main geographical divisions: Luzon, Visayas, and Mindanao (Figure 5.8) with the capital city Manila. With so many islands there are multiple ethnicities and cultures and many local languages (Figure 5.9). Most of the mountainous islands are tropical rainforest and volcanic in origin with frequent seismic activity (Figure 5.10).

Mineral deposits

Gold also mined during the Spanish regime. Silver is produced as a by-product of gold and copper mining. Chromite is mined in the south of Luzon. The vast nickel laterites of Surigao in northeastern Mindanao were first reported in 1912, although these were not exploited until 1975. The

Marinduque deposits were exploited using Sherritt technology. However the plant was later shut down due to increased cost of fuel during the Suez Crisis and was dismantled later.

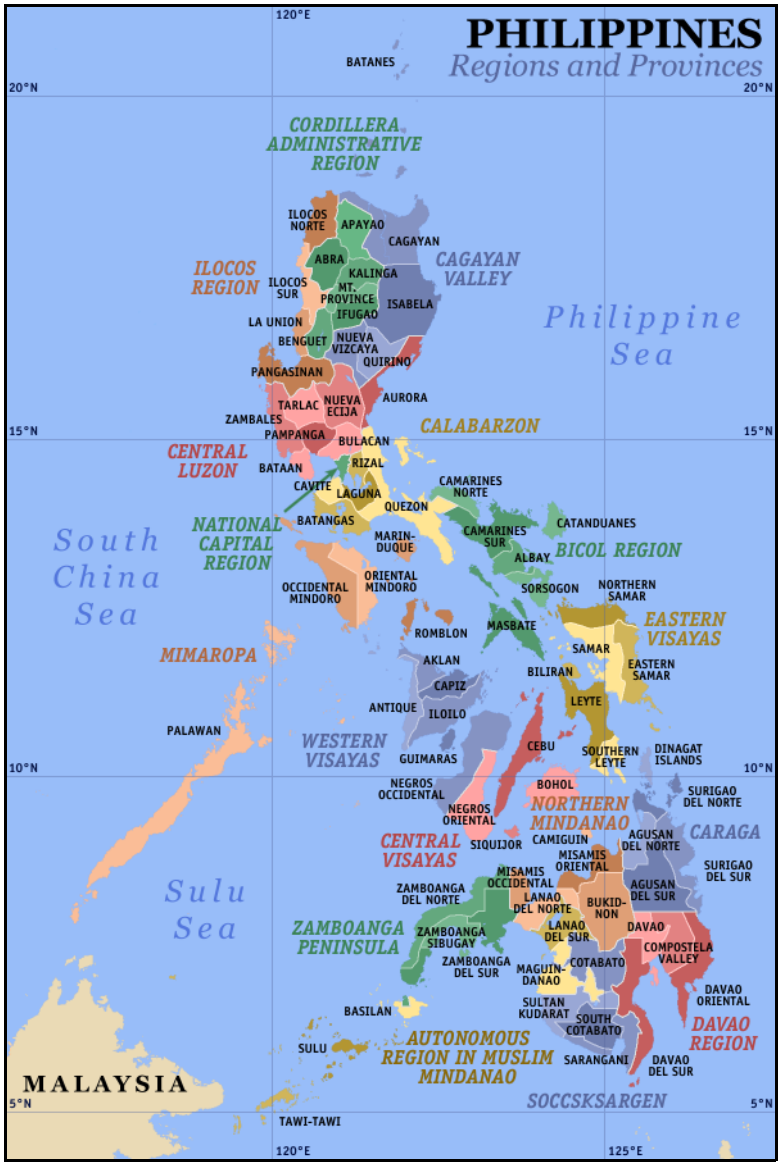


Figure 5.8: Regions.

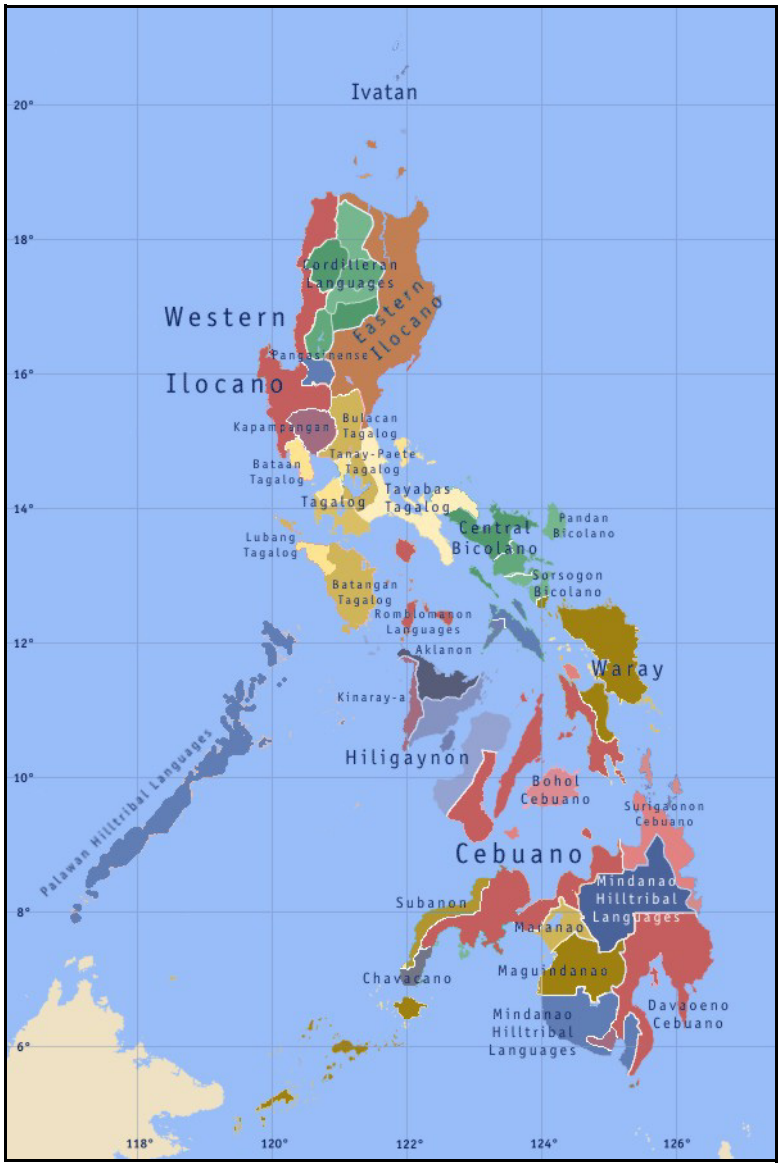


Figure 5.9: Local languages.

Mining of copper in the Philippines has a long history. Crudely-smelted copper was traded with the Chinese in the 14th Century. Late in the Spanish era copper mines were opened in Panay in 1842 and in northern Luzon in 1864. The metal began to play a major role in the country's mining indus-

try when the large-scale porphyry deposits began to be exploited in 1955. Molybdenum is associated with these deposits and plans are being taken to produce concentrates from which rhenium is expected to be recovered. Deposits of lead and zinc are widespread.

Figure 5.10: A view of some islands.

Table 5.1: Visits to Philippines in chronological order.

Dates	Places visited	Purpose of visit
March 4–13, 2011	Manila	Guest Professor at the University of Philippines
	Bulacan Province	Evergreen Lead Recycle plant
	Cavite Province	Pacific Rare Metals & Chemicals
March 26–April 1, 2012	Manila	Invitation by Teresito Malicse,
TBM Mining & Metallurgical Services	Subu	Carmen Copper Corporation
	Zambales laterite deposits	ENK Philippines

MANILA

The Kingdom of Maynila flourished during the latter half of the Ming Dynasty as a result of direct trade relations with China. In 1571 Spanish conquistador Miguel López de Legazpi founded Manila in what today is the district of Intramuros. Manila was made the capital of the Philippine Islands. Manila also became famous during the Manila–Acapulco Galleon trade which lasted for three centuries and brought goods from Mexico and Peru to Southeast Asia. Silver mined in Mexico and Peru was exchanged for Chinese silk, Indian gems, and spices.

Figure 5.11: Metro Manila map showing Bulacan Province in the north and Cavite Province in the south.

Figure 5.12: Map of Manila showing Rizal Park and the airport at the lower part.

Figure 5.13: Manila.

Figure 5.14: Manila.

Figure 5.15: Manila Asia Centre.

Figure 5.16: Manila Asia Centre.

Figure 5.17: A view inside a shopping centre.

Figure 5.18: Monument to José Rizal, March 2011.

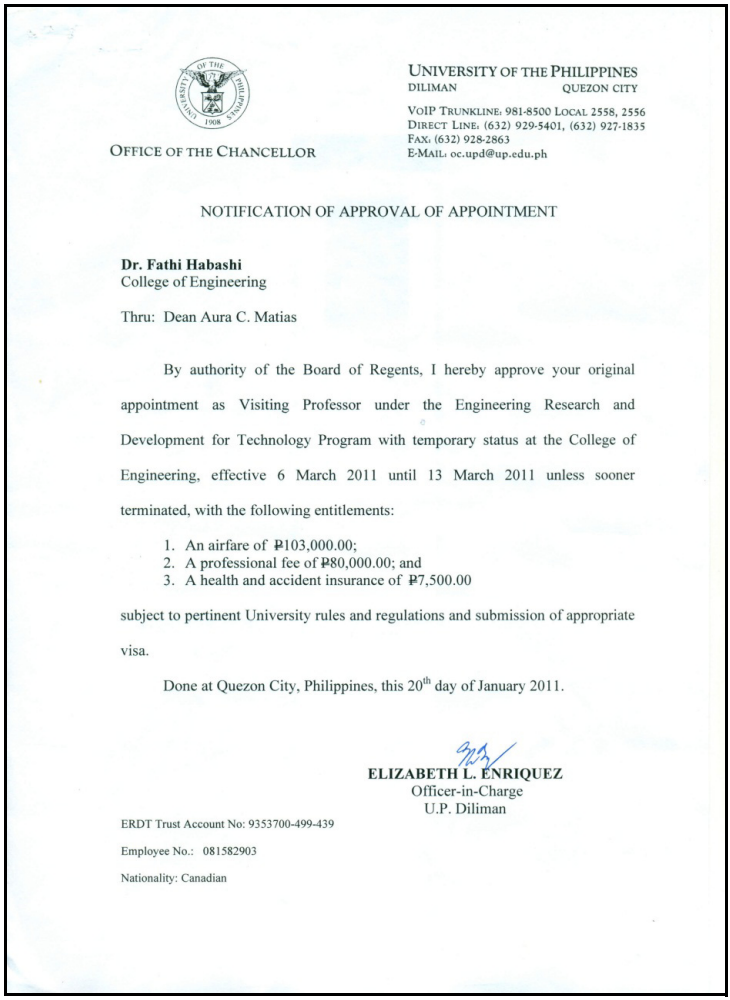
Figure 5.19: Monument to José Rizal details.

Figure 5.20: Musician in the hotel, March 2011.

Figure 5.21: University Campus.

University of the Philippines

The University of the Philippines (Figure 5.21) was founded in 1908 by authority of the United States. It began with the establishment of the Medical School followed few years later by the College of Law and the College of Engineering. The University of the Philippines Diliman was established in 1948 and located in Quezon City. It is the seat of administration. In 1956 a Metallurgical Engineering undergraduate course was added to what was then the Department of Mining Engineering.



UNIVERSITY OF THE PHILIPPINES
DILIMAN QUEZON CITY

VOIP TRUNKLINE: 981-8500 LOCAL 2558, 2556
DIRECT LINE: (632) 929-5401, (632) 927-1835
FAX: (632) 928-2863
E-MAIL: oc.upd@up.edu.ph

OFFICE OF THE CHANCELLOR

NOTIFICATION OF APPROVAL OF APPOINTMENT

Dr. Fathi Habashi
College of Engineering

Thru: Dean Aura C. Matias

By authority of the Board of Regents, I hereby approve your original appointment as Visiting Professor under the Engineering Research and Development for Technology Program with temporary status at the College of Engineering, effective 6 March 2011 until 13 March 2011 unless sooner terminated, with the following entitlements:

1. An airfare of ₱103,000.00;
2. A professional fee of ₱80,000.00; and
3. A health and accident insurance of ₱7,500.00

subject to pertinent University rules and regulations and submission of appropriate visa.

Done at Quezon City, Philippines, this 20th day of January 2011.

ELIZABETH L. ENRIQUEZ
Officer-in-Charge
U.P. Diliman

ERDT Trust Account No: 9353700-499-439

Employee No.: 081582903

Nationality: Canadian

Figure 5.22: Appointment as Guest Professor, March 4–13, 2011.

PROFESSOR FATHI HABASHI VISIT ITINERARY
March 7 – 13, 2011

MARCH 7, Monday

Time	Activity	Place	Responsible
7:45-8:00am	Fetch from Hotel	Sulu Hotel	Dr Mendoza
8:00 – 12:00	Lecture Series	Engineering Theater	Organizing Committee
12:00 – 1:00	Lunch	4th Floor MH	Organizing Committee
1:00 – 4:00pm	Lecture Series	Engineering Theater	Organizing Committee
6:00 - onwards	Dinner	Technohub	DMMME
8:00-8:30pm	Bring to Hotel	Sulu Hotel	Dr. Mendoza

MARCH 8, Tuesday

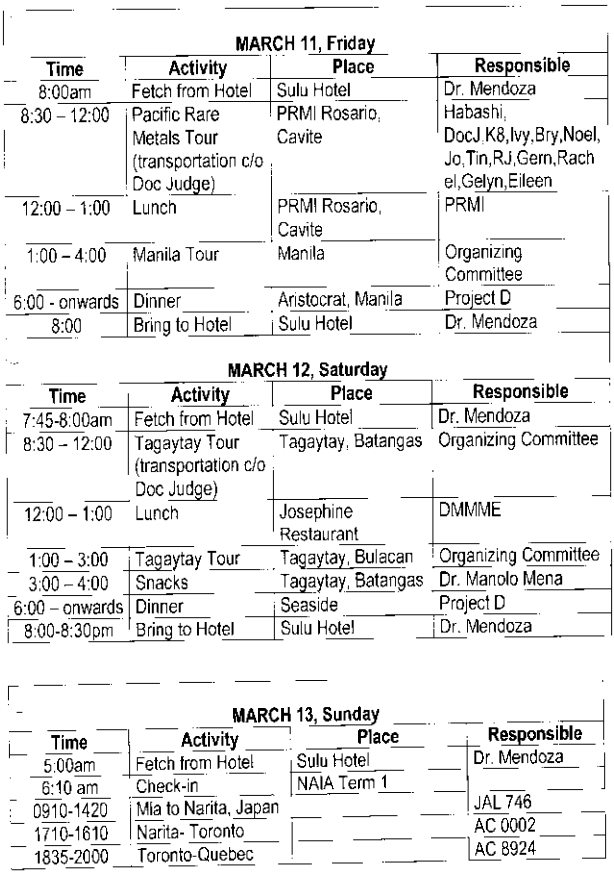
Time	Activity	Place	Responsible
7:45-8:00am	Fetch from Hotel	Sulu Hotel	Dr. Mendoza
8:00 – 12:00nn	Lecture Series	Engineering Theater	Organizing Committee
12:00nn – 1:00	Lunch	4th Floor MH	Organizing Committee
1:00 – 2:30pm	DMMME Profile	NEC Seminar Room A	DMMME
2:30 – 3:00pm	Snacks	NEC Seminar Room A	DMMME
3:00 – 4:00pm	DMMME New Building Tour	New Building	DMMME
6:00 – onwards	Dinner	NEC Grounds	SMEP
8:00-8:30pm	Bring to Hotel	Sulu Hotel	Dr. Mendoza

MARCH 9, Wednesday

Time	Activity	Place	Responsible
7:45-8:00am	Fetch from Hotel	Sulu Hotel	Dr. Mendoza
8:00 – 12:00nn	Lecture Series	Engineering Theater	Organizing Committee
12:00nn – 1:00	Lunch	4th Floor MH	Organizing Committee
1:00 – 3:00pm	Book Handover and Signing Ceremony	NEC Sem Room A	DMMME
3:00 – 4:00pm	Courtesy Call to Chancellor Saloma	Quezon Hall	Organizing Committee
4:00 – 5:00pm	Snacks	Chocolate Kiss	Project D
6:00 – onwards	Dinner	Technohub	Minercon
8:00-8:30pm	Bring to Hotel	Sulu Hotel	Dr. Mendoza

MARCH 10, Thursday

Time	Activity	Place	Responsible
7:45- 8:00am	Fetch from Hotel	Sulu Hotel	Dr. Mendoza
8:00 – 12:00	Evergreen Tour (transportation c/o Evergreen)	Evergreen, Sta. Maria, Bulacan	Habashi,Doc J, DocLes,K8,Ivy,Bry, Noel,Jo,Tin,RJ
12:00 – 1:00	Lunch	Evergreen, Sta. Maria, Bulacan	Evergreen
1:00 – 4:00	Technical Discussion	Bulacan	Evergreen
6:00 – onwards	Dinner	Kamay Kainan, Vis Ave., Quezon City	Project D
8:00-8:30pm	Bring to Hotel	Sulu Hotel	Dr. Mendoza



MARCH 11, Friday

Time	Activity	Place	Responsible
8:00am	Fetch from Hotel	Sulu Hotel	Dr. Mendoza
8:30 – 12:00	Pacific Rare Metals Tour (transportation c/o Doc Judge)	PRMI Rosario, Cavite	Habashi, DocJ,K8,Ivy,Bry,Noel, Jo,Tin,RJ,Gem,Rachel,Gelyn,Eileen
12:00 – 1:00	Lunch	PRMI Rosario, Cavite	PRMI
1:00 – 4:00	Manila Tour	Manila	Organizing Committee
6:00 - onwards	Dinner	Aristocrat, Manila	Project D
8:00	Bring to Hotel	Sulu Hotel	Dr. Mendoza

MARCH 12, Saturday

Time	Activity	Place	Responsible
7:45-8:00am	Fetch from Hotel	Sulu Hotel	Dr. Mendoza
8:30 – 12:00	Tagaytay Tour (transportation c/o Doc Judge)	Tagaytay, Batangas	Organizing Committee
12:00 – 1:00	Lunch	Josephine Restaurant	DMMME
1:00 – 3:00	Tagaytay Tour	Tagaytay, Bulacan	Organizing Committee
3:00 – 4:00	Snacks	Tagaytay, Batangas	Dr. Manolo Mena
6:00 – onwards	Dinner	Seaside	Project D
8:00-8:30pm	Bring to Hotel	Sulu Hotel	Dr. Mendoza

MARCH 13, Sunday

Time	Activity	Place	Responsible
5:00am	Fetch from Hotel	Sulu Hotel	Dr. Mendoza
6:10 am	Check-in	NAIA Term 1	
0910-1420	Mla to Narita, Japan		JAL 746
1710-1610	Narita- Toronto		AC 0002
1835-2000	Toronto-Quebec		AC 8924

Figure 5.23: Itinerary of the visit, March 4–13, 2011.

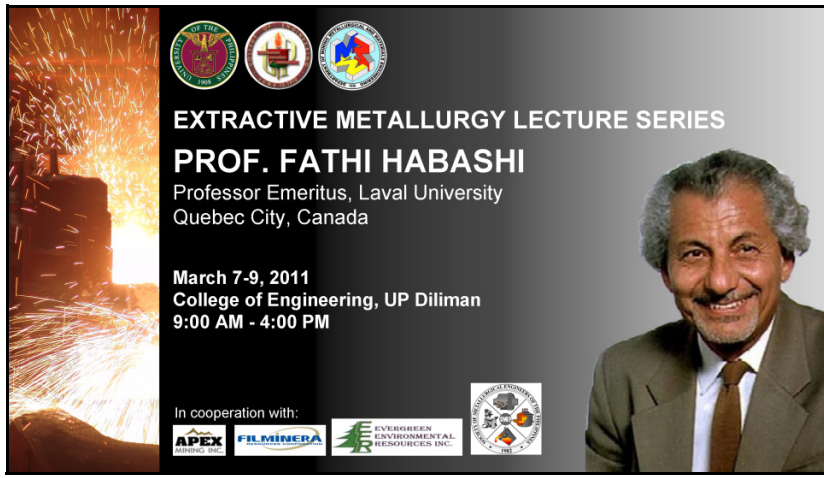


Figure 5.24: Announcement for the lecture series, March 4–13, 2011.

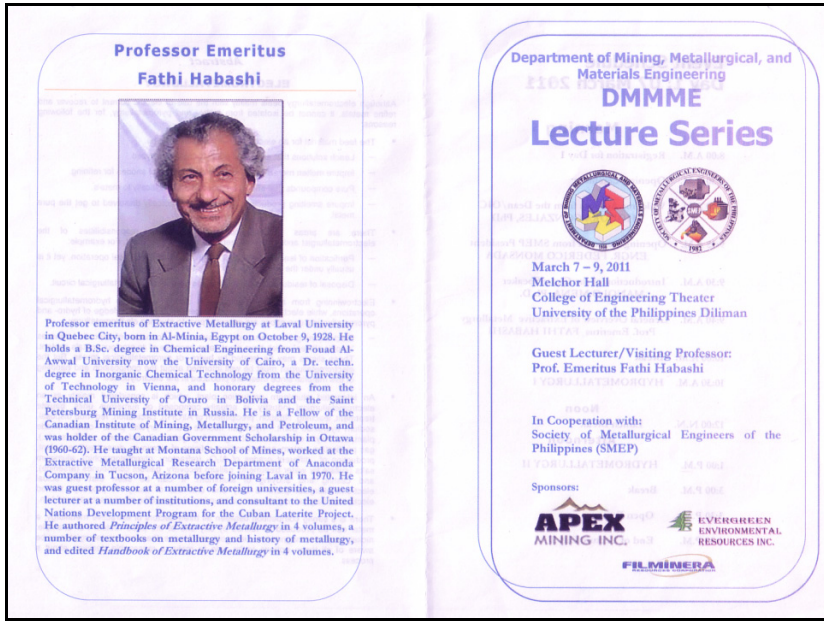
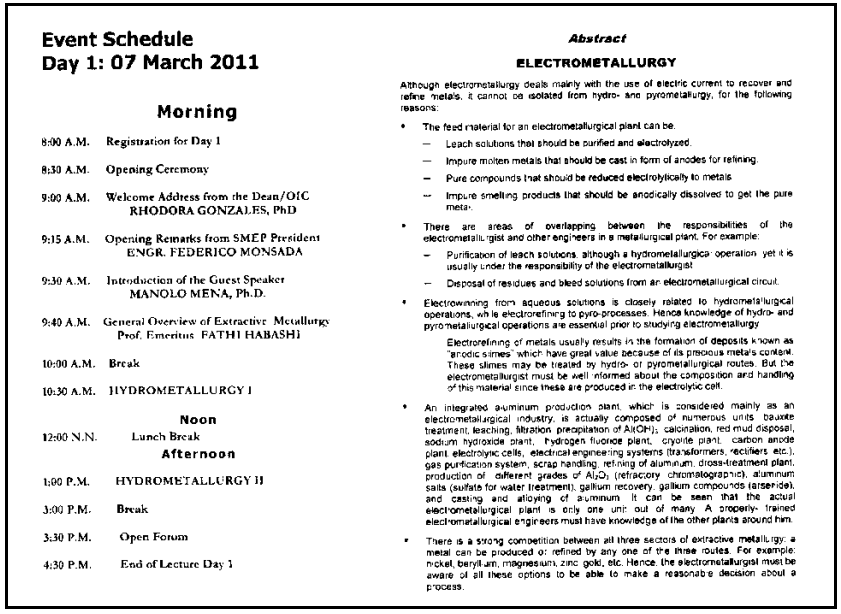


Figure 5.25: Program of lectures, March 4–13, 2011.



Event Schedule
Day 1: 07 March 2011

Morning

8:00 A.M. Registration for Day 1

8:30 A.M. Opening Ceremony

9:00 A.M. Welcome Address from the Dean/OIC
RHODORA GONZALES, PhD

9:15 A.M. Opening Remarks from SMEP President
ENGR. FEDERICO MONSADA

9:30 A.M. Introduction of the Guest Speaker
MANOLO MENA, Ph.D.

9:40 A.M. General Overview of Extractive Metallurgy
Prof. Emeritus FATHI HABASHI

10:00 A.M. Break

10:30 A.M. HYDROMETALLURGY I

Noon

12:00 N.N. Lunch Break

Afternoon

1:00 P.M. HYDROMETALLURGY II

3:00 P.M. Break

3:30 P.M. Open Forum

4:30 P.M. End of Lecture Day 1

Abstract

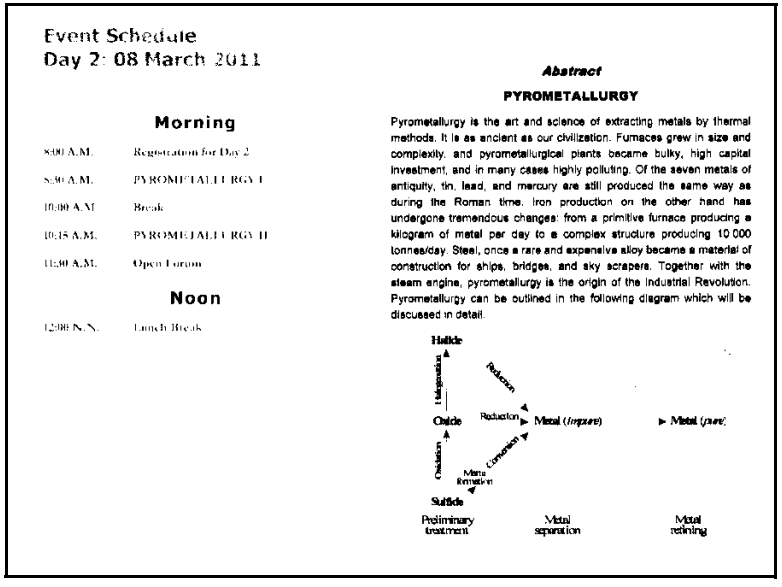
ELECTROMETALLURGY

Although electrometallurgy deals mainly with the use of electric current to recover and refine metals, it cannot be isolated from hydro- and pyrometallurgy, for the following reasons:

- The feed material for an electrometallurgical plant can be:
  - Leach solutions that should be purified and electrolyzed.
  - Impure molten metals that should be cast in form of anodes for refining.
  - Pure compounds that should be reduced electrolytically to metals
  - Impure smelting products that should be anodically dissolved to get the pure metal.
- There are areas of overlapping between the responsibilities of the electrometallurgist and other engineers in a metallurgical plant. For example:
  - Purification of leach solutions, although a hydrometallurgical operation, yet it is usually under the responsibility of the electrometallurgist
  - Disposal of residues and bleed solutions from an electrometallurgical circuit.
- Electrowinning from aqueous solutions is closely related to hydrometallurgical operations, while electrorefining to pyro-processes. Hence knowledge of hydro- and pyrometallurgical operations are essential prior to studying electrometallurgy.

  Electrorefining of metals usually results in the formation of deposits known as "anodic slimes" which have great value because of its precious metal's content. These slimes may be treated by hydro- or pyrometallurgical routes. But the electrometallurgist must be well informed about the composition and handling of this material since these are produced in the electrolytic cell.
- An integrated aluminum production plant, which is considered mainly as an electrometallurgical industry, is actually composed of numerous units: bauxite treatment, leaching, filtration, precipitation of $Al(OH)_3$, calcination, red mud disposal, sodium hydroxide plant, hydrogen fluoride plant, cryolite plant, carbon anode plant, electrolytic cells, electrical engineering systems (transformers, rectifiers etc.), gas purification system, scrap handling, refining of aluminum, dross-treatment plant, production of different grades of Al_2O_3 (refractory, chromatographic), aluminum salts (sulfate for water treatment), gallium recovery, gallium compounds (arsenide), and casting and alloying of aluminum. It can be seen that the actual electrometallurgical plant is only one unit out of many. A properly- trained electrometallurgical engineers must have knowledge of the other plants around him.
- There is a strong competition between all three sectors of extractive metallurgy: a metal can be produced or refined by any one of the three routes. For example: nickel, beryllium, magnesium, zinc, gold, etc. Hence, the electrometallurgist must be aware of all these options to be able to make a reasonable decision about a process.

Figure 5.26: Lectures on Day 1.



Event Schedule
Day 2: 08 March 2011

Morning

8:00 A.M. Registration for Day 2

8:30 A.M. PYROMETALLURGY I

10:00 A.M. Break

10:15 A.M. PYROMETALLURGY II

11:30 A.M. Open Forum

Noon

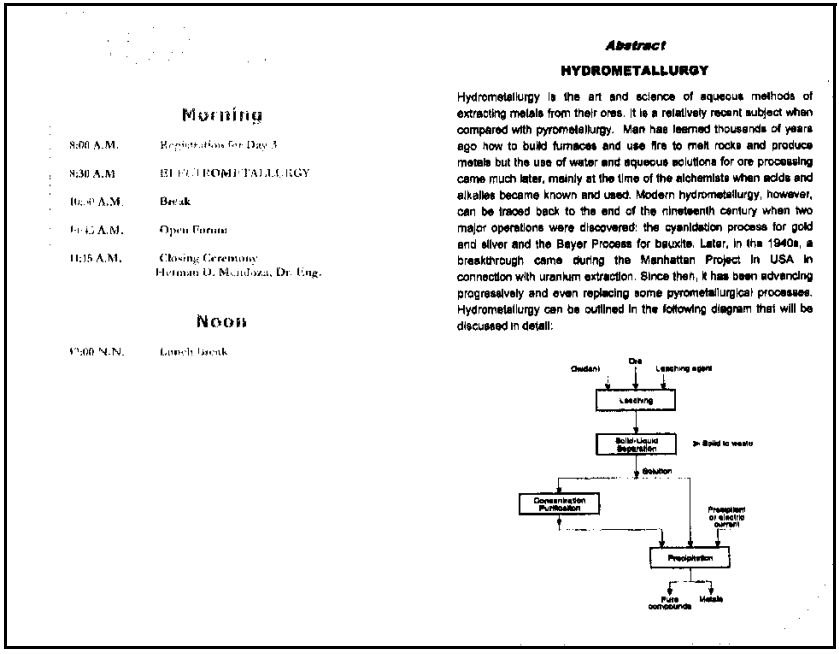
12:00 N.N. Lunch Break

Abstract

PYROMETALLURGY

Pyrometallurgy is the art and science of extracting metals by thermal methods. It is as ancient as our civilization. Furnaces grew in size and complexity, and pyrometallurgical plants became bulky, high capital investment, and in many cases highly polluting. Of the seven metals of antiquity, tin, lead, and mercury are still produced the same way as during the Roman time. Iron production on the other hand has undergone tremendous changes: from a primitive furnace producing a kilogram of metal per day to a complex structure producing 10 000 tonnes/day. Steel, once a rare and expensive alloy became a material of construction for ships, bridges, and sky scrapers. Together with the steam engine, pyrometallurgy is the origin of the Industrial Revolution. Pyrometallurgy can be outlined in the following diagram which will be discussed in detail.

Figure 5.27: Lectures on Day 2.



Morning

8:00 A.M. Registration for Day 3

8:30 A.M. HYDROMETALLURGY

10:30 A.M. Break

11:00 A.M. Open Forum

11:15 A.M. Closing Ceremony
Herman D. Mendoza, Dr. Eng.

Noon

12:00 N.N. Lunch Break

Abstract

HYDROMETALLURGY

Hydrometallurgy is the art and science of aqueous methods of extracting metals from their ores. It is a relatively recent subject when compared with pyrometallurgy. Man has learned thousands of years ago how to build furnaces and use fire to melt rocks and produce metals but the use of water and aqueous solutions for ore processing came much later, mainly at the time of the alchemists when acids and alkalies became known and used. Modern hydrometallurgy, however, can be traced back to the end of the nineteenth century when two major operations were discovered: the cyanidation process for gold and silver and the Bayer Process for bauxite. Later, in the 1940s, a breakthrough came during the Manhattan Project in USA in connection with uranium extraction. Since then, it has been advancing progressively and even replacing some pyrometallurgical processes. Hydrometallurgy can be outlined in the following diagram that will be discussed in detail:

Figure 5.28: Lectures on Day 3.

Figure 5.29: With students at the main entrance of the University, March 4–13, 2011.

Figure 5.30: Announcement of the courses on the campus, March 4–13, 2011.

Figure 5.31: Mining, Metallurgy, Materials.

Dear Professor Habashi,

We all wish you and your family a Blessed Christmas and a Prosperous New Year!!!
You are our INSPIRATION and more POWER to you.
We look forward of having you again here in the Philippines,

Graduating Students
Department of Mining, Metallurgical, and Materials Engineering, College of Engineering,
University of the Philippines, Dec 20111

Figure 5.32: From the students.

Figure 5.33: Course participants, March 4–13, 2011.

Figure 5.34: Course participants, March 4–13, 2011.

Figure 5.35: Certificate of appreciation, March 4–13, 2011.

Figure 5.36: Greetings by students, 2011.

Figure 5.37: Excursion with students, March 4–13, 2011.

Figure 5.38: Excursion with students, March 4–13. 2011.

Figure 5.39: A T-shirt created by a student, March 4–13, 2011.

Figure 5.40: At home with Mendoza and Yap families, March 2011.

Figure 5.41: Birthday greetings.

Evergreen Lead Battery Recycle

Consumed lead batteries are melted to recover lead (Figure 5.42).

Figure 5.42: Visit to lead batteries recycle plant, March 4–13, 2011.

Pacific Rare Metals & Chemicals

The company specializes in producing elemental selenium and tellurium and their compounds from a variety of sources (Figures 5.43–5.45).

Figure 5.43: Visit to Pacific Rare Metals plant, March 4–13, 2011.

Figure 5.44: Visit to Pacific Rare Metals & Chemicals plant, March 4–13. 2011.

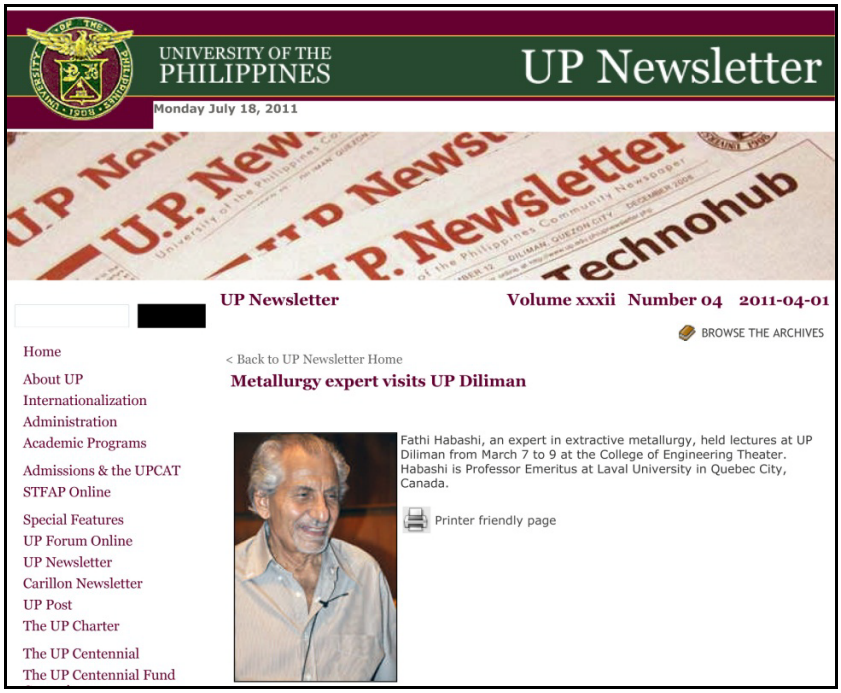


Figure 5.45: Newsletter 2011.

PHILIPPINES 2012

Invitation was received from Teresito Malicse, Principal Consultant at TBM Mining & Metallurgical Services in Makati City, Manila to visit the Philippines metallurgical industry.

Atlas Consolidated Mining and Development Corporation

Atlas was incorporated in 1935. A major restructuring was undertaken in 2004 with the creation of three subsidiaries to develop the Toledo Copper Complex, Berong Nickel Project, and the Toledo–Cebu Bulk Water and Reservoir Project. In addition, The Toledo Copper includes several underground mines, open pits and processing facilities to exploit the Carmen, Biga, and DAS Lutopan orebodies. Under Atlas, Toledo Copper operated as one of the largest copper producers in Asia from 1955 until the suspension of all operations in 1994. The final Feasibility Study on the rehabilitation of Carmen Copper Project was completed in August 2006.

Carmen Copper Corporation

Carmen Copper Corporation has been the largest copper exporter in the Philippines. The Toledo Copper Mine is about 60 km from Cebu City (Figures 5.46–5.51). The Mine produced 27000 tonnes of copper metal and 8000 ounces of gold in 2010.

Figure 5.46: Location of Cebu City.

Figure 5.47: Cebu City.

Figure 5.48: Cebu City.

Figure 5.49: With host Teresito Malicse, mine site in Cebu, March 2012.

Figure 5.50: From right: Teresito Malicse [Consultant], Adrián Ramos [Executive Vice President], Fathi Habashi, and George Pujtor [General Manager], Manila Office, March 2012.

Figure 5.51: Manila Office, March 2012.

ENK Philippines

European Nickel, ENK, is a UK registered company has projects in the Philippines and Albania. In June 2010 it merged with Rusina Mining to consolidate a development of more than 1.3 million tonnes of nickel in reserves and resources. The Company operates a heap leaching process to produce a mixed hydroxide intermediate product. The Acoje and Zambales deposits are based on Luzon Island in the Philippines (Figures 5.52–5.56).

A positive pre-feasibilty study demonstrated an economically viable heap leach nickel laterite process producing 24 500 t/year nickel and 930 t/year cobalt in mixed hydroxide product over an initial 10-year life of mine. At the Zambales deposit, an exploration program focusing on the nickel saprolite ore is underway to increase the resource further.

Figure 5.52: Location of Zambales laterite deposits.

Figure 5.53: Entrance to the mine, March 2012.

Figure 5.54: Rest House at the mine, March 2012.

Figure 5.55: Mining laterite.

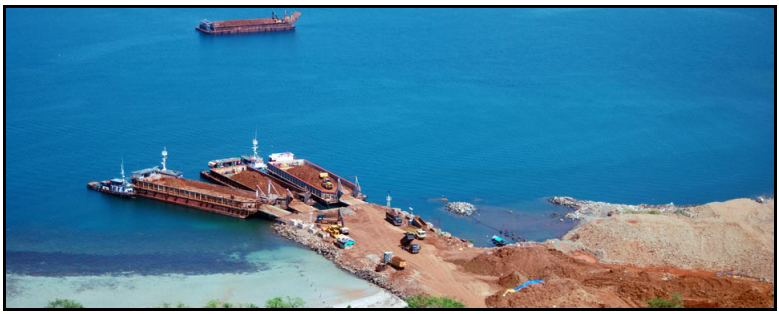


Figure 5.56: Shipping laterite to China.

Figure 5.57: Engineers operating the heap leaching plant, March 2012.

Figure 5.58: Engineers operating the heap leaching plant, March 2012.

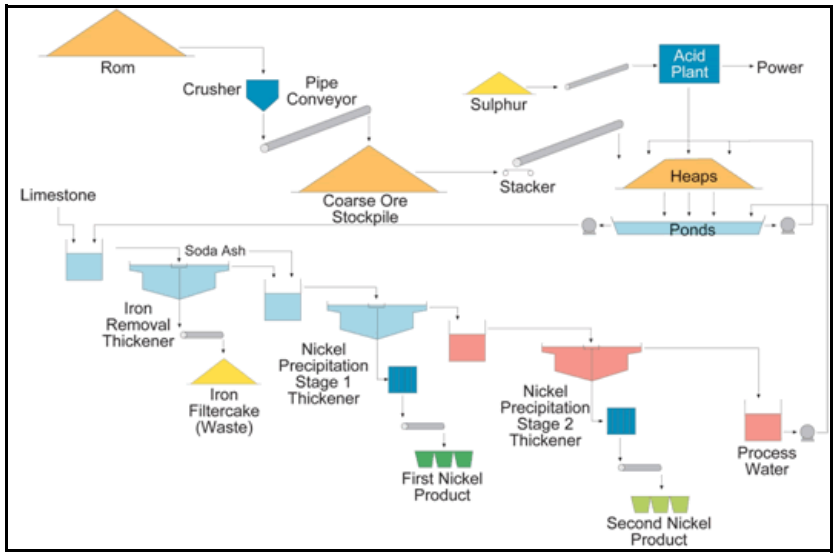


Figure 5.59: Heap leaching plant.

Figure 5.60: Leach solution processing plant.

The company has completed the tank leach laboratory tests with the Beijing General Research Institute of Mining and Metallurgy in China. The tests have shown superior recoveries and economics from tank leaching as opposed to heap leaching. Recoveries of nickel and cobalt over a three stage leaching circuit averaged 92% and 97% respectively over a 22-hour leach period. Sulfuric acid will be one of the major consumables utilized, representing 62% of the total operating costs. The company anticipates that the capital costs required for tank leaching will be equivalent or less than those for heap leaching and will require significantly lower working capital as a

result of reduced ground works and the ability to commence production more rapidly.

Figure 5.61: Nickel hydroxide product.

The plant can produce approximately 200 kg of nickel hydroxide per month by utilising ion exchange for Ni–Co separation and purification to process pregnant leach solution from the heap leach trial pad followed by precipitation of nickel hydroxide. ENK is in a joint venture with Balkan Resources to jointly develop Balkan's Kokogllave and ENK's Devolli nickel laterite deposits in Albania. The Devolli nickel laterite deposit has 35.6 million tonnes and Kokogllave has 30 million tonnes at a grade of 1.2% nickel in both. The Çaldag open-pit mine in western Turkey is located near İzmir and will produce 20 000 t/year of nickel and 1 000 t/year of cobalt in a mixed hydroxide product over a 14-year life of mine. The deposit's JORC proven reserves are 33.2Mt at 1.13% Ni.

Figure 5.62: Albanian deposit.

Figure 5.63: Turkish deposit.

Chapter 6

Thailand

Figure 6.1: Flag of Thailand.

HISTORICAL INTRODUCTION

The Khmer empire of the Angkor period along the Mekong River dominated south-east Asia (Figure 6.3). It was founded by Jayavarman II (reigned 802–850) who was consecrated as a god-king. Warfare between the dynasties of south-east Asia was an almost continuous process, bringing gradual changes in the size and shape of rival kingdoms.

Islam

By the end of the 13th century, Indian merchants trading through the Straits of Malacca established Muslim settlements in northern Sumatra. The wealth and sophistication of these traders brought converts to Islam and the influence of the religion became rapidly strong after a Muslim sultanate was established in Malacca from 1445.

Figure 6.2: Thailand and her neighbours.

The Europeans

One of the richest crops of south-east Asia — the spice — was of profound interest to European traders. After the Portuguese discovered a sea route to the East in 1498, the region became an arena of competition between outsiders. The Portuguese, established a base at Malacca in 1511. They were displaced in the 16th century by English and Dutch. By 1600 the Siamese liberated their land from the Khmer and founded Ayutthaya Kingdom (Figure 6.4). The kings of Ayutthaya were absolute monarchs and were considered as the incarnation of various Hindu gods. Buddhist monasteries became the centres of Siamese education and culture. During this period the Chinese began to settle in Siam, and soon established control over the country's economy. Most of these men took Thai wives.

During the competition between the European powers to control the spice trade the Dutch prevailed — developing a virtual monopoly in the region, until the French arrived in 1799 to begin a long involvement in Indo-China. By the beginning of the 20th century southeast Asia was colonized by France and Britain except Siam [the former Ayutthaya] which remained independent (Figure 6.5). In 1932, a bloodless revolution resulted

in granting the people of Siam their first constitution, thereby ending centuries of absolute monarchy. In 1939, the name was changed to Thailand then back to Siam in 1945 and finally Thailand in 1949.

Figure 6.3: The Khmer empire of the Angkor period dominated southeast Asia.

Figure 6.4: By 1600 the Siamese liberated their land from the Khmer and founded Ayutthaya Kingdom.

During World War II, the Japanese invaded Thailand to get free passage to Malaya. They used forced labour during the construction of the Burma–Thailand railway during 1942–1943. After the war, Thailand emerged as an ally of the United States. During the Cold War, Thailand went through decades of political instability as one military regime replaced another, but eventually progressed towards a stable kingdom in the 1980s (Figure 6.6).

Figure 6.5: By the beginning of the 20th century south-east Asia was colonized by France and Britain except Siam [the former Ayutthaya].

Figure 6.6: King Bhumibol Adulyadej, Rama IX and his wife.

Bangkok Airport

Bangkok has a modern and large airport (Figures 6.7–6.13).

Figure 6.7: Bangkok Airport, March 2012.

Figure 6.8: Bangkok Airport, March 2012.

Figure 6.9: Bangkok Airport, March 2012.

Figure 6.10: Bangkok Airport, March 2012.

Figure 6.11: Bangkok Airport lounge, March 2012.

Figure 6.12: Bangkok Airport, March 2012.

Figure 6.13: Bangkok Airport, March 2012.

BANGKOK

Bangkok is located near the mouth of Chao Phraya River (Figures 6.14–6.18). After the fall of Ayutthaya to the Burmese Kingdom in 1767, the newly declared King Taksin established his capital at the town, which became the base of the Thonburi Kingdom. King Phutthayotfa Chulalok (Rama I), who succeeded Taksin, moved the capital to the eastern bank and founded the Rattanakosin Kingdom in 1782.

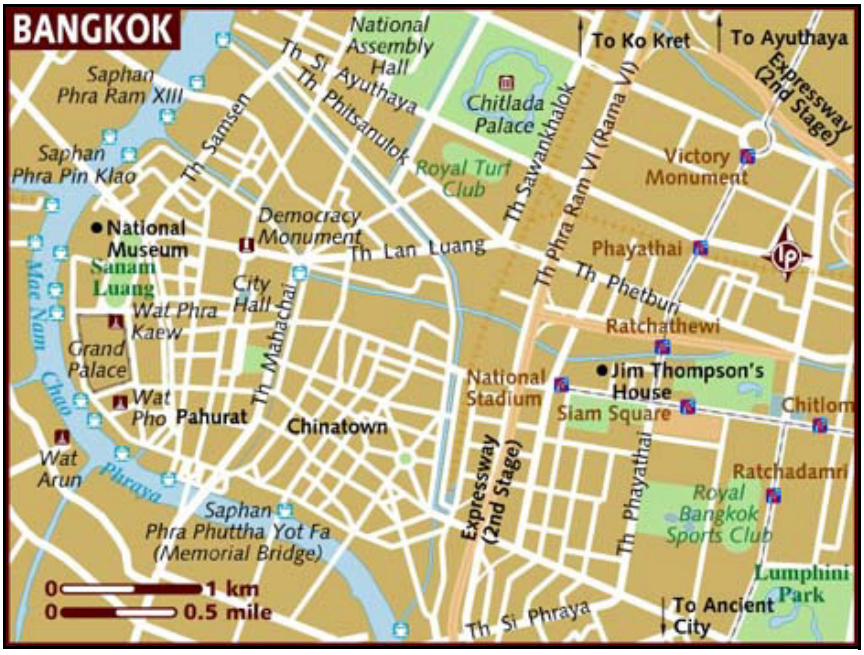


Figure 6.14: Map of Bangkok.

Figure 6.15: Bangkok.

Figure 6.16: Bangkok temple.

Figure 6.17: Royal palace.

Figure 6.18: Bangkok market.

Figure 6.19: Grand Inn Come Hotel, near Bangkok Airport, March 2012.

Wat Arun Rajwararam

Wat Arun Rajwararam (Figure 6.21), "Temple of the Dawn," is a Buddhist temple on the west bank of the Chao Phraya River. Named after Aruna, the Indian God of Dawn. The temple was originally located in the palace grounds. During the time of Rama I, it moved to the other side of the river. It was abandoned for a long time until Rama II, who restored the temple and extended the pagoda to 70 m.

Figure 6.20: Grand Inn Come Hotel, near Bangkok Airport, March 2012.

Gold Field Refinery

Gold Field Refinery is one of the precious metals and jewellery industry in Bangkok. It provides refining and assaying of gold and other precious metals such as silver, palladium, and platinum as well as pure gold products, silver chains and chemical products used in jewellery industry such as silver nitrate and gold potassium cyanide crystals. Gold is refined to 99.99+% purity. Plant is located in Pravet District near the airport. Miller process, aqua regia leaching process, and electrorefining are used. Gold is recovered from used crucibles by cyanidation.

Figure 6.21: Wat Arun Rajwararam.

Figure 6.22: Meeting Oran Koohapremkit, President of Gold Fields Refinery, and son Thanapisal Koohapremkit, Senior Vice President in Jakarta, June 2011. Photo by Nadia Habashi.

Figure 6.23: Gold powder 99.99+%, March 2012.

Figure 6.24: Gold ingot 99.99+%, March 2012.

Figure 6.25: Plant Manager Sompong Ruangprach and Lab Manager Ms. Wanwipa Poungjeen [Taew], March 2012.

Figure 6.26: Working session, March 2012.

Figure 6.27: Refinery Superintendent Trapong Tuenthamkaew [Bigg], March 2012.

Figure 6.28: Lab chemists, March 2012.

Figure 6.29: Plant engineers and Junior Vice President Oat Koohaprem-kit [in black shirt], March 2012.

Figure 6.30: Farewell dinner, March 2012.

Arutthaya

Ayutthaya (Figures 6.31–6.38) is 100 km north of Bangkok. It was founded in 1350 by King U Thong as the capital of the Siamese kingdom.

Ayutthaya launched attacks on Angkor, the great power of the region. Angkor's influence eventually faded while Ayutthaya became a new great power. Its gigantic monasteries, give an idea of its past splendour. In 1767, it was destroyed by the Burmese army, resulting in the collapse of the kingdom. The Burmese rule lasted only few months because they had also been fighting a simultaneous war with the Chinese. With most Burmese forces having withdrawn, the country was reduced to chaos. One general, Phraya Taksin, began the reunification effort. He gathered forces and began striking back at the Burmese. He finally established a capital at Thonburi, across the Chao Phraya from the present capital Bangkok and ascended the throne.

CULTURE

Classical Thai dances (Figures 6.39–6.41) have been part of Thai culture for centuries. They are performed to ensure rain for a bountiful harvest, please the spirits, mark festivals and important events, and entertain royalty.

Figure 6.31: Ayutthaya ancient park.

Figure 6.32: Ayutthaya ancient park.

Figure 6.33: Ayutthaya ancient park.

Figure 6.34: Ayutthaya.

Figure 6.35: Ayutthaya.

Figure 6.36: Ayutthaya temple.

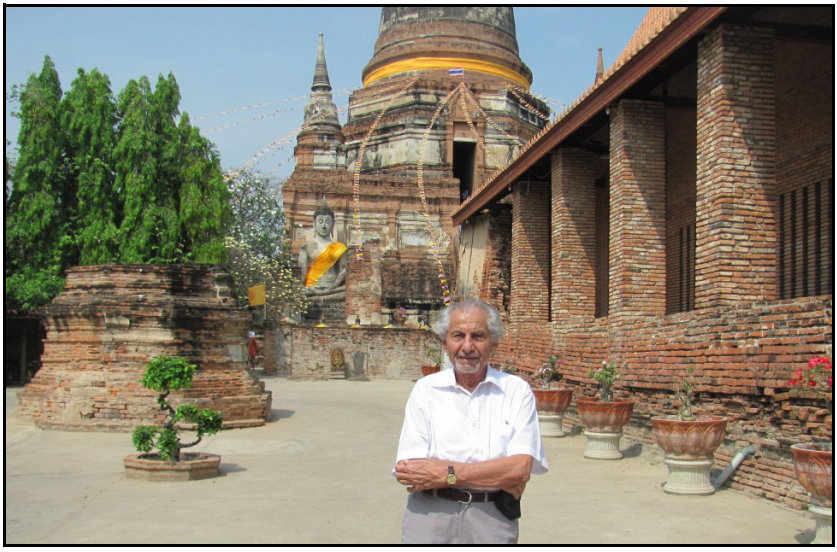


Figure 6.37: Ayutthaya.

Figure 6.38: Ayutthaya.

Figure 6.39: Traditional dance.

Figure 6.40: Traditional dance.

Figure 6.41: Traditional dance.

Chapter 7

Vietnam

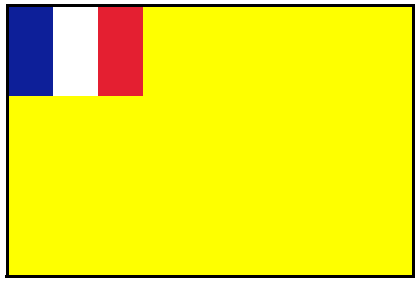


Figure 7.1: Flag of French Indochina.

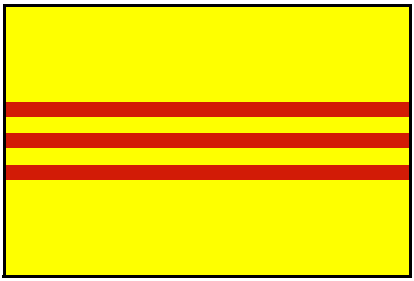


Figure 7.2: Flag of South Vietnam.

Figure 7.3: Flag of Vietcong.

Figure 7.4: Present flag.

Figure 7.5: Vietnam and her neighbours.

HISTORICAL INTRODUCTION

Vietnam (Figures 7.5–7.6) was part of Imperial China until 938 AD when they got their independence. Successive Vietnamese royal dynasties flourished as the country expanded into Southeast Asia. In the mid-19th century Indochina Peninsula was colonized by the French.

The country was usually called Annam until 1945, when King Bảo Đại (1913–1997) (Figure 7.7) the last king of the Nguyễn dynasty changed the name back to Việt Nam as was used in earlier time when the country was part of China. The use of Chinese characters was discontinued at this time and the alphabetic spelling became Vietnamese. Vietnam had been ruled from Huế by the Nguyễn Dynasty since 1802. The French government took control of the region in the late 19th century and split Vietnam into three areas: the protectorates of Annam and Tonkin and the colony of Cochin-china.

At the age of nine, Prince Nguyễn Phúc Vĩnh Thụy was sent to France to be educated. In 1926 he was made king after his father's death and took the name Bảo Đại. He did not ascend to the throne given his age and returned to France to continue his studies.

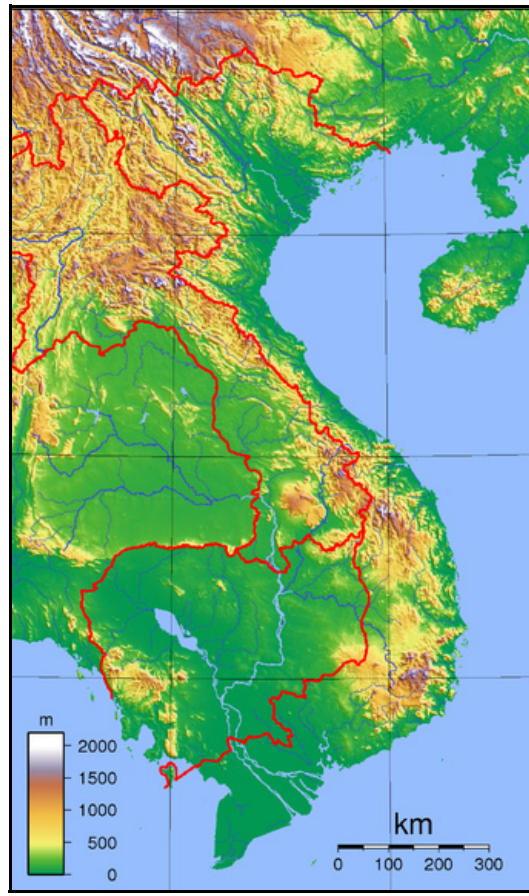


Figure 7.6: Annamese Mountains separate Vietnam from her neighbours.

During World War II the Japanese invaded Indochina and ousted the Vichy-French in March 1945 and claimed that they have liberated the country from French colonialism. They ruled through Bảo Đại who declared independence from France. When Japan surrendered to the Allies in August 1945, the Việt Minh under the leadership of Hồ Chí Minh (1890–1969) (Figure 7.8) forced Bảo Đại to abdicate due to his Japanese associations. Hồ Chí Minh then declared the independence of the country on September 2, 1945, but was ousted by the French in November 1946 who brought back Bảo Đại as Head of State.

Figure 7.7: Prince Nguyễn Phúc Vĩnh, who became in 1926 King Bảo Đại (1913–1997).

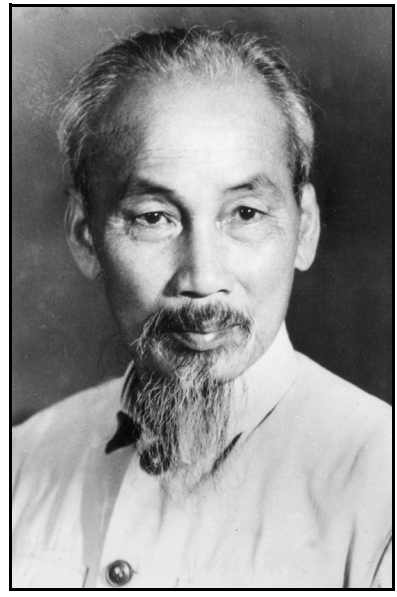


Figure 7.8: Hồ Chí Minh (1890–1969).

Vietnam then plunged into armed conflict and Bảo Đại left to live in Hong Kong and in China. The communist victory in China in 1949 led the communist countries to recognize Hồ Chí Minh government with capital in Hanoi but the United States extended diplomatic recognition to Bảo Đại's government in March 1950 with capital in Saigon. The outbreak of the Korean War in June led to US military aid and active support of the French war effort in Indochina, now seen as anti-communist rather than colonialist.

The war between the French colonial forces and the Việt Minh continued, ending in 1954 shortly after a victory for the Việt Minh at Điện Biên Phủ. The country was then partitioned into Northern and Southern Vietnamese administrations (Figure 7.9). Bảo Đại moved to Paris and French Riviera, but remained Head of State of South Vietnam, appointing Ngô Đình Diệm as his prime minister. In 1955, Diệm deposed Bảo Đại and established himself as president of the republic.

Vietnam War

The Vietnam War (Figures 7.10–7.17) began in 1959 with an uprising by Việt Cộng forces supplied by North Vietnam. Diệm was deposed in a military coup in 1963 then followed by a series of short-lived military governments. Fighting climaxed during 1968, when there were over 1.5 million South Vietnamese soldiers and 500 000 US soldiers in South Vietnam. On April 30, 1975, the North Vietnamese army overran Saigon. Vietnam was then unified under a Communist government. In 1986, the government initiated a series of economic and political reforms, which began Vietnam's path towards integration into the world economy.

Figure 7.9: Division of Vietnam in North and South.

Figure 7.10: Malcolm Browne's Photo of Vietnamese Mahayana Buddhist Monk Immolating Himself (June 11, 1963).

Figure 7.11: Eddie Adams' "General Nguyễn Ngọc Loan Executing a Việt Cộng Prisoner in Saigon" (February 1, 1968).

Figure 7.12: Ronald Haeberle's Photo of the Mỹ Lai Massacre (March 16, 1968).

Figure 7.13: Photo by Nick Ut taken on June 8, 1972 of terrified kids after Napalm Attack.

Figure 7.14: First anti war protest October 1962.

Figure 7.15: Anti-war protests in Washington.

Figure 7.16: Make love not war.

Figure 7.17: 58 267 Americans lost their life between 1959–1975 in addition to 1–3 million Vietnamese.

Chemical defoliation

In 1961 and 1962, the Kennedy administration authorized the use of chemicals to destroy rice crops. Between 1961 and 1967, the US Air Force sprayed 75 700 000 litres of concentrated herbicides over 24 000 km^2 of crops and trees, affecting an estimated 13% of South Vietnam's land (Figures 7.18–7.19). In 1965, 42% of all herbicide was sprayed over food crops. Between 1961 and 1971 US military used to defoliate large parts of the countryside in Vietnam since the enemy was conducting its activities in tunnels underground. About 45 000 000 litres of Agent Orange, which included dioxin, were sprayed. As of 2006, the Vietnamese government estimates that there are over 4 million victims of dioxin poisoning in Vietnam.

Figure 7.18: Spraying Agent Orange.

Table 7.1: Visits to Vietnam.

Dates	Cities visited	Purpose
October 2001	Hanoi	Institute for Technology of Radioactive & Rare Elements
	Hạ Long Bay	Cultural visit
October 2003	Hanoi	• 8th Eurasian Conference on Chemical Sciences • Hanoi University of Technology
	Hô Chí Minh City	University of Hô Chí Minh City

Figure 7.19: US destroying forests in Vietnam by fire.

HANOI

Hanoi (Figures 7.20–7.28) is the capital of Vietnam and the country's second largest city. It is located on the right bank of the Red River. From 1010 until 1802, it was the most important political centre of Vietnam. It was eclipsed by Huế, the imperial capital of Vietnam during the Nguyễn dynasty (1802–1945), but Hanoi served as the capital of French Indochina from 1902 to 1954. From 1954 to 1976, it was the capital of North Vietnam, and it became the capital of a reunified Vietnam in 1976, after the North's victory in the Vietnam War.

Figure 7.20: Hanoi Opera House.

Figure 7.21: With Ninh Nguyễn at Historical National Museum, 2003.

Figure 7.22: Historical National Museum.

Figure 7.23: Museum of Vietnamese Revolution.

Figure 7.24: An 11th-century temple.

Figure 7.25: Visiting a temple with Ninh's daughters, 2001.

Figure 7.26: Hồ Chí Minh mausoleum, 2001.

Figure 7.27: Hồ Chí Minh mausoleum.

Figure 7.28: In a park, 2001.

Figure 7.29: Institute for Technology of Radioactive & Rare Elements.

Institute for Technology of Radioactive & Rare Elements

This institute is part of Vietnam Atomic Energy Commission, Ministry of Science, Technology, and Environment (Figures 7.29–7.32). There was a cooperation between this institute and Laval University. Engineer Ninh Nguyễn spent three months in 1995 at Laval on a scholarship from the International Atomic Energy Agency in Vienna.

Hanoi University of Technology

Hanoi University of Technology was established in 1956 is the first and largest technical university in Vietnam built with the help of the former Soviet Union (Figures 7.33–7.36). The first universities in Vietnam founded during the French occupation were: Indochina Medical College (1902), University of Indochina (1904), École Supérieure des Beaux-Arts de l'Indochine (1925), and Hanoi University of Education (1951). Later, other technical universities were founded including Hanoi University of Civil Engineering, Hanoi University of Mining and Geology, Vietnam University of Water Resource, etc. After the unification of Vietnam, many of its professors went to Hồ Chí Minh City to rebuild Hồ Chí Minh City University of Technology.

INSTITUTE FOR TECHNOLOGY OF RADIOACTIVE
AND RARE ELEMENTS (ITRRE)

TENTATIVE WORK PLAN
FOR Mr. F. HABASHI'S VISIT TO ITRRE

Hanoi, 18 - 24 October 2001.

DAY	ACTIVITY	TIME	PERSON IN- CHARGE
Thu. 18 Oct.	Arrival. Airport pick-up and hotel arrangement in Hanoi.	19.30	Mrs. Y. Ninh
Fri. 19 Oct.	* Sight-seeing around Hanoi	09.00 ~~-12.30~~	Mrs. Y. Ninh
	* Watching the Thang Long Water Puppet Performance.	19.00 --------	Mrs. Y. Ninh
Sat. 20 Oct.	Visit to Ha Long Bay	08.30 ---------	Mrs. Y. Ninh
Sun. 21 Oct.	Return back to Hanoi	17.00 ---------	Mrs. Y. Ninh
Mon. 22 Oct.	* Greeting Ceremony	08.30 - 09.00	Prof. H. Trung
	* Seminar on: "Uranium in Canada"	09.00 - 10.00	Mr. F. Habashi
	Short break	**10.00 - 10.15**	
	- "Uranium recovery from ores".	10.15 - 11.30	
	* Lunch hosted by Prof. H.Trung	12.00 - 13.00	Mrs. Y. Ninh
	* Visit to ITRRE Labs.	14.00 - 16.00	Mrs. Y. Ninh
Tue. 23 Oct.	* Seminar on : "Kinetics of dissolution of uranium oxide"	08.30 - 10.15	Mr. F. Habashi
	* **Short break**	**10.15 - 10.30**	
	* Common discussion	10.30 - 11.30	
	* Lunch	12.00 -13.00	Mrs. Y. Ninh
	* -Visit to Lab. for Purification Technology.	14.00 - 15.00	Dr. L.B.Thuan Mrs Y. Ninh
	- Seminar on "Uranium and Rare Earth Elements in phosphate rocks".	15.00 - 17.00	
Wed. 24 Oct.	Departure from Hanoi Airport	~~10.50~~ --------	Mrs. Y. Ninh

Note:
- Prof. H. V. Trung: Director, ITRRE.
- Dr. L. B. Thuan: Head, Lab. for Purification Technology.

Figure 7.30: Program of the visit in 2001.

Figure 7.31: Huỳnh Văn Trung, Director.

Figure 7.32: Ninh Nguyễn Thị Yến, Guide.

Figure 7.33: Hanoi University of Technology.

8th Eurasian Conference on Chemical Sciences

Huỳnh Văn Trung, Director of Institute for Technology of Radioactive & Rare Elements in Hanoi was conference chairman (Figure 7.37). The conference took place at Daewoo Hotel in October 2003 (Figures 7.38–7.40).

Figure 7.34: Faculty members. On my left is Prof. Lê Xuân Khuông, who translated two of my books into Vietnamese, 2003.

Figure 7.35: Faculty members, 2003.

Figure 7.36: Library, 2003.

Figure 7.37: Huỳnh Văn Trung, conference chairman, 2003.

Figure 7.38: Hotel Daewoo, Hanoi, 2003.

Figure 7.39: Hotel Daewoo, 2003.

Figure 7.40: A magnificent clock made of carved wood, 2003.

HẠ LONG BAY

Hạ Long Bay features thousands of limestone karsts and isles in various sizes and shapes and many caves (Figures 7.41–7.48). It is a two-hour drive from Hanoi.

Figure 7.41: Location of Hạ Long Bay next to Hanoi.

Figure 7.42: Detailed map of Hạ Long Bay and its rocks.

Figure 7.43: Gigantic rocks in Hạ Long Bay.

Figure 7.44: Gigantic rocks in Hạ Long Bay.

Figure 7.45: Gigantic rocks in Hạ Long Bay.

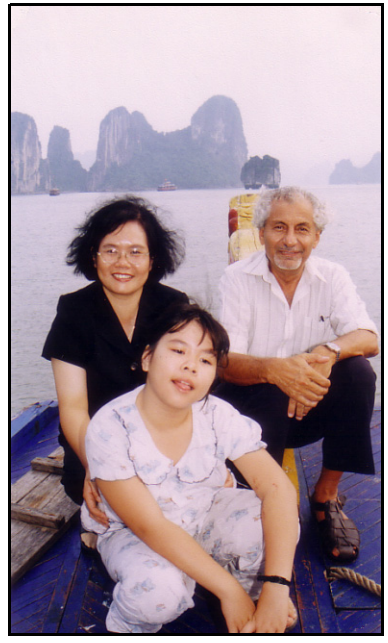


Figure 7.46: Hạ Long Bay with Ninh and daughter, 2001.

Figure 7.47: Inside a cave in a Hạ Long island, 2001.

HỒ CHÍ MINH CITY

Saigon was renamed Hồ Chí Minh City in 1975 in honour of the nationalist leader (Figures 7.49–7.52). The city has many French colonial buildings and newly-built skyscrapers. The city centre is situated on the banks of the Saigon River.

Figure 7.48: Promenade in Hạ Long city, 2001.

Figure 7.49: Hồ Chí Minh City centre.

Figure 7.50: Hồ Chí Minh City.

Figure 7.51: City Hall with Hồ Chí Minh statue.

Figure 7.52: Post office.

National University of Hồ Chí Minh City

National University of Hồ Chí Minh City was founded in 1995 by the merger of nine universities: University of Hồ Chí Minh City, Thủ Đức Technology Training University, Hồ Chí Minh City University of Technology, Hồ Chí Minh City University of Agriculture and Sylviculture, University of Economics, University of Accounting and Finance, Hồ Chí Minh City Pedagogical University, Hồ Chí Minh City Architecture University, branch of Law University of Hanoi.

Figure 7.53: National University of Hồ Chí Minh City.

Figure 7.54: Prof. Dang Máu Chiến and family, 2003.

Figure 7.55: Traditional dress.

CULTURE

Vietnam girls have colourful national dress (Figure 7.55) and traditional dances (Figure 7.56). Motorbikes play an important role in everyday life (Figures 7.57–7.58). Artisanal work is magnificent (Figure 7.59).

Figure 7.56: Traditional dances.

Figure 7.57: Motorbikes as means of transportation.

Figure 7.58: Transporting the family.

Figure 7.59: Artisanal art, souvenir from Hồ Chí Minh University.

BOOKS TRANSLATED IN VIETNAMESE

Two of my books were translated in Vietnamese:

- *Principles of Extractive Metallurgy*. Volume 2- Hydrometallurgy (Figure 7.60)
- *Pollution Problems in the Mineral and Metallurgical Industries* (Figure 7.61)

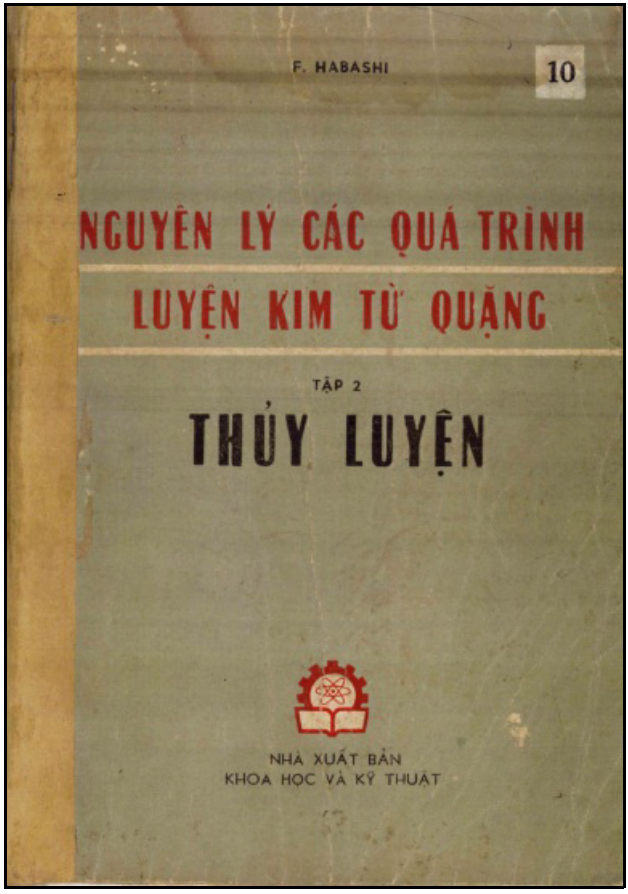


Figure 7.60: *Principles of Extractive Metallurgy*. Volume 2 — Hydrometallurgy.

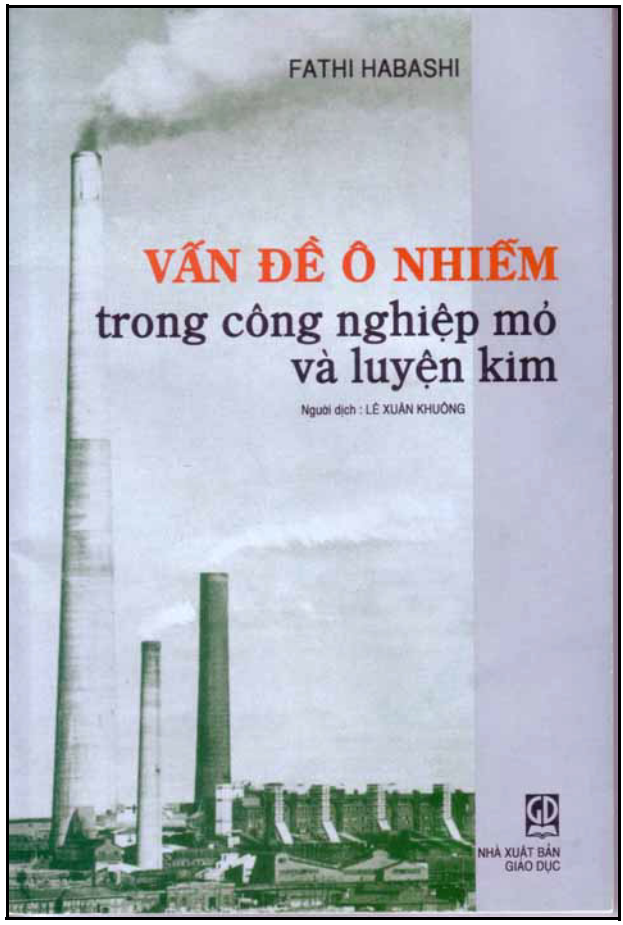


Figure 7.61: *Pollution Problems in the Mineral and Metallurgical Industries.*

Name Index

Subject Index