Discovering the Geography of Taiwan

A Field Trip Report

Hamburg, October 2009

Contents

Introduction to Field Trip Report “Taiwan”

“Geography is what Geographers do”
A. E. Parkins in 1934

Geographers have to go out and *see* their research objects in order to develop appropriate research objectives. Therefore, field trips represent an integral constituent of studying Geography. These outdoor experiences are the heart of any study of geography and are just as important as learning about analytical methods and gathering background information, facts and data on the earth’s places and spaces. The German geography curriculum includes field trips to foreign countries as an approach of deconstructing “the self” and “the others”. It is a didactical concept which goes beyond factual learning and even beyond the discipline itself. The publication presented here is the final report of such an experience. We describe the far away island of Taiwan from a German perspective.

Taiwan is a special place and at the beginning of our preparatory seminar for the field trip I was sure that many students did not even know where exactly to find this island in the Chinese Sea named *Formosa* by the Portuguese. When we reached the island we were full of expectations, pre-conceived opinions and prejudices. After the field trip we had come to appreciate that Formosa is not only a beautiful island, but home to beautiful people as well. Our exciting encounters ranged from the welcoming party in the small village in the mangroves – where the mayor and the representative of the community had been standing in the rain for hours waiting for their European guests – to the temple guides and visitors in Tainan who patiently answered thousands of questions concerning the religious daily life of Taiwanese, and the many University colleagues who welcomed us with open arms and open minds – we were overwhelmed by so much hospitality! From time to time we asked ourselves how we could ever adequately repay such openness in Germany.

“Reisen bildet” – Travel broadens the mind – is a German saying. Taiwan taught us how interesting and diverse a place and how friendly and helpful a people can be. At the same time we were taught to think about ourselves and our homeland. This is what field trips are all about. Taiwan and our Taiwanese hosts helped us to learn these lessons thoroughly and to broaden our minds.

The following is a report of our field trip, focusing on a sample of our activities, the topics we addressed and the experiences we had. It is a German perspective drawn up with assistance from our Taiwanese friends. We want to thank them very much for their help and support. Also, we would like to express our sincere gratitude to all our hosts and the many helpers and students we met and who helped to make our trip a special and unforgettable experience. Among many others we would like to express our special gratitude to Shew-Jiuan SU, Geography Department NTNU, Linda Chung-Ling OUYANG, Geography Department NTNU, Chiuan-Chieh CHI, Dong-Hwa University Hwa-Lien, Chi-Jen Ding, Department of Environmental and Culture Resources, National Hsinchu University of Education and in Kaohsiung, Robert Lo, Department of Geography, National Kaohsiung Normal University.

The idea for this field trip was born during a small island conference in Maui, Hawaii, between my dear colleague Huei-Min Tsai from National Taiwan Normal University NTNU and myself. It was the dream of cross-cultural education, of creating a shared experience for Geography and Environmental Science students of two worlds. The idea was to bring together a group of German and a group of Taiwanese students to learn *of* and *about* “the self” and “the others” through a real cross-cultural endeavour. It was a challenge for everybody. Huei-Min did everything possible to make this dream come true. We owe her a great deal of gratitude and we thank her for all the efforts she put into this endeavour.

The adventure we experienced is proof once more that Geography is not only about describing the earth. It is about living *in* and *experiencing* new worlds, collecting new ideas and taking them back home to interpret them in our own life. Thank you Taiwan for this adventure. We shall never forget it.

Beate M.W. Ratter, Hamburg, October 2009

1

Early European Encounter
by Christin Bernhold, Hamburg and Kerstin, Taipei

Introduction

Tainan City and especially Anping Harbour are special places concerning the Dutch colonial history of Taiwan. The Dutch colonial history has had among others a deep impact in some parts of this island.

In the following chapter we will point out the most important aspects of the Dutch Rule in Taiwan. After giving a historical introduction in the "Early European Encounter" and the beginning of the Dutch occupation the latter is going to be discussed under the headings agriculture, trade, taxes and missionary activities (see also Hsieh 1964).

Each of the groups that historically occupied Taiwan "brought with it its own cultural traits, customs, beliefs, moral values, types of agricultural crops and technical abilities". The cultural influence of each group left its traces in Taiwan so that today we can find "remnants of every culture that appeared on the island". For example, during the Dutch rule the landscape of the island was transformed by farmers with advanced technological skills like removing forests, damming rivers, draining swamps or developing large cities. Furthermore, the Dutch brought new kinds of food and cultural customs and tried to convert the aborigines to Christianity.

It certainly would be exaggerated to say that all these effects still have a great influence on today's life in Taiwan. But nevertheless in the ongoing chapter we are going to have a closer look on some aspects of contemporary Taiwan that might have their derivation in the "Early European Encounter". In other words: we want to follow up the theme in regard to present times.

Early European Encounter in today's Taiwan

We want to give an impression of the Dutch colonial period and the role it played in Taiwan. In order to convey an understanding of the circumstances of the beginning of the Dutch rule we will first address some important items for example the European Rivalry (especially) in Taiwan.

European Rivalry in Taiwan
During the 16th and the 17th century, European powers began to lay the foundations of their Asiatic colonial empires. For example, the Portuguese acquired a base in China, at Macao, in 1557, Spain took over the Philippines in 1571, and the Dutch colonized Java in 1595. In 1590 (other sources say 1583) today's Taiwan was peered for the first time by a European force – by the garrison of a Portuguese cog (Weggel 1991:6f.). It is said that they were highly impressed by the beauty of the nature so that they named the island "Ilha Formosa" (Beautiful Island). Under this name the island was introduced to the western world. But the Portuguese left "Ilha Formosa" again after establishing a settlement in the northern part of the island.

The next Europeans to occupy Taiwan were the Dutch. But why were they interested in occupying this island? In 1619 the head office of the “Dutch East India Company” (“Vereinigte Ostindische Compagnie”, VOC) was established in Batavia which is now called Jakarta. The VOC had two main ambitions in the East Asian Region: economical contact with the Chinese and the purchase of Dutch basements. In 1622 the Dutch established a military base on the Penghu Islands in the Taiwan-Street but the next year they where forced by the Chinese to give them up. Looking for a new base, they moved to the main island of Taiwan. In 1624 they landed at the south western coast and immediately started claiming territory from the aborigines living there (Hsieh 1964:140). The first big project of the Dutch was the construction of the “Fort Zeelandia” and the town of Anping. Today we can find a museum inside the ancient fort which we visited with the field trip group because it presents one of the most important places in Taiwan concerning the Dutch history. The entrenchment was very important for them, because they were in fear of attacks by the Portuguese and by the Spaniards. Twenty-nine years later, in 1653, they built another Fort, the “Fort Providentia” nearby (Weggel 1991:14).

“The Dutch moved their capital from Fort Zeelandia to the newly completed Fort Providentia called by the Chinese Hung Mao Chen or “Red Hair Castle” from a characteristic they ascribed to the Dutch” (Hsieh 1964:141).

We visited this place, where today only the foundation walls of the ancient fort are obtained.
Six years after the landing, in 1630, a number of merchants, missionaries and other Dutch settled in and around Anping in order to have a base for the expansion of their foreign trade. Furthermore they encouraged the planting of sugarcane which is still very important for Taiwan’s economy, started to tax the indigenous people and tried to convert them to Christianity (Hsieh 1964:140).

During the first few years, the Dutch reached these goals very successfully – a fact that alarmed the Spaniards. Fearing for their supremacy the latter sent a fleet from Manila to the northern part of Taiwan which in 1626 was still not occupied by the Dutch. They soon took the north eastern cape of the island and gave to it the Spanish name “Santiago” (Weggel 1991:15f.). Very soon they left Santiago behind and moved to a more desirable place. This location named “Santissima Trinidad” by the Spaniards is known as “Keelung Harbour” today. Like the Dutch, the Spanish colonists quickly started building a fort called “Fort San Salvador” and another one in today’s “Tamshui Harbour” called “Fort Santo Domingo”. In the Spanish-ruled part of “Ilha Formosa” there were attempts to convert the natives to Christianity, too, and between 1626 and 1642 many Catholic missionaries were sent to the island.

The Dutch in southern Taiwan made many attempts to drive out the Spaniards. In 1630 and in 1641 they assaulted Castillo and Fort Santo Domingo but in vain. Finally, in 1642, while the Spaniards were menaced by native rebels in the Philippines they conquered Castillo. From then on the whole island was under Dutch rule.

The Dutch Rule

After 1642, when the Dutch were “freed” from all European competitors, they began to strengthen their hold on Taiwan through the VOC. The company appointed a governor and for thirty-eight years it used the island as a trading centre. As a finance source they implemented a taxation system. “The Dutch government gave the company full power to rule and taxed the aborigines and the Chinese on Taiwan” (Hsieh 1964:141). The VOC divided the territory of the aborigines into seven districts each of which was governed by an

aborigine elder. “The company gave badges of honour to the elders and established an advisory council made up of them”. The immigrants not only served as tax payers in this period. In 1650 nearly 300 Chinese villages were under the direct jurisdiction of the company and “the Dutch recognized the value of the immigrants on account of their agricultural experience (…)”. In order to have a better control and better exploitation-conditions they organized them into farm groups: each 50 households were united in one group and every 30 or 40 groups elected a captain who was responsible to the governor for local “peace and order”. Under this organization the area of cultivated land and agricultural production continued to increase.

In the following chapters we will give an overview of some important points that characterized “Ilha Formosa” at that time.

Agriculture
As we have seen the Dutch encouraged agricultural production and took steps to expand the area of cultivated land. Before this historical period there were no agricultural implements except the plow. Within development of the expansion of agriculture the colonists made a lot of modifications in the regional agriculture. For example the exploitation of cows and horses for agricultural work had been unknown before and was now introduced by the Dutch. The company appointed two officials to take the responsibility for raising cows). Similar to other colonies in the world the wealth of the Dutch was based upon the exploitation of others, either Chinese immigrants or indigenous people. “Human labor was a very important element in increasing agricultural production.” The Dutch exploited Chinese tenants and aborigine workers which cultivated the farms and raised sugar cane, wheat and tobacco. Most of the Dutch living in Taiwan didn’t work as farmers but were merchants, teachers, missionaries or soldiers. At this time it was still fortunately for them that the number of Chinese immigrants was increasing due to the unstable political situation in China.

One thing introduced by the Dutch that is still known and still used in Taiwan is the land survey called “ka”. The name is derived from the word “akker” and one ka is on a par with 0.96 ha (Weggel 1991:18). Well digging was also brought to the island. “The largest and deepest well on the island, located in the present city of Chiayi, is believed to have been constructed by the early Dutch colonists.” (Hsieh 1964:143). Today the well is a tourist-attraction with the name “red-hair-well” referring to the impression of the aborigines that most of the Dutch had red hair.

Trade
Taiwan, under Dutch control, was the centre of exchange of goods among a number of areas such as Japan, China, Batavia and Holland. The main export products were rice, sugar, rattan, deerskins, deerhorns and drugs for the traditional medicine in China. In exchange they imported raw silk and silk textiles, porcelain and medicine from China, and spices, amber, tin, lead, cotton as well as opium from Batavia (see also Weggel 1991:14). Some of the latter where later traded to China. They used silver as a medium of exchange which they received from Japan (Hsieh 1964:143). Exchanging all these goods the VOC made a large profit. Historians agree that Taiwan played a very important role for the Dutch East India Company as a trading centre: “Taiwan was then a busy area, handling all these goods, and the Dutch East India Company, which carried on the business, made a large profit.”

Taxes
We already mentioned that the VOC imposed heavy taxes on the people living on the island of Taiwan. “For making a profit from a colony, trade is quicker than agriculture and taxation is even quicker.” The first tax to be imposed was a land tax. Therefore farms were classified as upper, middle and low grade farms, and taxes of different amounts were collected

accordingly. Furthermore they established a tax on exports, at that time mainly on deerskins and sugar. Another tax was the poll tax. Every inhabitant who reached the age of seven years had to pay a poll tax. This tax was very lucrative for the colonists because the number of Chinese immigrants almost doubled between 1623 and 1644 and the tax collected from them added up to a large sum. The aborigines also had to pay taxes, but they where "kindly permitted" by the Dutch to pay in deerskins, which where used for trade.

Missionary activities
According to custom for colonies Taiwan was a field for missionary activities, too. As Holland mainly was a protestant country Protestant missionaries strived to Christianize the aborigines. They established primary schools in every aboriginal hamlet in which the Dutch language as well as Christian religion was taught. By 1650 it is already reported of 5900 converts.

The first missionary called Georgius Candidius wrote a work entitled "Short Account of the Island of Formosa" which was published in Germany in 1627. In this writing Candidius describes the manners, customs and the religion of the inhabitants). It can be seen as a sign for the fame of Candidius that the aboriginal converts named the most important Taiwanese lake after the missionary ("Lake Candidiud"). (Weggel 1991:15). The lake is today known as "Sun Moon Lake", a place we also visited during the field trip. During the Spanish occupation in northern Taiwan an old European conflict of religious denomination had been brought forward to Taiwan as the Spaniards tried to bring catholic Christianity to the northern part of the island. But after the Dutch had expelled the Spanish Catholic missionaries in 1642 the Protestant Belief was also spread in the north (Hsieh 1964:145). In order to accelerate the missionary work the Dutch sent young aborigines to Holland to make them learn about the Christian religion and returned them to Taiwan to help to teach what they had learned. Beside the conversion to Christianity the "educational work" of the Dutch had some external effects, for example the adaptation of Dutch names. It is said that the names were kept long after the people in Taiwan had forgotten where they derived from. The use of the Dutch language was also widely spread among the natives. When the Dutch "Father de Marilla, S.J., visited Taiwan in 1715 he found several aborigines still able to speak and read Dutch and who had in their possession fragments of a Dutch Bible."

The End of the Ming Dynasty and the Conflict with China

While the Dutch were occupying Taiwan China was going through a period of conflicts and hard combats. In 1644 China was invaded from the northern steppes. The invaders were the Manchus, "the struggle continued for many years in the south, and the population suffered". The Manchus overthrew the Ming Dynasty and thereafter proclaimed the Qing Dynasty (also referred to as the Manchu Dynasty) that lasted until the beginning of the 20th century. The struggle in the south of China continued for years.

In addition to this challenging situation, pirates from all over the world constantly ravaged Chinese coastal towns so that the coast was evacuated by the Qing Dynasty (Weggel 1991:19). "Consequently thousands of people, especially from the coastal provinces (…) began to pour across the Taiwan Strait to the island." (Hsieh 1964:145). Therewith they also weakened Zheng Chengong/Cheng Ch'eng-Kung (historians use different spelling of this name), the last member of resistance against the Manchus. Zheng Chengong had to flee from China and chose today's Taiwan as a shelter and as his new centre of resistance. The mass migration to Taiwan changed the Character of the island. At first the Dutch welcomed the new settlers and provided them with agricultural implements in conditions that the immigrants could at once start working on the farms. The immigrants were very profitable for the colonists because they collected a lot of rents and taxes. At that time they still didn't

allow farmers to own any real estate. Different attitudes brought about a conflict between the two groups very fast. The Chinese wanted to grow more rice, for example, whereas the Dutch were mainly interested in cultivating sugar cane for the export business. As an even more important fact the Chinese wanted to work the land for themselves and didn't want to be exploited by the Dutch any longer

The Chinese settlers finally joined forces with the fighter Zheng Chenggong and put an end to the Dutch rule in Taiwan in 1661. The southern coast of Taiwan was only protected by four Dutch ships and 2.000 soldiers at that time (Weggel 1991:20f.). This bare protection can be seen as one reason for the fast success of the Chinese. Only Fort Zeelandia held out against the siege for nine month but in 1662, after the Chinese assured free passage to Batavia for the Dutch, the Fort was given over to the Chinese. Within a few years after the Dutch left nearly all the forts fell to ruins and most of the aborigines returned to their ancient languages and beliefs.

Summary

The main purpose of both the Dutch and the Spanish colonization was trade; the Aborigines and the Chinese settlers were only seen as a source of income. In addition, the small size of the military forces stationed in the colony and the great distance between the bases prevented fast reinforcement of the garrisons. All these conditions joined to bring about the failure of the Spaniards and the Dutch in Taiwan.

There are only vestiges of Dutch culture left in Taiwan: The ruins of Fort Zeelandia and Fort Providentia, fallen ramparts, old wells, and irrigation canals, and the remains of a few churches. Also, sugar cane is still raised on Taiwan, and the linguistic influence of the Dutch can be traced in present-day Taiwan ... (Hsieh 1964:147).

References

Hsieh, Chiao-Min (1964): Taiwan - Ilha Formosa. A Geography in perspective. London: Butterworth

Hung, Chien-Chao (2000): A History of Taiwan. Rimini: Il Cerchio

Weggel, Oskar (1991): Die Geschichte Taiwans. Vom 17. Jahrhundert bis heute. Köln. Weimar. Wien: Böhlau Verlag

2

Religion and Culture in Taiwan
by Robert Stier, Hamburg

Introduction

It is not easy describe religions in Taiwan. If someone should categorize the religions in Germany, it would be much easier. In Germany the two most common religions are Protestantism and Catholicism. In the northern part of Germany most of the religious population is Protestant and in the south most of the religious population is Catholic. The basis of their belief is the Bible and everybody can read it. Both religions have features of their own by which one can easily separate them (of course this is a simplified and exaggerated way to describe religion in Germany).

Separating the religious groups in Taiwan is much more complicated. On the Taiwanese governmental website there are six religions listed, the first two are Buddhism and Taoism: (http://www.gio.gov.tw/taiwan-website/5-gp/yearbook/ch21.html). Another governmental website (USA) describes the Taiwanese Religion as a „mixture of Buddhist and Taoist“ (https://www.cia.gov/library/publications/the-world-factbook/geos/tw.html#People). In the following chapters I will try to describe some of the main features of Taiwanese religion, the influences and its development.

The three most important religions

The three most common religions in China are Buddhism, Taoism and Confucianism. Once these three religions were teachings, they only became religions later – except for Confucianism. Like the other teachings it had an enormous influence on today‘s Taiwanese religion and society, but somehow it is not considered a religion. So whenever Confucianism is mentioned in this work it is just meant as a teaching (Kleeman 1996:547f. in Chi 2005:18). All three religions have in common mental origin but do not have an institutional equivalent, which also makes it difficult to characterize a religious institution. Another problem is that most religious institutions are shaped in a syncretic way, which means that religious thoughts, ideas and philosophy are mixed and create a new system or a new view of the world (Köhn 1998:48 in Chi 2005:53). In addition, most religious institutes traditionally did not require a self-designation of their mental origin, which means that in these cases no designation of the institution existed. This is why many (or even most) religious institutions have a problem answering the question about their religious origin or their religious affiliation (Chi 2005:54). Most of the allegedly „Buddhist“ or „Taoist“ institutions also have a few „Buddhist“ or „Taoist“ elements.

The popular religion

Especially in Taiwan the term “folk religion” (or “popular religion”) has developed. „The term popular religion here designates everything that does not belong specifically to an institutionalized religion (...). Sociologically speaking, this popular religion here is not confined to the people but is common to all strata of society, including the imperial court“ (Stein 1979:54 in Seiwert 1985:17). In addition popular traditions are „those religious traditions, which do not refer to a literary tradition (like Buddhism or Taoism). Because of the

fact, that the popular religion is no religion with a literary tradition, we have no real sources to study it. We can assume that the history of the popular religion in Taiwan began with the permanent settlements (starting in the middle of the 16th century). The Chinese settlers had to face many problems in their new country. The passage to Taiwan itself was very dangerous not only because of the typhoons. Arriving in Taiwan, the settlers had to fight the indigenous population, they were not used to the climate and they had to fight epidemics like malaria or cholera, which caused many deaths. In this situation people started to pray to their gods, which were brought from Mainland China (from the teachings of Buddhism, Taoism). But the new situation required new gods and new ones were invented. The settlers started to build temples, which are the most important indicator for the development of the popular religion, because (like already mentioned) there are no traceable written sources. In nearly all descriptions of temples we can see which divinity was prayed to, when the temple was built and other details (Seiwert 1985:18). The variety of gods we can find in some temples shows, that people had gods for nearly all substantial areas of life.

As we see, the mutual influence between the popular religion and the religions with a literary tradition can be retraced to antiquity. Each of these four religions (or teachings) tried to implement itself and although there was a great rivalry between the three religions based on literary traditions (Buddhism, Taoism and Confucianism), all of them opposed the popular religion. After some time numerous elements of traditions of the three religions were taken over by the popular religion until they became part of it. For example the Buddhist conception of hell and rebirth and the family and social ideals are shaped by Confucianism. The original conceptions of the popular religion were either placed above or subordinated to the new conceptions (Seiwert 1985:138).

Gods and Ghosts: A Remarkable Feature of the Taiwanese Religion

Although there has been a mutual influence between the three religions and many elements were taken over, some beliefs and imaginations were interpreted different. The three religions all belief in gods and ghosts but even though some of their names appear in every three religions, they sometimes have a different part in it. (Seiwert 1985:139).

In Taoism gods are seen as the manifestation of a cosmic order. Buddhism has its Buddhas and Bodhisattvas who are intermediators of salvation. For the popular religion gods were representatives of power in the first place. The most important characteristic of these creatures is that they have the power to intervene into the world of the humans. They can help humans, but they also can harm them. The humans can win their favor by bringing gifts to them. And they can react with resentment when they are neglected. So making sacrifices is a very important part in the past and present enactment of Taiwanese religion. There is an important difference between two kinds of creatures. On the one hand there are the gods called shen (神) and on the other hand there are the ghosts gui (鬼). The descriptions of these two creatures vary from source to source. In most descriptions the gods are good and the ghosts are evil. But this is a rather rough outline. The gods have legitimized power. They got their power directly from the Jade emperor Yuhuang Shangdi (玉皇上帝) The gods represent the official moral order and they police their obedience. They punish everyone who breaks the ‘normal’ order or social norm. The ancestors of one‘s own also have legitimized power and are called gods. Like parents they represent the valid social order. But their power is (different to the other gods) limited to the family and their descendants (Seiwert 1985:141).

Officially the gods always punish the humans who offend against the normal order or the social norm. The gods are there to protect and reward the ones who follow them. But in the population it has always been customary to win their favor by bringing gifts and sacrifices to

them.

The ghosts on the other hand have illegitimate power. Depending on the context, gui is sometimes also translated as „Demon“ or „Dead Spirit“. This power is not integrated into the social norm and this is why it is called illegitimate power. The powers of the ghosts to cause damage have always been reason enough to fear or to respect them. That is why in Taiwan the people do not only pray to the creatures with legitimized power, but also to the creatures with illegitimate power (Seiwert 1985:141).

If someone dies the person can become both, a god or a ghost. Becoming a god or ghost depends on more than one variable. After the death of a person, their existence in the ghostly sphere can be made comfortable with „food offerings, clothing, housing, and above all with money“ (Jordan 1972:33).

After some time the person can become a god and will live a peaceful life in a sphere which is invisible for humans. But lots of them are not that pleasant. It may also happen that the dead has no descendants to provide him with offerings. „Slowly he is reduced to dire poverty and becomes a most pitiable creature. In desperation, and often in rage he attacks human beings to gain direct fulfillment of his needs or at least to win attention of his plight“. So he becomes a ghost. He can also become a ghost from the very moment of his death, when he dies by force or ‘unnatural’ in general. The fear of those ghosts seems to be a central idea of the Taiwanese popular religion.

The Development during the 20th Century

Development during the Japanese colonial rule

Between 1895 and 1945 Taiwan was ruled by the Japanese. During this period the first documentation and categorization of the different Taiwanese cultural-religious groups, institutions and customs were made (Chi 2005:14). The Japanese categorization was based on faith and historical origin. In the final report of 1919 which was called „Report of the determination of the religions in Taiwan “, the religions were categorized as follows:

Already Existing Religions before Japanese Colonization:
- Confucianism
- Buddhism
- Taoism
- Vegetarian
- Christian religions

During Japanese Colonization Imported religion:
- Shinto
- Japanese Buddhism
- Christian religions from Japan

This report is still the basis for any discussion about Taiwanese religion. One important thing is that in this report Confucianism is listed as a religion. Before that it has always been a teaching only, it has never been an accredited religion. In the beginning the Japanese were very tolerant in relation to the tradition in Taiwan. But after 1937 they began to bring the Japanese state religion “Shinto“ in to a granted privileged position by using political pressure (Chen 1992:38ff. and Hardacre1989:34ff. in Chi 2005:15).

The faith based on the “Shinto“-concept and its rites were promoted everywhere by force.

The conventional wooden statues of gods in all local temples were burned, religious institutions were dissolved and replaced by Japanese „Shinto“.(Chen 1992:229ff.)

One example is the traditional local Confucian institutions which always had the function to promote Confucian ethics locally. These traditional institutions were gradually replaced by public schools, which were established by the Japanese. After 1922 the number of public schools exceeded the number of traditional institutions for the first time. After 1937 the traditional institutions were officially forbidden (Li 1999:374f. in Chi 2005:16),

All this events had one consequence: The Taiwanese population began to think about „their religion“. Confronted with the Japanese intervention against the conventional conduct of life and the repelling of Confucianism, the Taiwanese population thought about their own identity for the first time. With the prohibition of the traditional institutions in 1937 the Taiwanese population became aware, that (regarding their cultural identity), they were in a crisis. Other institutions took over the function of the traditional institutions secretly by continuous to promotion of the ethical teachings (Chi 2005:17). But the Japanese occupants did not only try to repel Confucianism; they even tried to repress the popular culture of Taiwan. From 1937 to 1945 the traditional elements and moral values were strongly suppressed by the Japanese. Corresponding public activities were strongly endangered (Jones 2003:24f. in Chi 2005).

The Taiwanese people became more and more aware of concepts that were of non-Taiwanese origin or of Taiwanese origin and learned to separate between them. They began to align with supra-regional Taiwanese organizations and religious groups (Zhi-YuWang 1997:56f. in Chi 2005:17). A new religious discourse developed, religious organizations joined against the occupying power. Facing the cultural menace “religion” itself got totally new identity in society and was established in Taiwan.

Research of the undefined religion in Taiwan and the short but intensive suppression of the Japanese had two after-effects:

1. The Japanese definition of the religion in Taiwan helped the Taiwanese people to create a basis on which they could describe a religion of their own.
2. The strong political intervention of the occupying power had the consequence that local religious groups began to join together, forming a network of cultural information (Chi 2005:18)

Development in post-war Taiwan

With the development of the national state the religious sector changed a lot, too. During the Japanese occupation Confucianism was declared a religion. The new government countermanded this declaration. Confucianism became what it had been during all former Chinese dynasties: The leading cultural orientation and the ethical teaching with the greatest influence on the locals. It was the reanimation of the cultural tradition (Chi 2005:19). Although Confucianism still was the most important ethical teaching and still represented the popular moral values, it was not limited to the traditional institutions anymore but it was now aligned to the whole population (Cheng 1998:13 in Chi 2005). Since 1970 two major changes happened. First of all traditional local temples and religious institutions had to register not only for state inspection but also for financial promotion. Additionally they were sponsored by the government to start charity programs. The government‘s aim was, that the institutions could relieve the state of its sociopolitical load (Chen 1998:93ff. in Chi 2005:20). The second change happened in 1987. In this year the martial law in Taiwan was abolished and with it freedom of association arose. Since then, many civil and religious organizations appeared. Some organizations which were classified illegal before 1987 now became legal.

The effects of the political measures on the religious sector in post-war Taiwan can be summarized under three points. Firstly, after 1987 all religious institutions became equal before the law. Before that Christian institutions and organizations were privileged by the government. Native religious institutions had been subjected by state interventions and were controlled strictly. From 1987 on every institution was equal. The religious institutions got under the influence of the state. Secondly, ethical discourses between the religious institutions became admissible. Since the 1980ies the democratization got stronger and the movement for political independence of Mainland China grew. A neutral state structure came into being including civil movements and activities (Chi 2005:21). Because of this, Confucianism and political power lost their connection. Especially after 1987 (with the freedom of association and freedom of reunion) Confucianism lost most of its privileges (Huang and Wu 1994:79f. in Chi 2005:21). Thirdly, religious institutions got permission for proselytization and other activities like charity and the promotion of cultural activities. From the government point of view this was a positive and expected development. The role of religion in state and society was assigned by the state itself.

The Empirical Work in Tainan

The first goal of the field trip day was to get in touch with native people. The students were supposed to get to know the people‘s mentality and experience their reaction when asked for help by foreigners. The second objective was to find out what the people know about their religious history and culture and to what extent these aspects are anchored in their daily lives.

The empirical work began in the bus on the way to Tainan. I started by asking our Taiwanese counterparts to tell us something about their religion and what they believe in. At the first moment nearly half of them said, that they were not religious at all. Most of the other half said they were Buddhists, two of them were protestant. I did not want to concentrate the questioning on a special group like the Buddhists or the Protestants, because I thought it would be interesting if all of them had said what they know about Taiwanese religion. One part of our discussion was the ghost month“ gui yue (鬼月) which just had been over two weeks ago. During gui yue the gates between the ghost sphere and the human world open and the ghosts are allowed to step inside the human world. During this time many offerings are made to the ghosts and paper money is burned to welcome the ghosts in the human world. It is not allowed to travel during this time, because especially during the ghost month accidents can happen very easily. It is also not allowed to come near water because many ghosts are in there. Strongly religious people are afraid of being dragged into it. When the ghost month is over, the people make offerings to the ghosts to ask them to go and leave the human world behind. During the discussion about the ghost month it turned out that some of the students who described themselves as not religious knew more about it than the ones who described themselves as Buddhists. The discussion went on with the topic of how many ghosts would visit the earth and how many ghosts exist in temples and institutions. None of the students were sure about that. Some said there were only twenty to thirty. Others said that there were so many that one could not count them. Regarding the discussion afterwards I would say the interpretation and the meaning of the term „ghosts“ among the students was too different to reach an agreement. The students were not even able to agree with one another if the ghosts are all evil or if there are also good ones. When we arrived in Tainan I divided the group into six smaller groups. In every group were three to four students with at least one Taiwanese student to help. Each group was given a name of a temple they had to find plus the address of the temple. All students had maps of Tainan, but they were not allowed to use them. It was part of the exercise to reach the goal by asking the natives. The names and addresses of the temples were written in Pinyin and not in Chinese characters. The Taiwanese member of the group was advised to hold back and to help only if really

necessary. When they arrived at the temple they had to search for answers for questions they were given. Each group had been given individual questions about the location they had to visit. The location also had to be described as detailed as possible. The procedure of finding out the answers to the questions was the same as before. The students had to ask the natives they could find in the respective institution. Also this task was about making contact with the people (so getting the right answers to the question was not the principal purpose.

The experiences the particular groups made with the reaction of the people they had asked were similar. Each of the six groups reported that the natives were very kind and tried to help them as well as they could. One group reported they were accompanied there by someone who they had asked. Another group of six people were taken to their goal by car (when the man they asked heard that they had to walk to their temple he nearly "swallowed his cigarette" and offered to take them there). For one group it was very hard to reach their location, because it they were sent to different directions four times. None of the inhabitants of Tainan they asked for the way wanted to admit that they did not know how to get there. One group could not find the temple, so they just visited a different one which was on their way. Another similarity was that in every group the Taiwanese student had to help asking the way, because most of the natives which were asked could not speak English well enough.

Also during the work in the temples the experiences the students made were quite interesting. When the students tried to do their tasks by asking the natives (for example: "who is represented by the statue?", "how old is the temple?" etc.) most of the people they asked were very happy to answer the question. In one temple there was only one monk who could not speak any English, so the Taiwanese student had to translate. In that temple, the students could recognize some religious signs on the wall, which they had already seen that morning while we were visiting the Buddhist institution Zhong, Tai Si (m2)（中臺寺）. The temples we visited were the TianhouKung (天後宮）, the ChengHuangMiao（成隍寺）, the MiTuoSi （彌陀寺）, the FaHuasi（法華寺）, the YuHuangTan (天壇）and the TungYueTian（東嶽殿）(this is only for completeness and the interested reader mentioning).

Conclusion

During writing and investigating Taiwanese religion the most interesting point for me was that people obviously can choose their faith from different religions. If they do not like a part of one religion they do not care about it and if they like a part of another religion, they just integrate it into their belief. During the time in Tainan a man told me that he does not care about the ghost month and that he would not consider himself as religious. But when his son was born, he took him to a fortune teller, so he could give him a name which would fit. That guaranteed that his son would be successful in his future life. Another quite interesting fact is the categorization of the religion. When I asked a girl if she went to the temple to pray, she said „yes". She would pray for success and good grades at school. But when I asked her, if she was a Buddhist, she could not answer.

I also was very satisfied with the empirical work by the students in Tainan. The students experienced parts of the Taiwanese culture by doing fieldwork. The fact that the German students depended on the help of the Taiwanese (the natives in Tainan or their counterparts) forced them to get in close contact to both. The feedback I got from them was good, too. While searching for their temple, they saw lots of other temples throughout the city. Some told me that they had the impression that every twenty meters there was another temple. The special thing about the temples is that many of them are found in blocks of flats, which is a big contrast to Germany. In Germany churches are not just between houses. They are fenced off the neighborhood and they have big churchyards. The students learnt in Tainan to

be sensitive for religious symbols like the signatures above the entrance doors. Most of them did not know what their meaning was. Of course no one could read them, but before that day no one even had an idea of their meaning.

References

Chi, Wei-hsian (2005): Der Wandel der Sozialform des Religiösen in Taiwan. Bielefeld
Jordan, David K. (1972): Gods, Ghost and Ancestors. London
Seiwert, Hubert (1982): Volksreligion und nationale Tradition in Taiwan. Stuttgart

Internet Sources

https://www.cia.gov/library/publications/the-world-factbook/geos/tw.html#People (Dec.20. 2008)
http://www.gio.gov.tw/ct.asp?xItem=35745&ctNode=2602# (Dec. 22. 2008)

3

The Political System of Taiwan – A German-Taiwanese Perspective

by Simon Brinkrolf, Hamburg

Introduction

This paper combines an overview of the political system of Taiwan with personal experiences and with the reception of these politics among Taiwanese students. Firstly I give a description of the political system of Taiwan based on the representation of that topic in German descriptive literature. I outline the political establishment in Taiwan, partly in comparison to the German one. Secondly I compare these literature-based descriptions with findings from our trip in Taiwan: During the field trip of German students of Geography in Taiwan, accompanied by Taiwanese counterparts in September 2008, several talks and interviews were done about individual political views on Taiwan, China and politics in general. I aim to compare these individual views of a young student generation in Taiwan with the picture drawn in non-Taiwanese literature about the political agenda. The aim of this paper is to give an impression of the political system of Taiwan and furthermore to understand the differences between the international picture being drawn of the political agenda of Taiwan and it's perception among Taiwanese society.

Political System

In the following chapter I am going to describe the political system of Taiwan. With the expression "political system" I aim to include the entity of all state and non-state institutions, actors, regulations and policy within a marked frame of action (in this example the borders of a national state) who are participating in enduring processes and solutions of political problems as well as in establishing and enforcing commonly obliging political decisions (comp. Holtmann 1994:517). Based on this definition there must be a focus on both – state institutions and non-state actors of the civil society (as long as they are participating in the described policy enforcement processes).

But before turning to these actors, a question should be discussed which seems to be more than obvious for Taiwanese readers, but needs clarification for German ones: Can we talk about Taiwan as a nation state? For Germans, who at large talk about Taiwan as an autonomous national state[1] it might be a surprising discovery that Taiwan has got only minimal international recognition by few countries (Figure 1), that its official name is 'Republic of China' (ROC) and that this is the same state which has had full jurisdiction over Mainland China until 1949.[2]

[1] This diagnosis is based on personal experience during the preparation of the field trip.
[2] A deepening presentation of Taiwan's history seems infeasible within the constrains of this paper. Please compare other sources such as Schubert 2003.

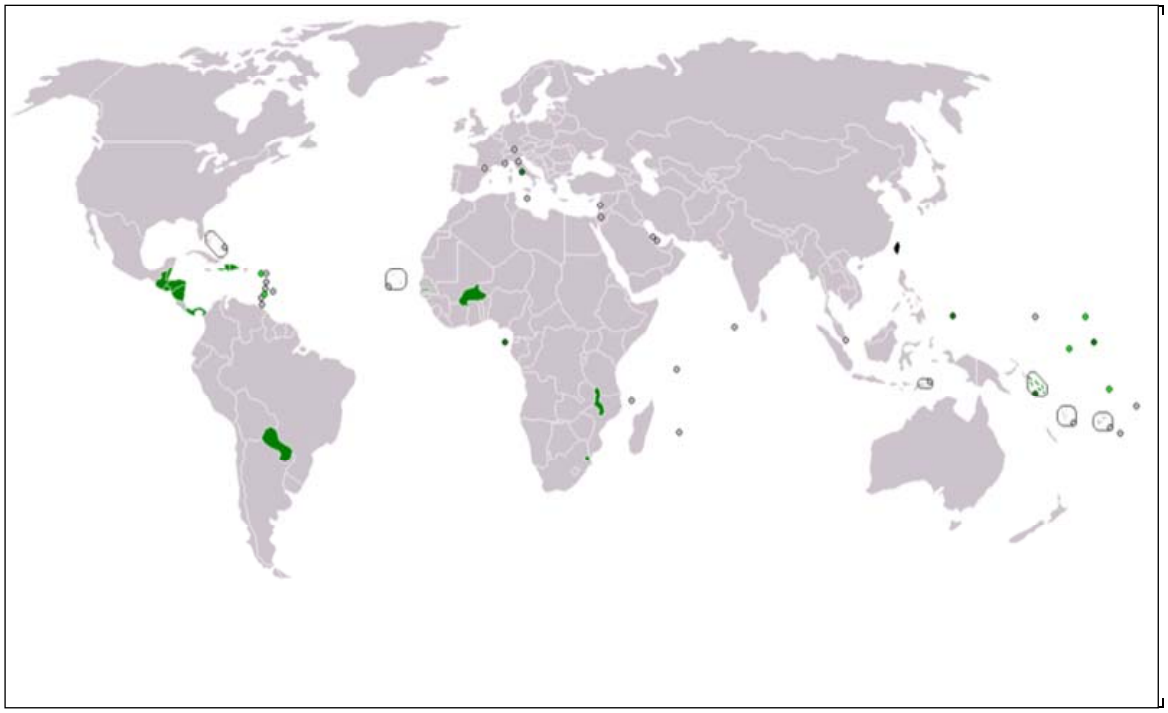


Figure 1: National states recognizing Taiwan as a national state (marked green)
Source: Jedamzik 2007

As Taiwan by itself fulfils the above mentioned definition of a political system and contains its own constitution, has an independently elected president, national borders and an army, one can speak of a factual existing national state without international recognition.

State and government
Taiwan's government has got the structure of a republic with a strong position of the president. The current president, who who officially is head of the state, is Ma Ying-jeou. He won the presidential election in March 2008. Ma Ying-jeou is a member of the Kuomintang party; one of the few major parties in Taiwan and the most important one in Taiwan's recent history since its independence. With his success in the presidential election he is displacing the former president Chen Shui-bian, who is a member of the Democratic Progressive Party (DPP) who is traditionally supportive of Taiwan's independence.

The executive branch of Taiwan is headed by the Premier of Taiwan, currently Liu Chao-shiuan holds this position. He, eight cabinet ministers, five to seven ministers without portfolio and several chairmen of commissions are forming the government, commonly also 'The Cabinet'. The ministries are similar to the ones in Germany: Interior, Foreign Affairs, National Defense, Finance, Education, Justice, Economic Affairs, Transportation and Communications. Within the Taiwanese political system here the chief policymaking is to be found (Weggel 2007:295f.).

The Taiwanese parliament represents the legislative branch of the state and consists of 225 members, who are mostly elected by the people for duration of three years. The description of the legislative branch as a parliament is controversial, as originally the national assembly was meant to form the parliament, while the legislative branch was seen as a part of the government. After the abolishment of the national assembly and a transfer of all legislative power to the legislative branch (completed 2005) it's referred to as "the parliament".

Constitution

The Taiwanese constitution is based upon the 'Three Principles of the People', a political conception developed by the first president of the Republic of China, Sun Yat-sen in the 1920s (compare ICL 1994).

These principles can be divided into

- Nationalism: aiming for national independence and equality of the people including it's minorities
- Democracy: stressing the power of politics for the people to express their desire and their political freedom
- People's Livelihood: emphasizing the need to use the governmental power (only) to pleasure the people.

The constitution originally set up a republic within the tradition of Chinese five branches of government and a national assembly. While the national assembly got abolished in the meantime (comp. above), the five branches still remain and are shown in the next section. Nowadays the constitution is regularly challenged by modernizing forces aiming to establish a further democratized and slimmed constitution without the principle of the five branches.

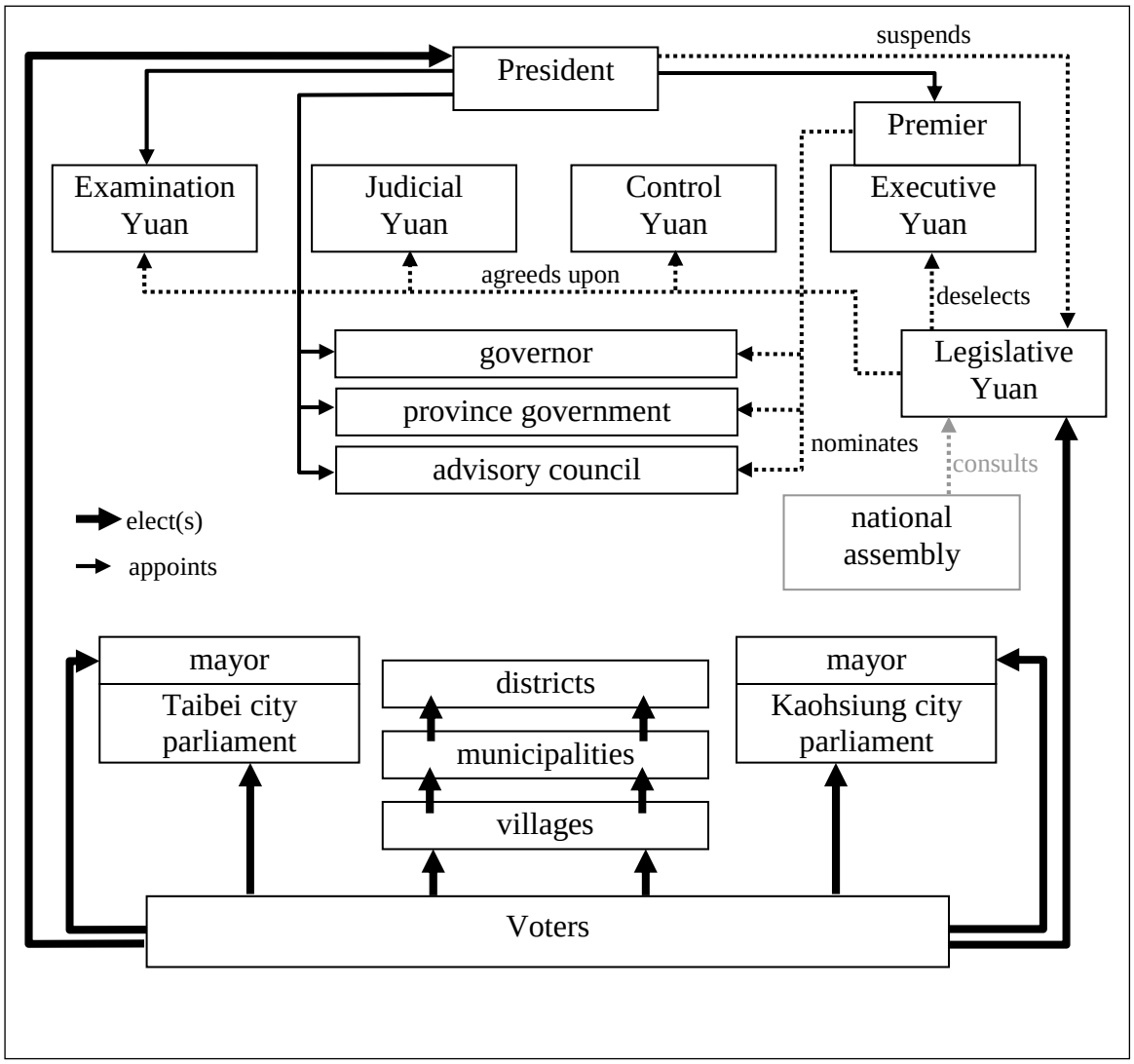


Figure 2: Political system of Taiwan
Source: Own design based on (Schubert 2003:338)

Structure of the political system
As described in the previous sections the political system of Taiwan is republican and based on the traditional Chinese distribution of power in five branches and a strong position of the president. In Figure 2 one can see that the public (i.e. the voters) directly elect the president and the legislative yuan. The President appoints the Premier and governors, while the legislative yuan agrees upon the examination, judicial and control yuan and keeps the power to deselect the executive yuan.

A comparison with the German political system is shown in Figure 3. As Germany is a federal state without much priority on the presidential position, the federal state parliaments, governments and the federal council hold power, while the president's function is focused on representative duties. While in Germany a five-branch-system is missing, similar ideas are realized by sharing power in-between judiciary, legislative and executive parts of the system.

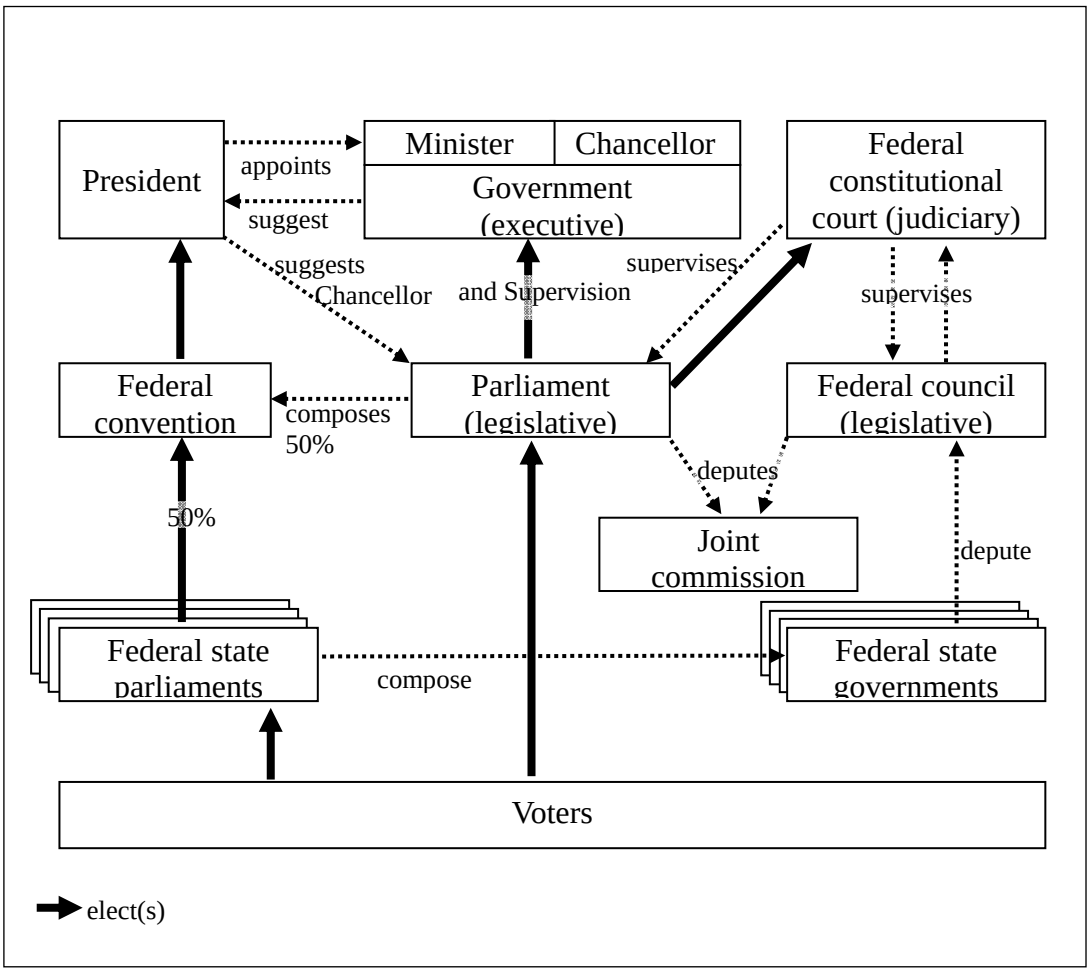


Figure 3: The political system of Germany
Source: Own design based on DAAD 2007

Civil society
In Taiwan more than 100 parties are established, but only two – the Kuomintang and the Democratic Progressive Party – usually aggregate more than 80% of voter's voices (comp. Weggel 2007:295f.). Whereas Parties like the 'Green Party Taiwan' exist, there is no split-up between the classical European ideologies such as socialism, liberalism and conservatism represented in the Taiwanese parties.

Similar to Germany there are labour unions in Taiwan. While about 20% of all German workers are member of a labour union nowadays, the Taiwanese percentage equals at about 30%. The Labour Union Law grants nearly all workers the right to form a union to "conclude collective agreements with the employers and to help promote the well-being of the workers" (Chang-fa Lo 2006:221)

Another important part of the civil society are the local factions of Taiwan; something rather unknown in Germany. Local factions are 'dyadic non-corporate groups' (Landé 1977:XIII) based on a patron-client relationship. In Taiwan local factions hold significant amount of influence. As Chung-li Wu has shown, local factions 'exert considerable influence over elections, facilitating their role as intermediaries in (...) grassroots voter mobilization' (Chung-li Wu 2003:89). Their role as intermediaries is processed via deep and often traditionally rooted social bonds. They are tied rather by these social relationships than by a commonly shared ideology (Schubert 2008:442). While in Germany most pressure groups are conceded to contain power over political decisions, those are the same time criticized by the people. On the contrary, at least Chung-li Wu observes, that it 'is widely accepted that Taiwan's local factions often play important roles' (Schubert 2008:93) in Taiwan's policy making. When comparing positive and negative aspects of these circumstances one must admit that local factions can function (as described) as an intermediary between state and people. But at the same time it must be considered that local factions are power brokers, with a rather high potential risk of abusing it (Chung-li Wu 2003:94).

Based on Schubert (2008:435) there are living about 400,000 natives in Taiwan, representing about 1.8% of the Taiwanese citizen. They are not related to mainland China's Han-Chinese, but are descendants of the so called "mountain people". Due to a huge heterogeneity within the so called 'natives' it seems difficult to further characterize any distinction without taking a huge risk of stereotyping (compare Schubert 2008:435ff.).

German-Taiwanese Encounter

The following chapter describes and aggregates the individual views and understandings of politics as experienced with our Taiwanese counterpart students during the field trip. Talks about the political system and political issues in general where hold in personal, non-institutionalized atmosphere during the duration of the field trip.

Influential political debates
While German students usually learn to locate themselves somewhere between the political ideologies being significant in Europe (conservatism, socialism, liberalism) and while it serves as a self-description saying for example "I am left winged socialist", these ideologies do not seem to be of huge importance for Taiwanese students. During our talks it was often necessary to describe my understanding of "conservatism" or "socialism" before being able to get an answer about the personal engagement. Several students said 'This is no influential discussion in Taiwan' or expressed in similar ways, that these 'policy concepts' are rather major in European context and don't function as a positioning guideline in Taiwan. Even though some student's parents are members of labour unions, the (in Europe) typical separation between employee and entrepreneur in economy did not seem to be as strong

and rooted as it seems to be the case in Germany, for example. In Germany the universities can be seen as typical places of anti-conservative idea development; with Germany's history in the last decades the demands of active students were often contrary to the commoners. While of course there are also political students in Taiwan with new ideas about society, the self-cognition of our Taiwanese student counterparts seemed seldom to be defined via these antipodes.

Chinese – Taiwanese
After having prepared themselves for the field trip to Taiwan, the German students had the conflict between Taiwan and Mainland China as the most influencing ongoing debate in mind when reaching Taiwan. During the time of the field trip in Taipei rather huge demonstration marches took place in Taiwan – the supporter of the rather pro-independence party DPP were mobilised to demonstrate against the rather pro-China politics of the currently ruling Kuomintang party. But, partly surprisingly, the Taiwanese counterparts face this topic in a very practical manner. 'Yes, of course I am Taiwanese and Chinese' one student replied when being asked about this barrier. While the Germans had a rather strong division in mind – influenced by their perception of what is being written about Taiwan in German or English language – for Taiwanese students it did not seem to be a major problem. 'Yes, the parties are divided by this question' one student said, 'but this does not bother me'.

Some students are aware of their families' roots, telling 'My grandmother was a Han-Chinese from the mainland', but these historical roots did not seem to influence the student's views about their country nowadays. Asked, if Taiwan should reach independence in the future or rather should reunite with Mainland China, many students opted for keeping the status quo. 'I think it will stay like this for a long time' the Germans got to hear regularly when asking that question.

Daily politics
During our field trip we realised that several topics were influencing the daily political debate. One was very comparable to Germany: Global politics with the United States of America as a main actor and its so called “war on terrorism”. Like many German students, several Taiwanese counterparts expressed a pretty critical political opinion about the global tension and the so called ‘clash of civilizations’ (Huntington 1996). The Taiwanese students seemed to be quite sensitive for these developments and often shared the German point of view, which was moderate and rather critical against USA-dominated world order without being able to offer convincing solutions or seeing the Muslim world's solutions as seriously preferable.

Another topic which arose a few times during the field trip was centred on ecology, the Greens and ways of eco-living. During discussions about alternative, more ecological ways of housing for example, one student expressed her appreciation for people trying to reduce their energy consumption. Similar opinions were to be heard while talking about regenerative energy production. Because some German students presumed, that in Taiwan wind energy was no topic of huge consideration, several Taiwanese students hurried up to clarify, that there are a couple of huge wind farms existing in Taiwan. This awareness of eco issues seemed often to be linked with a general scepticism about current economic development and its impact on the living system. As Weggel (2007:286) shows, this awareness is likely to be based upon a fundamental rise of ecological issues in Taiwanese society.

Studies and politics
While the ‘big questions’ which are discussed in the literature did not seem to strongly influence the students, it’s rather usually, that students get politicized via their studies. When being ‘forced’ to occupy with topics like city development, access to public transportation systems, conflicts about land use etc. it’s often inevitable to start politicking and to develop a

political attitude towards these topics. One student, analysing in his thesis the role of informal workers in city development processes, openly showed a critical opinion about the ongoing city development strategy of the official planning department. The discussion about the access to public transportation in rather poor neighbourhoods in Taipei's west, originally initialized by the German students, got strong participation by Taiwanese students showing a deep knowledge about the current development and its historical roots.

Conclusion

As a conclusion, the Taiwan-Mainland China issue should be discussed again. Personally I was puzzled two times while dealing with that topic: First time, in a pretty uninformed state, I was surprised realising the depth of this conflict and its assumed importance for the Taiwanese identity. In all monographs about Taiwan's politics being accessible at home, this topic gets centrally focused on (comp. for example Weggel 2007, Schubert 2003 or Neukirchen 2004). Weggel (2007:318) for example observes, that in Taiwan 'exception has become standard' applied on it's national recognition – of course this finding is obvious, but whereas Weggel concludes, this status being able to quickly transform into a 'time bomb' with transnational constraints, the German student's experiences with their Taiwanese counterparts cannot support the demonstrated importance of this topic. Taiwanese students and maybe Taiwanese society in general, seem to have adopted a way of more 'laid-back handling' of the issue than I expected. In my personal opinion this way of dealing with the problem opens a possibility and a huge promise for a future with peaceful coexistence of Taiwan and Mainland China.

References and Internet Sources

Chang-fa Lo (2006): The legal culture and system of Taiwan. London

Chung-li Wu (2003): Local factions and the Kuomintang in Taiwan's electoral politics. In: International Relations of the Asia-Pacific. Vol. 3: 89-111

DAAD (2007): Beziehungen zwischen den Bundesorganen. Online: http://www.daad.de/imperia/md/images/deutschland/03schaubild1bundesorgane.jpg (last access 2009/04/25)

Holtmann, Everhard (1994): Politik-Lexikon. 2nd Edition. München

Huntington, Samuel (1996): The clash of civilizations and the remaking of world order. New York

ICL (1994): Taiwan Constitution. Online: http://www.servat.unibe.ch/icl/tw00000_.html (last access 2009/05/12)

Jedamzik, Patrick (2007): Taiwan darf noch immer nicht mitspielen. Online: http://www.patje.de/2007/07/25/taiwan-darf-noch-immer-nicht-mitspielen (last access 2008/11/04)

Landé, C.H. (1997): Introduction: the dyadic basis of clientelism. In: Schmidt, S.W./ Scott, J.C./ Landé, C.H. and Guasti, L. (eds), Friends, Followers, and Factions. Berkeley and Los Angeles, cited from Chung-li Wu (2003): Local factions and the Kuomintang in Taiwan's electoral politics. In: International Relations of the Asia-Pacific. 2003, Vol. 3:89-111

Neukirchen, Mathias (2004): Die Vertretung Chinas und der Status Taiwans im Völkerrecht. Baden-Baden

Politics of the Republic of China. Online: http://en.wikipedia.org/wiki/Politics_of_the_Republic_of_China (last access 2009/05/14)

Schubert, Gunter (2003): Das politische System Taiwans. In: Heberer, Thomas and Derics, Claudia (Publ.): Einführung in die politische Systeme Ostasiens

Weggel, Oskar (2007): Geschichte Taiwans. München

4

City Development of Taipei

by Steffi Ehlert, Hamburg and Julian Frank, Hamburg

Introduction

Taipei was the starting point of our Taiwan field trip in summer 2008. Taiwan's capital Taipei is not only the capital of the Republic of China, it is also the cultural and economic centre of the island. In the following chapters we would like to examine the question why and how Taipei became the cultural and economic centre of Taiwan? Which historical aspects were important for this development? What are the current trends and what does that mean for Taipei's future? To answer these questions it is important to consider the historical city development and analyze the development of Taipei's population and its land use.

Historical City Development

Taipei's historical city development until the 1980s can be divided into 4 phases:

1. The Initial Settlement
2. The Late 19th Century
3. The Japanese Period
4. The Republican Period

1. The Initial Settlement

The first inhabitants of the Taipei Basin have been the Pingpu, a tribe of Taiwan aboriginals. For a long period the Pingpu tribe were seen as a cilivized tribe. So both, Han Chinese and Pingpu lived together in villages and mingled through marriages. In that way, Pingpu lost their own cultural identity. It is generally thought that most of the aborigines moved out of the Taipei area by 1820 (Selya 1995:20).

The first contacts between Pingpu and Chinese settlers in the Taipei area were made around 1709 when a farmer named Chen Lai Chang came from the mainland province Fukien received a government land grant covering most of Taipei Basin. When Chen arrived he had been preceded by other Chinese settlers who had established a settlement at Hsinchuang, some kilometres down the Tamshui River. These early settlers traded forest products and agricultural products e.g. sweet potatoes with the Pingpu. The Chinese settlement which developed on the east side of the confluence of the Danshui River was named Manka and later the Chinese termed it Mengchia (měngxiá). Chen and the Chinese settlers continued their trades at Manka. By 1738 the settlement boomed and the settlers built a temple in honour of KuanYin, the Chinese goodness of mercy. This temple is known as LongShan temple. The following years saw more temples being built. In 1759, when soldiers stationed in Hsinchuang were transferred to Mengchia, its importance as a commercial political settlement received a boost. The Peak in the prosperity of Mengchia was during the period 1821 till 1859 (Selya 1995:21).

In 1853 the centrality, growth and prosperity of Mengchia began to decline. Basically there

are three reasons of the decline of Mengchia:

- The Tamshui River continued to silt up so the harbour of Mengchia became unapproachable.
- An anti-foreigner sentiment developed and a leading British tea merchant moved some kilometres north of Mengchia to the new settlement of Ta-tao-chen.
- Ta-tao-chen established as a result of some battles between Lower and Upper Guilds and the battles between the migrants.

Ta-tao-chen soon became the major trading centre for tea and camphor - the leading export products of Taiwan (Selya 1995:21).

2. The Late 19th Century

The first important of many political decisions which would affect the recent future of Taipei was taken in 1875. The central government of China established Taipei area as a separate prefecture (Liu 1995:26). The Inner City between Ta-tao-chen and Mengchia was build, and was destined for government officials and other representatives. In 1878 the administer Chen decided to start the building of a wall around the Inner City. The wall was some 5.000 meters in length, six meters high and enclosed a big square. Five gates existed, the East, West, North, South and Small South gate. The wall itself was surrounded by a moat. Within the wall, streets were laid out in strict grid pattern. By 1880 all the formal government buildings were completed (Selya 1995:22).

In 1895 a second important decision was made which would affect Taipei's future (Selya 1995:23). After the Sino-French War (1884-1885) the central government of China decided that Taiwan would become a separate province with Taipei as its capital. The Inner City was designated as the administration centre and Ta-tao-chen got the role of a commercial district. And southeast of the Inner City new residential areas were opened (Selya 1995:23).

3. The Japanese Period

In 1891 Japan got control over Taiwan after the Sino-Japanese War of 1984. The Japanese retained Taipei as the capital of Taiwan and started large-scale building projects including new government buildings. Many of them are still in use. They also built a sewerage system and flood control dikes along the Tamshui River. The Japanese also improved the traffic by redesigning and paving roads. One major project was to tear down the walls of the Inner City in 1900. This was done for both aesthetic and traffic reasons. Four of the gates from the wall were left standing: The East, North, Small and Great South. Some structural and design modifications during the Japanese period were also a result of a typhoon. They moved the Confucian Temple to it's current place on Talung Street (Selya 1995:24). Mengchia was renamed into Wanhwa and some parts of it became the entertainment district. Ta-tao-chen continued as the tea trading, production and re-production centre and a small business district. Segregated residential patterns were also started by the Japanese. The areas along the river became the area for poor residents and the Japanese started new, separate neighbourhoods for themselves in the northern and eastern parts of the city e.g. Ta-an district (Selya 1995:24).

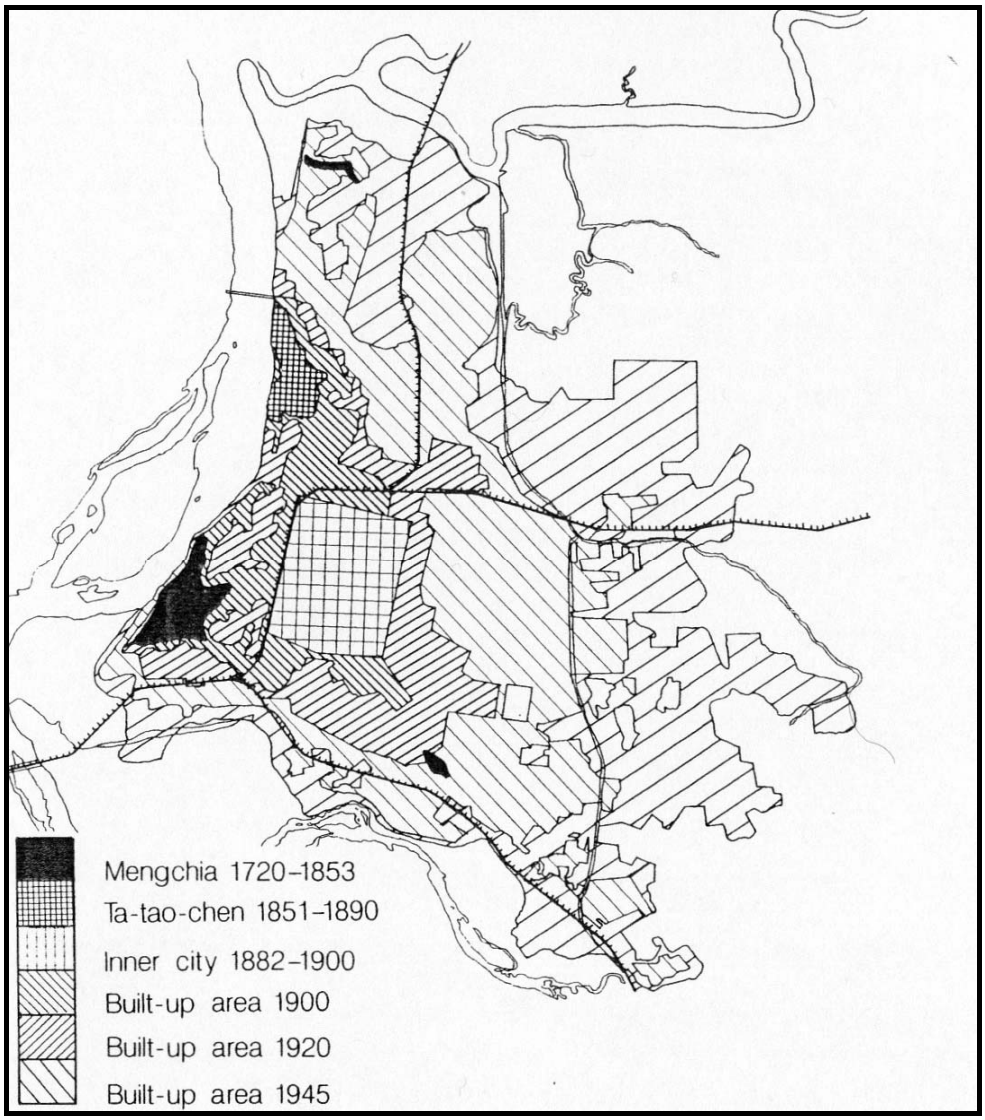


Figure 4: Historical City Development (Selya 1995:22)

4. The Republican Period

The Japanese period ended in 1945 with the end of World War II and the retrocession of Taiwan to Chinese control (Selya 1995:24). The transition of Taiwan from Japanese colony to a Chinese province was not easy. The Japanese had left Taiwan and in 1949 the Nationalist government of the Kuomintang under Chiang Kai-shek were driven by the Chinese Communists from the mainland to Taiwan. They moved with a large number of officials and other civilians to Taiwan's capital Taipei. With the nationalistic immigration from the mainland Taiwan's population increased from 6,807,601 to 7,555,588 in 1950 (Hsieh 1964:184). So the central government of the Republic of China, under the leadership of the Kuomintang (Nationalist) Party, did not have the time and interest to arrange a smooth transition of power (Selya 1995:2). In some aspects the nationalistic Chinese administration was a continuation of the Japanese one. The old government buildings were taken over; in patterns of segregation the Japanese were replaced by mainland Chinese (Selya 1995:24). So the retrocession of Taiwan to Chinese control had only marginal influences on the status and function of Taipei as a city. It is still the leading political and economic centre of the island with an international charisma (Selya 1995:2).

There are five immediate functional impacts which related Taipei's evolution into such an international city:

- In Taipei there were three separate governments located – the national, provincial and municipal (Selya 1995:4).
- The demand for headquarters, houses, food and entertainment for its officials, military establishment and the diplomatic community which followed Chiang Kai-shek, the leader of the Kuomintang (Selya 1995:4).
- Together with the government, the military and the diplomats the treasures of the National Palace Museum, the National Library and entire universities came to the island. With all the new cultural institutions Taipei got the status of a major cultural and education centre (Selya 1995:5).
- The arrival of major banking and financial institutions in coordination with the national government transformed Taipei to a major financial and economic centre (Selya 1995:5).
- The final impact were the U.S. government aid and a number of advisory groups which started working with the nationalistic government to recover from effects of World War II. As a result of this multinational and international commitment Taipei got its international flair (Selya 1995:5).

Political decisions are mainly involved in the urban development process. The decision of the inclusion of the six townships surrounding Taipei as well as the decision to build a new international airport in Taoyuan, ca. 30km southwest of the city, were very important for Taipei's development. The new areas gave the city the space to grow and it afforded more comprehensive urban planning (Selya 1995:26).

In the 1970's the decision to build a new international airport had a significant impact on the development of Taipei since it permitted a down-scaling of Songshan Airport in north central Taipei. The area south of the city airport became the focus of intense public and private development during the late 1970s and early 1980s. This was not least caused by the reduced traffic and noise from airport activities. It was a mixed development, since the increased popularity of the area contributed to the decline of the shopping and entertainment area west of the central railroad station. In fact the rise of the east of Taipei as an entertainment and shopping centre started around 1970, when the international airport was still in Songshan. International enterprises set up their Taiwan offices near the airport. Furthermore, the first western style market was founded in east Taipei, which attracts "modern" Taipei citizen to east Taipei. In the end, the traditional business centre in west Taipei lost its former importance (Selya 1995:26).

The change from a simple provincial capital to the provisional capital of the national government provided the major economic, financial, political and cultural framework which evolved Taipei into a city with international charisma (Selya 1995:5).

Population development

The already mentioned inclusion of six further districts into the city boundaries of Taipei, named Neihu, Nangang, Muzha, Jingmei, Shilin and Beitou induced a growth of more than 350,000 inhabitants in the year 1967. In 1990 an adjustment was decided to remodel the total of 16 districts into 12 down to the present day valid districts. The image below will show the actual districts of Taipei (Figure 5) (Department of Budget, Accounting and Statistics 2008).

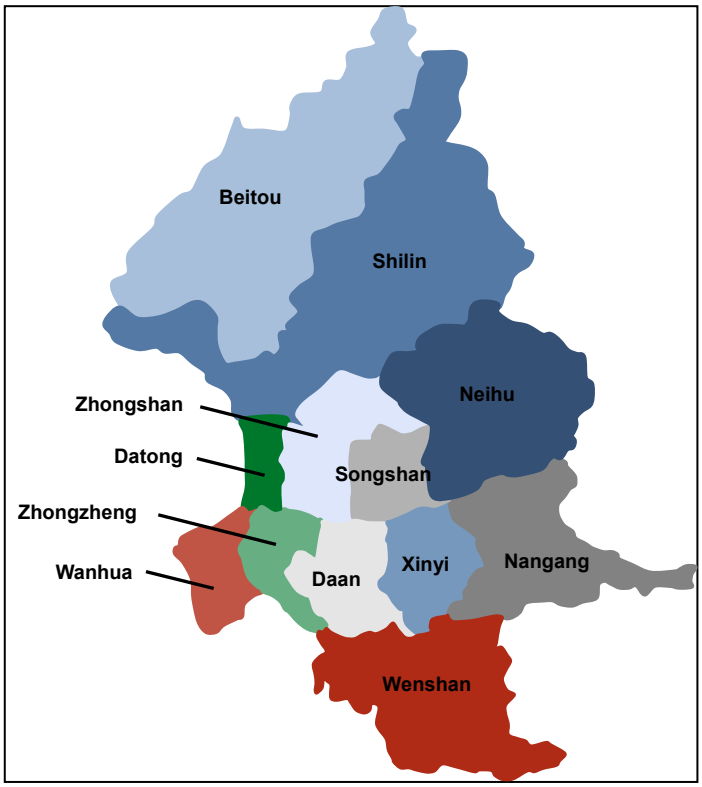


Figure 5: Overview of the districts of Taipei City
Source: Own design based on: upload.wikimedia.org/.../Taipei_district_map.

The city of Taipei has seen an eminent growth of population in the 20th century. Between 1957 and 1991 the population increased about 50,000 inhabitants per year. In 2007, the total population of Taipei City was 2.6 million, about 90,000 less than in 1990 when the city had its population maximum. Since 1992 the number of inhabitants was stable with small tendencies of declining. The increase or decline of a population depends on the evolution of migration (social increase) and the number of births and deaths (natural increase).

Figure 6 shows the reasons for the end of increase of population in Taipei. The halt is caused by a continuous fall of birth rates on one side and a stable number of deaths on the other side. The result is that the excess of birth over death is decreasing (Liu 1995:74). This can be explained with different arguments. One argument could be the availability of modern birth control devices, which could be responsible for the declining number of births (Selya 1995:94). Another reason could be that Taipei changed into a modern industrialized and service orientated city. In regard to this the inhabitants also changed their way of life and their moral concepts – carrier became more important than family life. This is also known as social change and caused the demographic changes we experienced in Germany since the beginning of the 1960s, too (Gans 2007:778).

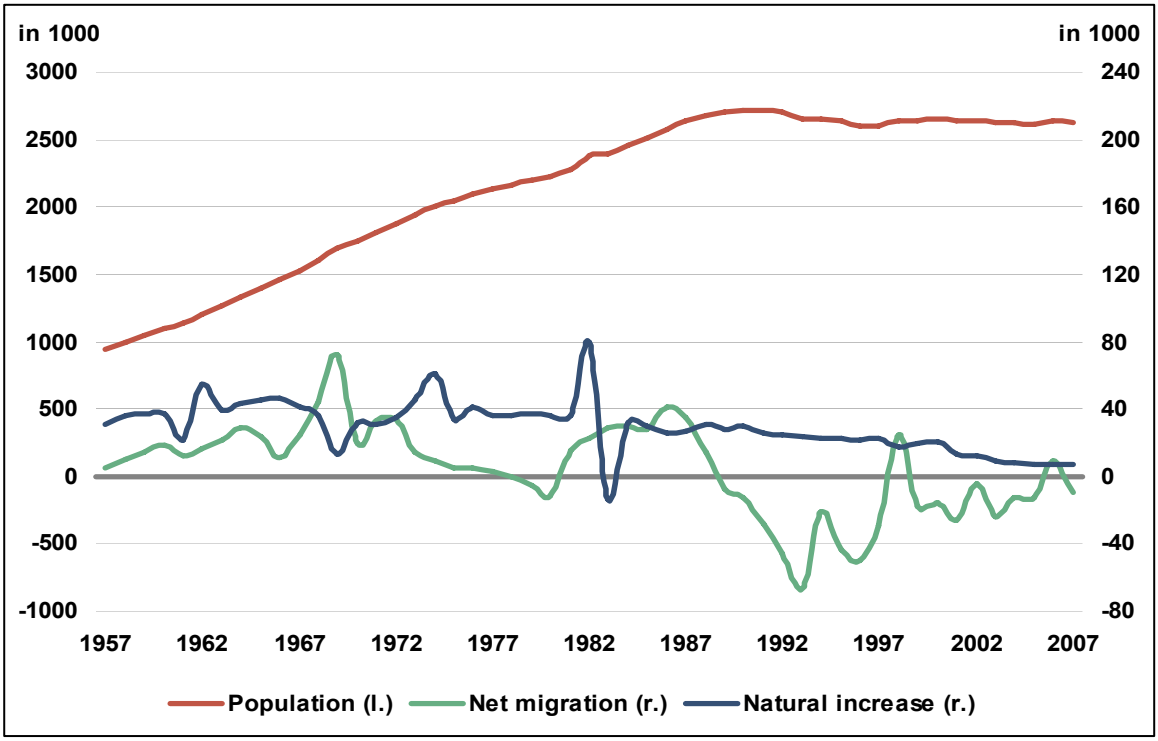


Figure 6: Population, net migration and natural increase in Taipei City
Source: Own design based on: Selya (1995:91), Department of Budget, Accounting and Statistics 2008

The demographic development of Taipei is also remarkable (Figures 7a and b). In comparison to the population pyramid of 1968 the chart of 2007 shows that the population between 1 to 20 years had a much higher part of the total population than it has today. In the same time, the stake of the middle aged people (30-60 years) and also the relative numbers of senior citizen increased (Department of Budget, Accounting and Statistics 2008).

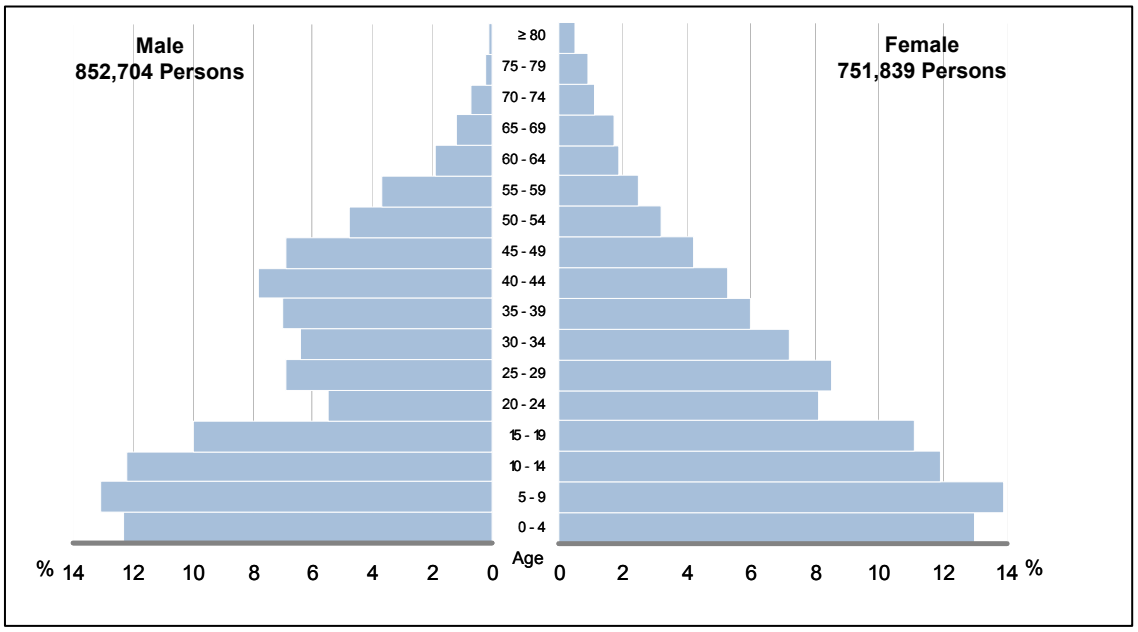


Figure 7a: Population pyramid (end of 1968)
Source: Own design based on: Department of Budget, Accounting and Statistics 2008

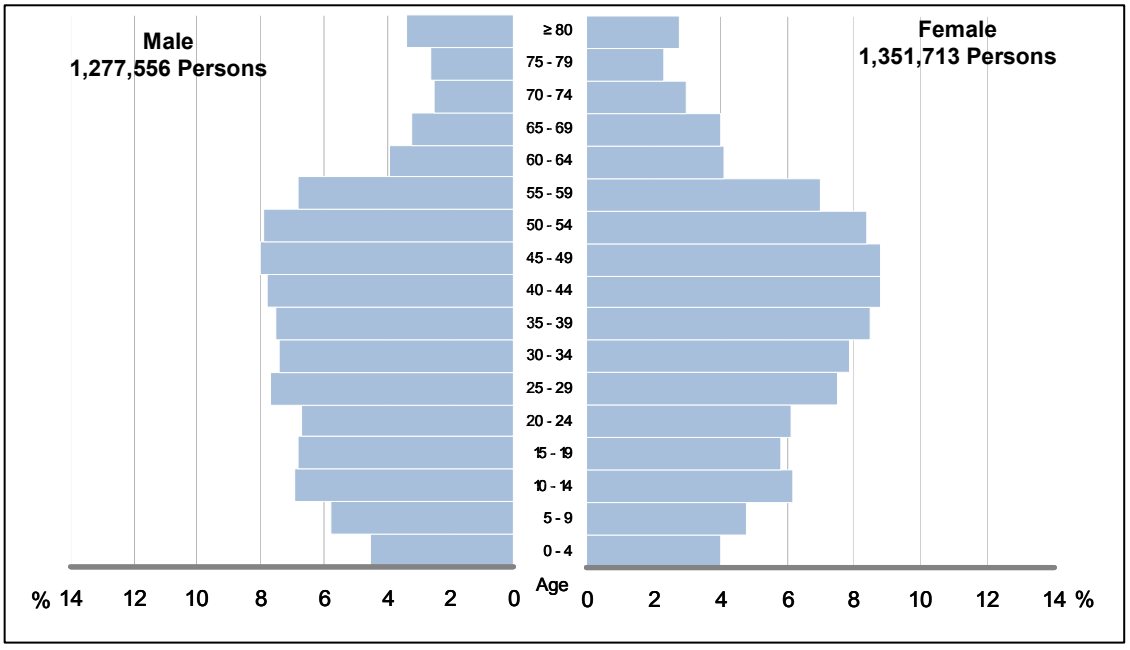


Figure 7b: Population pyramid (end of 2007)
Source: Own design based on: Department of Budget, Accounting and Statistics 2008

The most important reason for the decreasing number of inhabitants is the negative net migration since the early 1990s. The declining net migration is caused by different reasons. The attractiveness of the location (supply with workplaces, living conditions and so on) is responsible for positive net migration. But an attractive location involves a rising rent level on the real estate market because of the high demand for apartments.

This demand still exists because of the rising number of households in Taipei and is caused

by the declining number of inhabitants per household and the rising needs for living space per inhabitant (Figure 8). The number of households climbed from 870,000 in 1998 to 948,000 in 2007. That means that nearly an average of 7,800 units had to be built year by year in the last decade to satisfy the demand (Department of Budget, Accounting and Statistics 2008). And this continuing building activity provides rising land prices and as a result rising rents in the city. If we take a look at Taipei County (the surrounding area of Taipei City) we can determine a rising number of people living in the outskirts in Taipei County in the same period when Taipei City had a phase of a stable number of inhabitants.

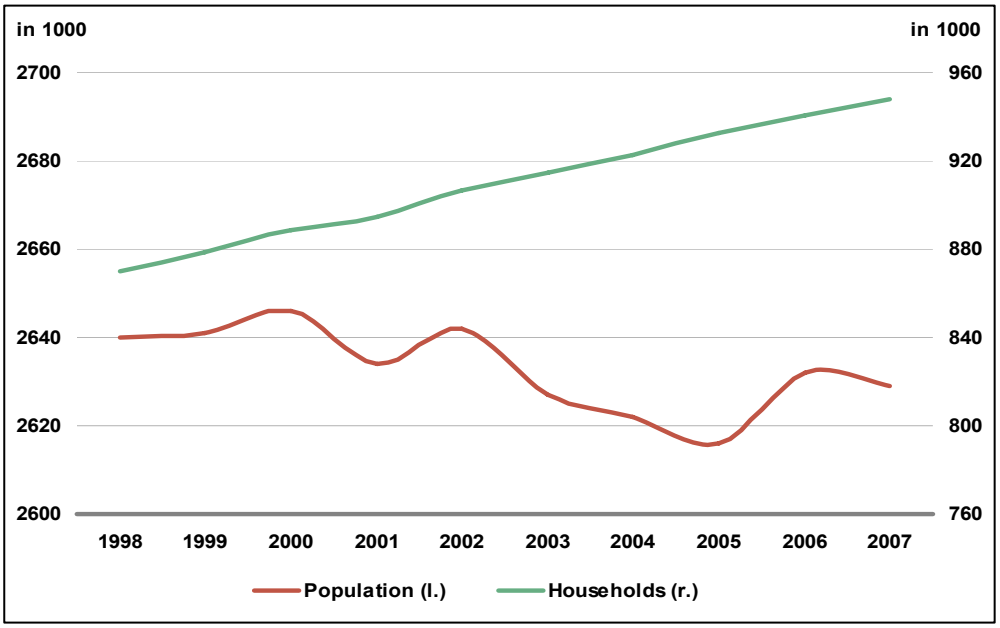


Figure 8: Number of households
Source: Own design based on: Selya (1995:91), Department of Budget, Accounting and Statistics 2008

The number of inhabitants in Taipei County has risen from 3.3 million in 1995 up to 3.7 million in 2004, which is an increase of 400,000 inhabitants within 10 years. This is an indicator of suburbanization processes (Taipei county government 2009).

Furthermore, Taipei is a city with a high population density. The city occupies a total area of 271 km². The average population density for the whole city is about 9,670 inhabitants per km². The range is from 5,000 inhabitants per km² in the peripheral areas in the north and northeast to 22,000 inhabitants per km² in the city centers (Figure 9). The lower density in the northern and eastern part is caused by the geomorphologic composition of the area (volcano and forest) (Department of Budget, Accounting and Statistics 2008).

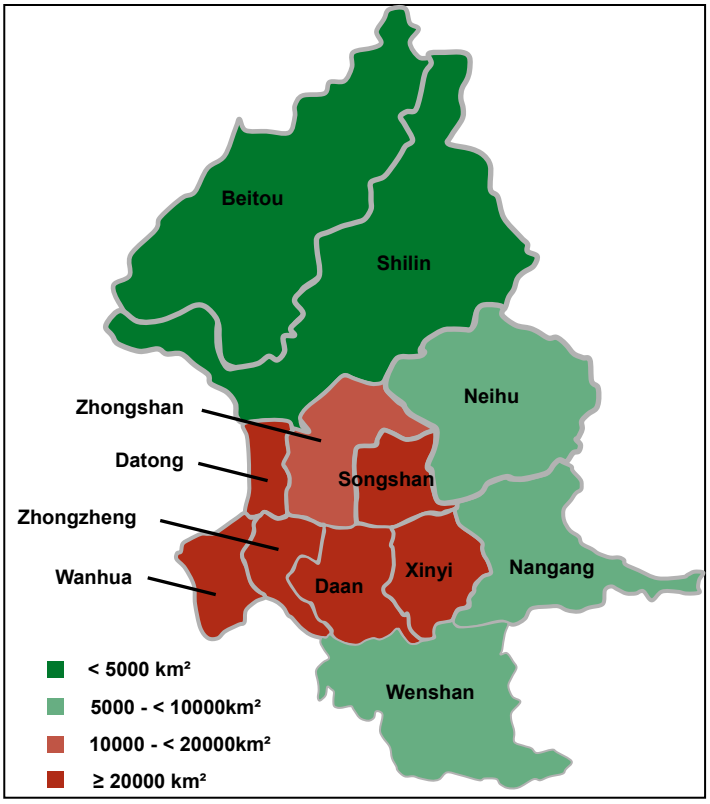


Figure 9: Population density in inhabitans per km²
Source: Own design based on: upload.wikimedia.org/.../Taipei_district_map.
Data from Department of Budget, Accounting and Statistics 2008

Land use and planning

As we have shown, Taipei is a city with a high density of population and many different functions. It is the capital, financial and economic centre of Taiwan which reflects its important role in land use and city planning. Taipei as major business centre is offering a great amount of office space for national and international companies. Taipei has got six important subcenters where companies can find modern office spaces:

- Taipei Main Station → ~ 47,000m² grade A office space
- Zhongshan North Road → ~ 110,000m² grade A office space
- Nanjing-Songjiang Area → ~ 105,000m² grade A office space
- Minsheng-Dunhua Area → ~ 370,000m² grade A office space
- Dunhua-Renai Area → ~ 310,000m² grade A office space
- Xinyi-Jilong Area → ~ 590,000m² grade A office space

(CB Richard Ellis Q4 2007: 7)

49% of the district area of Taipei is useable for urban development. 7% belongs to commercial functions which include the above mentioned office centers. The residential function represents nearly 29% of this area and the industrial function plays a marginal role with just 3% (tab. 1). The biggest part of urban land use belongs to the category “others” which consists of public facilities areas (53% of urban developed area) and other defined areas (8% of urban development area) like administrative areas, culture and education areas, entertainment areas, airport area and special areas. 51% of the Taipei area is not

suitable for urban development. This part consists of agricultural and science areas, reserved land and waterside areas. The characteristic and specification of the function of each area can be seen in the table.

District	For Urban Development					Not For Urban Development
	Total	Residential	Industrial	Commercial	Others	Total
Grand Total	13,349	3,815	448	919	7,268	13,831
Sogshan	852	180	1	46	598	104
Xinyi	1,039	285	21	84	648	82
Daan	1,093	334	-	118	641	43
Zhongshan	998	221	22	182	573	370
Zhongzheng	704	166	-	69	470	57
Datong	478	94	6	98	279	90
Wanhua	575	150	-	74	352	311
Wenshan	1,636	544	-	39	1,052	1,515
Nangang	972	145	108	42	677	1,212
Neihu	1,447	382	20	35	810	1,711
Shilin	1,897	841	24	79	953	4,340
Beitou	1,686	474	45	53	1,114	3,997

Unit: Hectare

Table 1: Land use in the districts of Taipei
Source: Department of Urban Development, End of 2007

In the planning history of Taipei, the Japanese were the first who started planning systematically between 1905 and 1911. According to this you can find different information. In 1932 a second plan was necessary because of the growth of the city from 1,809 to 6,698 hectares. World War II and the ending of the Japanese period prevented the plan to set a general grid system (Selya 1995:140 and141).

After the Japanese occupation the government had different plans and guidelines for the development of the land use. The first plan was introduced in 1968 by the Urban and Housing Development Committee of the Council for International Economic Cooperation and Development. This plan contained lots of infrastructure projects like roads and sewerage treatments plants. It was also illustrated with a lot of maps, tables and graphs. The planned land use map showed a city with one dominating CBD in the older districts of Taipei with a short extension to some eastern districts. Around the CBD the high density population areas were set, with a big preservation area around. Alongside the river the agricultural areas were set and a big national park in the northern parts of Taipei (1995: 33 and 141). The next master plan for urban land use was issued in 1990. “The detailed plans focus on a series of 13 specific areas or problems.” Some of these areas/projects were: Lower downtown redevelopment, Taipei Railroad special district, Keelung River shorting program, urban renewal and urban survey. The plan also included new business districts in addition to the old CBD. There have also been processes of redensification: “Medium density residential areas have been converted to higher residential densities.”

Nowadays the urban development plans look different to the older ones. They have a new focus of quality of life, environment, architecture and new technologies – to create a city with a rising importance in the international community. This is also pushed by marketing

strategies. Another focus is set on TOD (Transit Oriented Development) to get an effective transport system to connect the different districts of the city and also areas in the outskirts to prevent traffic jams and to keep air pollution low (Department of Urban Development of 2007/ Bureau of Urban Development 2005:23 and 24).

Summary

Taipei has its roots in the early settlements of Mengchia and Ta-tao-chen which were located next to the Tamshui River. Because of the location close to the river it was a perfect trading location. With the political decision of the central government from the mainland of China to establish the Taipei area as a separate prefecture and connect Mengchia and Ta-tao-chen with the Inner City (where all the administrative institutions would be located) the first step of Taipei's modern development was taken. In the late 19th century this development was continued under the Japanese occupation. But the most important impact on the cultural and economic development was connected with the retrocession to China and the escape of the Kuomintang (Nationalist) Party from mainland China to Taiwan. During that time Taipei hosted (and still does) three governments - the national, provincial and municipal. With this concentration of political power the demand for cultural and educational institutions was increasing. So Taipei was rising to the political and cultural centre of the island.

The result of Taipei's economic and administrative importance is permanent growths of population until the beginning of the 1990s. People came to Taipei to find work and wealth. But the society was confronted with a new problem – the social change. As in western countries like Germany, for example, career became more important than family. In addition to this a demographic change started too. In spite of stagnation of population growth nowadays rents are still rising. This is caused by the limited city areas due to the geographical situation and a booming real estate market. Taipei shows the typical characteristics of a modern major city with typical demographic and social problems.

References and Internet Sources

Bureau of Urban Development. Taipei City Government (2005): City of Taipei. The Urban Development Context

Department of Budget, Accounting and Statistics: Taipei City Government: http://english.taipei.gov.tw/dbas/index.jsp?categid=636&recordid=1373. (last view: Feb. 2009)

Department of Urban Development (2007): Urban Development Plans

Elllis, Richard, C.B. (2007): Market View Taipei Office. 2007, Q4

Gans, Paul (2007): Bevölkerungsgeographie. In: Geographie – Physische Geographie und Humangeographie. Hrsg. Gebhardt et al.. München.

Hsieh, Chiao-Min (1964): Taiwan – Ilha Formosa. London

Liu, Hua-Yueh (1995): Stadtentwicklung von Taipei. Stuttgart

Selya, Roger Mark (1995): Taipei. Wiley

Taipei County Government: (available on: http://english.taipei.gov.tw/TCG/index.jsp?categid=80&recordid=232) (last view Feb. 2009)

5

The Urban Transportation System in Taipei
by Malte Lemke, Hamburg

Introduction

Taipei is one of the largest cities in Asia – with approximate 2.7 million inhabitants in the city itself and over 10 million inhabitants in the metropolitan area (figure of 2007; TW-GOV 2009a). The City is densely populated[3], in its urban sprawl limited by the surrounding mountains and the ocean; distances are therefore shorter than in comparable American cities, for example. Nevertheless is the daily coverage of inner-city distances a mayor demand of its citizens. Therefore, Taipei's urban transportation system is playing a crucial role in the viability of this metropolis: only the mixture of different means of transportation creates and enables a sustainable transportation system for the inhabitants. Taipei herein is relying on three different means of transportation:

- individual motorised vehicles,
- motorcycles and
- public transportation system.

This article will discuss the historical development of these in the first two chapters, with a special focus on the MRT, the metro rapid transit system, which is part of the public transportation system. In chapter three the perception of the urban transportation system will be discussed. Based on the work of our group during the field trip, I will qualify and analyse the mental maps. These may give us information about the subjective importance of the means of transportation for two different groups: (a) foreigners, represented by the students of the University of Hamburg and (b) locals, represented by the students from the NTNU.

Historical Development of Urban Transportation in Taipei

The historical development of the urban transportation system in Taipei is best described in three periods:[4]

- 1960s and 1970s
- 1980s until mid 1990s
- Mid 1990s until today

1960s and 1970s

The 1960s and 1970s in Taiwan are characterised by an extensive start of industrialisation. Throughout the two decades, strong population growth comes along with a strong growth of private mobility and heavy investment in streets. At the beginning of the 1960s, Taiwan is a rural country with most jobs being found in agriculture – at the end of the 1970s it's at the

[3] This high density even led to a stagnation of population growth in the inner city area during the last 10 years (TW-GOV 2009)

[4] This description starts with the establishment of the Kuomintang regime and Taiwan's takeoff into industrialism (see Simon Brinkrolf's article in this book).

edge of being an industrialised country (Liu 1996).

Taipei experiences an even stronger increase in inhabitants, mostly due to migration of two different kinds: (a) inner-state migration from rural areas to the city and (b) migration from mainland China to Taiwan. In 1968 Taipei has 1.58 million citizens and 2.66 million people living in the whole metropolitan area. By 1982 these numbers have grown by approximate 50 respectively 100 percent: Taipei inhabits 2.33 the metropolitan area even 4.78 million citizens (Tsai Hc 1985).

With its focus on street-bound traffic with cars, trucks, motorcycles and public busses and an inner-city train system, which almost lost all importance during industrialisation, Taipei begins to experience serious problems by the end of the 1970s (Hua-Yueh 1996). The intensity of traffic during rush hours leads to a loss of productivity, even though the high share of motorcycles prevent the city from a collapse; the decrease of air quality is followed by an increase of health related problems. Yet, it takes almost another decade for Taipei's government to address these problems.

1980s until mid 1990s

The 1980s also see a fast growth of Taipei in population numbers (especially in the suburbs) and an even more rapid growth of numbers of vehicles. As the distance from home (suburb) to work (city centre, industrial area) increases, the need for individual motorized transportation increases, too. The increased average wealth allows more and mare citizens to choose a car before a motorcycle. The consequence is therefore that the number of vehicles is not just growing absolutely – the space used per vehicle in traffic is growing even faster. In 1981 the number of vehicles adds up to 615,000 – by 1996 it has grown by over 100 percent: 1.44 million vehicles are registered in Taipei (TP-GOV 2009a). The total collapse of street-based transportation, including the only public transportation with busses, seems inevitable.

To address the problems of transportation, the Executive Yuan[5] passes the initial network design of the Taipei Metro in 1986, which was designed by the Council for Economic Planning and Development. Construction was planned to take until the end of the 1990s, but under the pressure of traffic numbers and growth, it's only 1996 for the first line to open for customer service (TRTC 2009a).

Mid 1990s until today

With the introduction of the MRT during the mid and late 1990s, the modal split of Taipei changes dramatically (see table 2). The number of registered vehicles only grows by 200,000 during this decade: from 1.59 million in 1998 to 1.8 million in 2008 (TP-GOV 2009a). Slower growth of Taipei, of course, is one of the main reasons for this stagnation, too. But the increasing share of the MRT gets a significant part of the traffic off the streets onto the rail tracks. In total, the private motorised transportation experiences a strong formalisation. Security rules and measurements are introduced – and enforced. Today Taipei has three equally important sockets in urban transportation, which are all highly developed. This is somehow uncommon: with a share of 29 percent in the modal split (see table2), motorcycles are very dominant.[6] Motorcycles play a special role, because their space-usage is relatively low and their speed is relatively high (both compared to cars). If the persons that use motorcycles at present change to cars in the future, traffic during rush hour will stand still throughout the city again. Therefore it seems correct to describe Taipei as a motorcycle dependent city (MDC) – Khuat Viet Hung explains: "While MDCs are still poor and having competing needs in using their limited resources, they cannot dream to have an ordinary

[5] The Executive Yuan is the executive branch of the government of Taiwan.
[6] This share was up to 60 percent during the 1970s.

automobile or transit oriented transport system as in developed cities" (Khuat 2006). Unlike other MDCs Taipei is highly formalised (i.e. duty to wear a helmet while using a motorcycle) and has a state of the art public transportation system.

In regard of the modal split, Taipei is (and may always be) a MDC. The high share of public transportation and the wide reaching formalisation of motorcycle traffic nevertheless indicate a special place among metropolitan areas throughout Asia.

Non-Motorised Traffic	10
Public Transportation	35
Cars / Trucks	26
Motorcycles (Scooter)	29

Table 2: Modal Split (2001, in %)
Source: Hua-Yueh Liu 1996, own estimations

Last, ten percent of non-motorised traffic is relatively high number. As Taipei is a city of motorcycles, bicycles do not play a crucial role in every day life. Walking does. This is especially true because in Taipei living and working areas are mixed – there is no classical "central business district". Especially in the local economies (also in the suburbs) it is possible for the inhabitants to walk to work.

The present urban transportation system

Three sockets of urban transportation

In respect of the modal split (table 2) I argued that motorised urban transportation in Taipei is (almost equally) relying on three sockets. The biggest share is carried by public transportation (35 percent). Public transportation depends on busses and the Mass Rapid Transit System (MRT), whereas the MRT is responsible for 17 percent[7] of all urban transportation in Taipei (the share of trains is only about 1-2 percent).

Even though only one quarter of the people depends on cars for transportation, the space consumption of individual cars, trucks (trucks make up to 20 percent of the individual motorised traffic) and taxis[8] is by far the greatest. Although the streets are, of course, also used by busses (and therefore the public transportation), the wide streets and highways are necessary only due to individual motorised transportation (Khuat 2006).

It is obvious that the introduction of the MRT was essential for Taipei to manage its traffic problems. The effect of the MRT on the modal split can be visualised by the growth in the numbers of cars and motorcycles, too[9].

[7] Due to unavailability of comparable numbers, this share is an estimation made considering different numbers of transportation in Taiwan and Taipei.
[8] I did not find data about the share of Taxis in individual motorised transportation.
[9] The numbers given below must be interpreted in respect of the city growth during the last 10 years, too.

Public Transportation	Growth in passenger numbers: 100%
Cars / Trucks	Growth in registered vehicles: 20%
Motorcycles (Scooter)	Growth in registered vehicles: 25%

Table 3: Growth in passenger numbers and registered vehicles 1996 to 2006
Source: TP-GOV 2009a, TP-GOV 2009b, TRTC 2009b, own calculation

Even though these numbers are not directly comparable, they point out a clear tendency. This tendency becomes even more obvious, when taken into account that the number of registered cars is even shrinking: from 2006 to 2008 the registered private and business cars decreased by 15.000 units (total: 640.000). With a growing metro network you can expect that the tendency of the last years will continue in the future (see chapter: Future of the MRT). But before concentrating on the MRT, I want to continue with a short description of the public transportation system in total.

The public transportation system
The public transportation system depends on two different types of traffic: (a) busses and (b) MRT. The share of both of these in the modal is approximately equal. Although the Metro is faster and more comfortable, busses are a necessary means of transportation for various reasons.

First, busses are far more flexible and can operate in regions that are unreachable for the metro. Second, the metro network is not yet dense enough – busses play a crucial role in offering service in network gaps. Third, the western part of the Taipei metropolitan area is not covered by any metro connection (yet). In this part of the city, busses are the only means of public transportation.

This is a problem out of two reasons: The western parts of the city still being unconnected today are mostly poorer neighbourhoods with a weaker social structure. This may be the first political dimension. The second political dimension is given by higher prices for bus tickets (in comparison to the cheap, subsidized metro tickets) in a less well-off neighbourhood. Yet, the insufficient connection of the western parts of the city is going to be corrected during the next decade. The history, present and future of the MRT is the topic of the next chapters.[10]

The MRT

History of the MRT
The following table is quoted from information of the Taipei Rapid Transit Corporation (TRTC 2009a). It gives a short overview of the most important dates of the development of the metro network so far. Highlighted information is being discussed in the next chapter.

1986 Approval on the initial route network plan of Taipei Metropolitan Rapid Transit Systems by Executive Yuan
1996 Opening of Muzha Line, the first driverless medium-capacity rapid transit line in Taiwan. Operation length is 10.5 km
1997 Opening of Danshui Line from Danshui Station to Zhongshan Station, the first heavy-capacity rapid transit line in Taiwan. Length increases 21.2 km, total length extends to 31.7 km

[10] In this chapter I am referring to some discussions during our field trip.

1997 Opening of Danshui Line to Taipei Main Station (0.7 km)
1998 Accumulated passenger transport volume exceeds 100 millions
1998 Opening of Zhonghe Line and Xindian Line North Section. Length increases 7.9 km and total length extends to 40.3 km
1999 Opening of the entire Xindian Line. Operation length increases 8.4 km and total length extends to 48.7 km
1999 Opening of Banqiao Line from Longshan Temple Station to Ximen Station and Nangang Line from Ximen Station to Taipei City Hall Station. Operation length increases 7.7 km and total length extends to 56.4 km
2000 Extension of Banqiao Line to Xinpu and Opening of Xiaonanmen line. Length increases 5.5 km, total length extends to 61.9 km
2000 Opening of the entire Nangang Line. Operation length increases 3.2 km and total length extends to 65.1 km
2001 Accumulated passenger transport volume exceeds 500 millions
2002 Introduction of the 'IC EasyCard' for Metro system, buses and parking lots
2004 Opening of the Xiaobitan Branch Line from Qizhang Station to Xiaobitan Station. Operation length increases 1.9 km and total length extends to 67 km
2005 The new Metro etiquette: Passengers are required to stand at least 1 meter from the platform edge when waiting for trains
2005 Supply of wireless broadband network is completed
2005 Taipei Metro's accumulated ridership reached two billion passengers
2006 Opening of Banqiao Line's Phase Ⅱ and Tucheng Line from Xinpu Station to Yongning Station. Operation length increases 7.4 km, and total length extends to 74.4 km
2006 Passenger security: Platform Screen Doors installed in Taipei Main Station and Zhongxiao Fuxing Station
2008 Taipei Metro's accumulated ridership: 3 billion passengers
2008 Opening of Nangang Eastern Extension Line from Kunyang Station to Nangang Station. Operation length increases by 1.4 km, and total length of MRT lines extends to 75.8 km
2009 Inauguration of Neihu Line from Zhongshan Junior High School Station to Nangang Exhibition Center Station. Operation length increases by 14.7 km, and total length of MRT lines extends to 90.5 km

The MRT today

The MRT network was continuously extended from the late 1980s until today. The most important issue of the metro system is to reach as many customers as possible. But the TRTC also works on an integration of the MRT into the city and the establishment of the metro not only as another means of transportation but a high class service with state of the art standards. Integration is addressed with the introduction of the 'IC EasyCard' which is not only valid for the metro system, buses and parking lots but gives the customer reductions on ticket fares of up to 60 percent. The quality of service is acknowledged worldwide: 'Taipei's insanely efficient, remarkably punctual and shockingly clean subway system is a marvel of mass transit every city should emulate' (Lew 2008). Alexander Lew's article is just one of many praising the service, the cleanliness and the high standards of security architecture of Taipei's metro: 'the Taipei Rapid Transit System has many lessons to offer on how to run a subway system. With customer satisfaction topping 94 percent, Taipei Metro may well be the best mass transit system in the world' (Lew 2008). And it's comparable cheap, too: a maximum of 65 NT$ (1.40 €) to travel throughout the city or from suburb to suburb is much cheaper than the RER in Paris, for example (2.80 to 6 €).

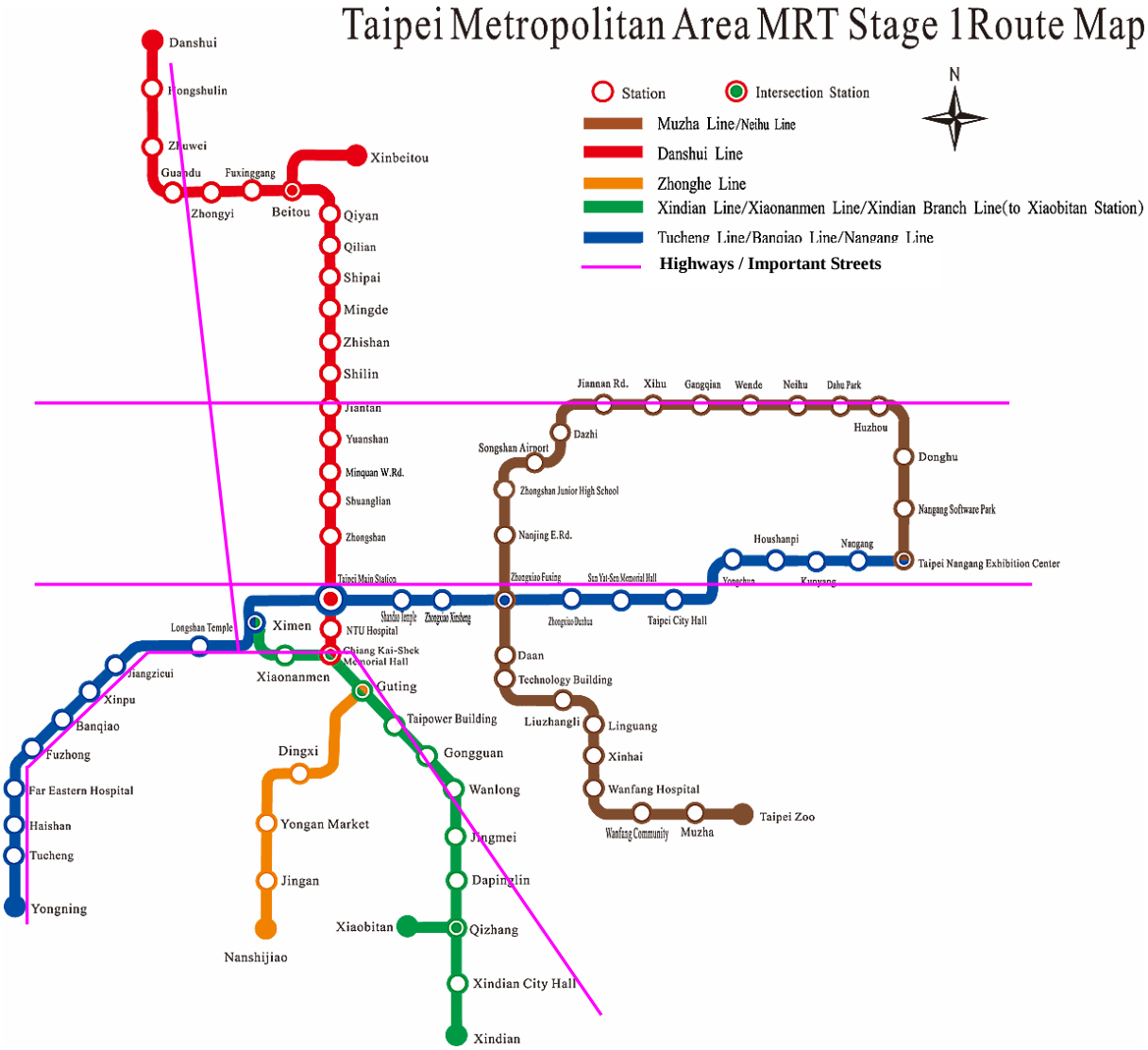


Figure 10: Current MRT route map 2009
Source: TW-GOV 2009b, own changes

In the route map of the present state of the metro system you can clearly see the gap in the western part of the network. It is also obvious that the system is planned for the whole metropolitan area and therefore even connecting suburbs that are close to the ocean (Danshui). And, if you take in account the basic street framework, it's revealing the aim during the 1980s: to get traffic off the street. The first stage of the network system was built as addition to the existing street layout. In the following chapter I will describe the next stage of the network development that is planned for the next decade.

Future of the MRT

As indicated in the last chapter, the extension of the MRT will be continued during the next decade(s). The plans already exist: the next stage is going to integrate the western parts of the city into the network. In fact, the orange line in the following picture (Figure 11) is scheduled to start service in 2010 (Xinzhuang Line) and 2011 (Luzhou Line) (TW-GOV 2009b). This means that the government is seriously interested in closing the gap in the east and has been throughout the last years.[11]

[11] Nevertheless, it was the connection of the inner-city (business) airport which was to be finished even before (2009).

Figure 11: MRT route map 2010-2016
Source: TW-GOV 2009b

Even a connection of the new, far-out Taoyuan International Airport with the MRT system is planned. Overall, the plans for the next stage of the system seem to follow the inner 'logic' of the network but the existing street framework, the MRT is in a way emancipating from the street bound traffic. The importance of the old centre, the main station is renewed as a major transition station.

Perception of the Urban Transportation System

How is the urban transportation system perceived? How is the MRT described in comparison to the streets and highways? During our field trip I had the chance to ask the Taiwanese and German students to draw mental maps that should cover the urban transportation layout. The following chapter will deal with findings of that field day.

Field work

„The map is never neutral" (Harley 1989). Even though Harley is arguing against the objectivity of classical cartography, his quote might be a good start to see the benefits of (subjective) mental mapping. The concept of 'mental maps', developed by Roger Downs and David Stea in the 1970s (Downs/Stea 1982) is trying to take in into account, that every day life is built upon subjective images of the city – perception and memories are constitutive for space, the mental map works as an intersection between memory and space.

During the field day I asked the group to draw maps of the urban transportation system of Taipei. I gave no further information, did not tell what might be of special importance and just said that everything dealing with inner city transportation might be considered interesting for the map. The students drew the maps in groups of two or three. There were three different kinds of groups: (a) Taiwanese students, (b) German students and (c) mixed groups. The groups had half an hour to draw the maps. Afterwards we had an open discussion about the different maps and tried to find out differences between the different groups.

In the following chapter I will describe and analyse two of the maps as examples of the work during the field day. The points I will make are also a result of the discussion during the field day.

Examination of mental maps

The first map is drawn by two German students (Figure 12). It shows the basic inner city layout bordered by the river banks of the Danshui and Keelung River. The streets are similar to patterns of a chess board and represent the knowledge of the students of the colonial history of Taipei and its historical street layout. The MRT is pictured as a star formation with only one station given: the main railway station. The airport is very dominant – even though it's not the airport the group used when they arrived in Taiwan. In this map the riverbanks almost seem as natural borders for the city. The layout of the MRT (with its gap in the west) seems logical – only further knowledge and a contextualisation make it possible to interpret the borders in a more satisfying way.

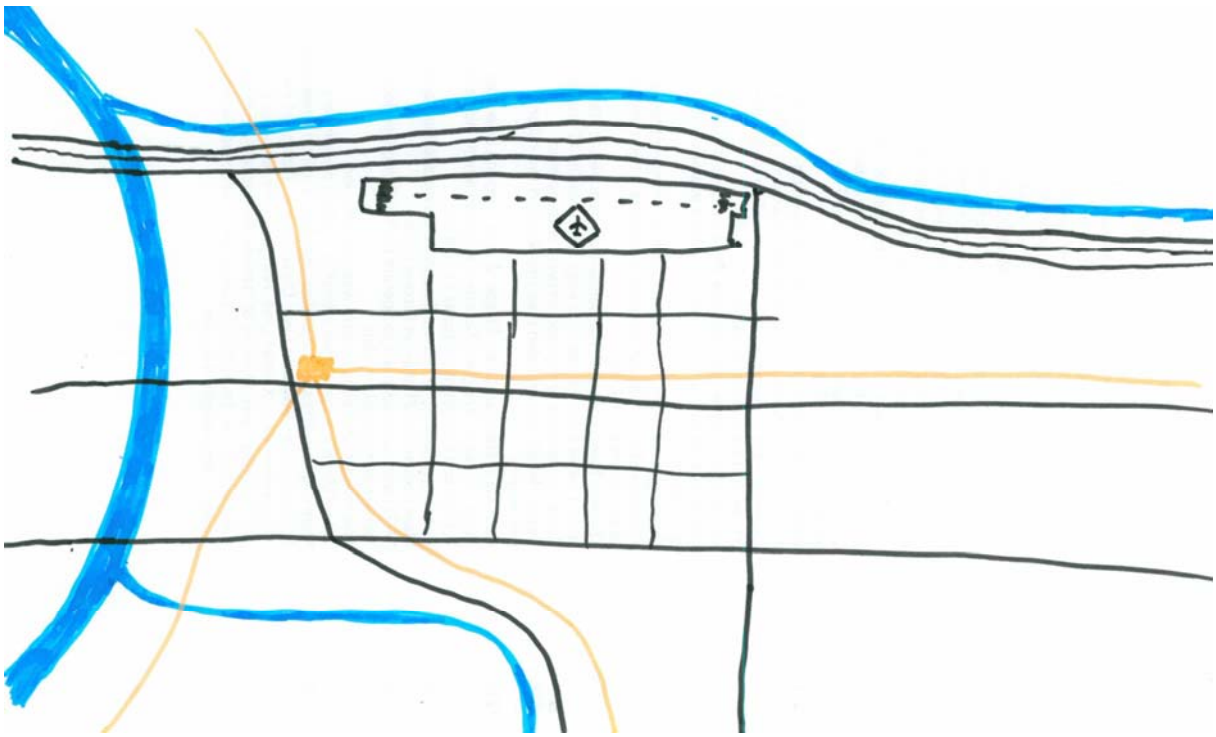


Figure 12: Mental map of Taipei, 09-2008, by two German students

The second map is drawn by two Taiwanese students. It shows the inner city with a different focus. The region south east of the old city centre is much more detailed than other parts of the city – it is the neighbourhood of the National Taiwan Normal University (NTNU). Here, too, the rectangular patterns are obvious. Even though less detailed, the rest of the city shows the knowledge of locals – streets and places are labelled with names, the map is less

schematic than the first one. The perception of the MRT is more detailed, too. The colourful lines do represent the system much more accurate than the streets shown for the rest of the city.

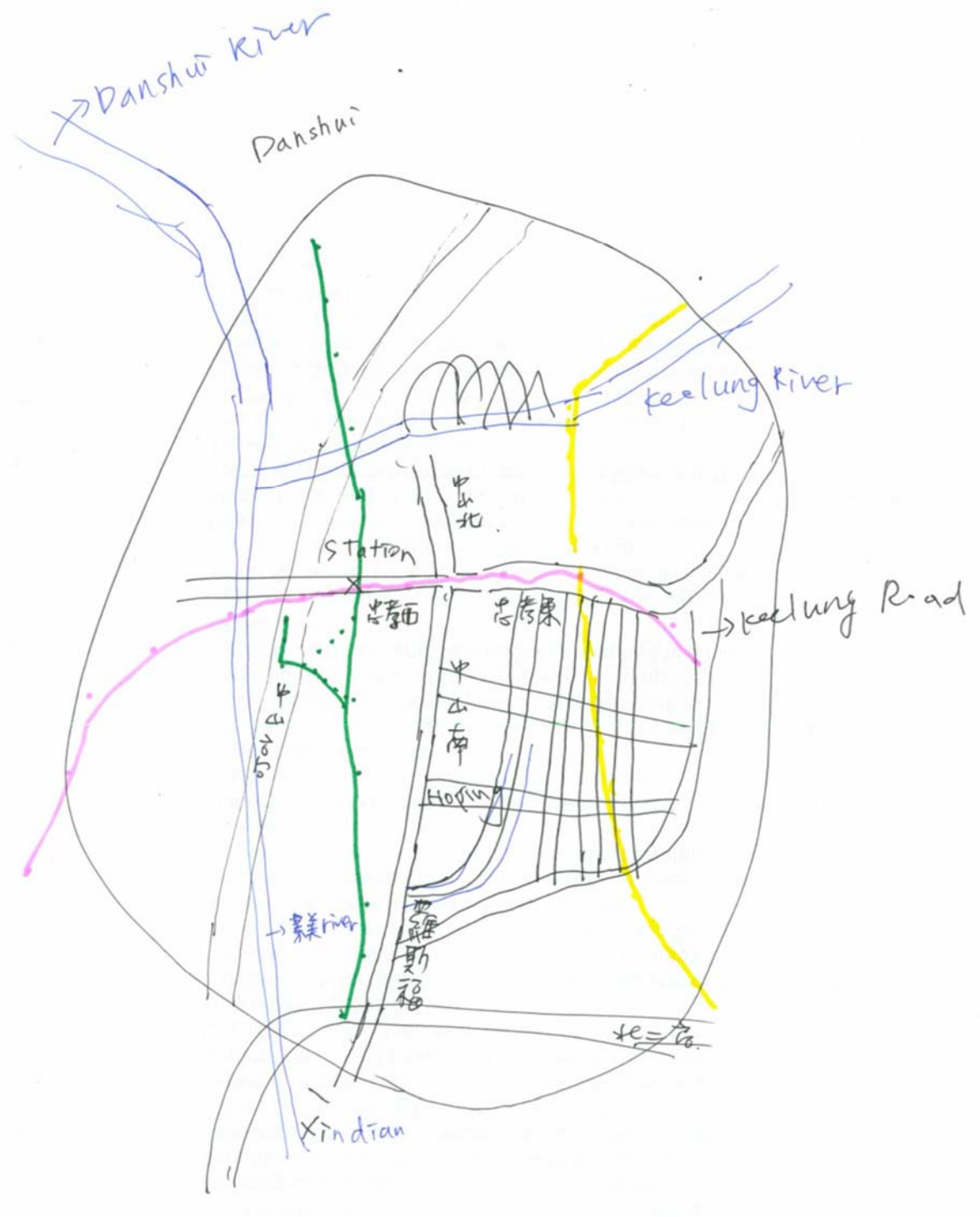


Figure 13: Mental map of Taipei, 09-2008, by two Taiwanese students

Conclusion

Taipei has developed from a street traffic dependent, motorcycle dependent, typical Asian city to have one of the most modern and convenient metro systems worldwide. Its continuous growth made it necessary to improve public transportation – and the city government chose to integrate a completely new concept, the metro into the urban transportation system of the city. 94 percent of the customers are satisfied with the MRT's service – this high acceptance is maybe the most important measure for a successful reshaping of the city's traffic structures.

References

Downs, Roger M and Stea, David (1982): Kognitive Karten. Die Welt in unseren Köpfen. New York

Harley, John Brian (1989): Deconstructing the Map. In: Cartographica, 26:1-20

Hua-Yueh Liu (1996): Stadtentwicklung von Taipei. Vergleichende Darstellung mit Stuttgart am Ende des 19. Jahrhunderts. Stuttgart

Khuat Viet Hung (2006): Traffic Management in Motorcycle Dependent Cities. Darmstadt

Tsai Hc (1985): Relationships of population growth and socio-economic development between satellite areas and the inner city-Taipei metropolitan case. In: Ingu munje nonjip. 1985, 07. Taipei

Internet Sources

Lew, Alexander (2008): All Subways Should be Like Taipei's Marvel of Mass Transit. In: Autopia, http://www.wired.com/autopia/2008/05/taipei-metro-re/

TP-GOV (2009a): Taipei City Government, Motor Vehicles Office: Number of Vehicles in Taipei; http://english.taipei.gov.tw/tcmvd/index.jsp?categid=2430&recordid=1455

TP-GOV (2009b): Taipei City Government, Department of Transportation; http://english.taipei.gov.tw/dot/

TRTC (2009a): homepage of the Taipei Rapid Transit Corporation > Company Information > Chronicles; http://www.trtc.com.tw/e/

TRTC (2009b): homepage of the Taipei Rapid Transit Corporation > Company Information > Statistics > ridership counts; http://www.trtc.com.tw/e/

TW-GOV (2009a): statistical data from the Taiwan Government; http://www.ris.gov.tw/web_eng/eng_sta.html

TW-GOV (2009b): Department of rapid transit systems; http://www.dorts.gov.tw/english/Network/images/map_LSS1_L.gif http://www.dorts.gov.tw/english/Network/images/map_LSS2_L.gif

6

Industrial Transformation of Taiwan: With a Special Focus on the Hsinchu Science Park

by Christian Roggenbuck, Hamburg

Introduction

The industry of Taiwan has transformed drastically in the last twenty to thirty years. The economy has thereby shifted from being focused on industrial production to a knowledge-based economy. How have these transformations taken place and which importance Science Parks have for these developments? How can these transformations be characterized and how are Taiwanese companies affected? Which role do Taiwanese companies play in global production networks? Industrial development in Taiwan took off rapidly after the stop of the Second World War and the end of the Japanese colonisation period. The 1950s were characterized by an agrarian reform and an economic concentration on farming products in the exporting sector. Industrial production started slowly and was built up in the 1960s with a focus on light industries. These industries were pushed aside with the development of heavy industries such as shipbuilding in the 1970s. The industrial profile of Taiwan was challenged in the 1990s by the upcoming Communication and Information technology Industry. Within this industrial transformation of Taiwan, the establishment of Science Parks has had a key function. They have been constructed to introduce high-tech-companies and attract talents to Taiwan, and to overall promote the upgrading of Taiwanese industry (http://eweb.sipa.gov.tw). So far five Science Parks have been created in Taiwan, with Hsinchu Science Park being the biggest amongst those. The economic importance of the Hsinchu Science Park has made it a crucial destination for our field trip, in terms to understand the industrial transformation of Taiwan.

The main aim of our visit was to gain knowledge of the industrial transformation taking place in Taiwan at present. Additionally, we wanted to see the locality in which the high-tech-companies are concentrated. Next to that, the structure of the Hsinchu Science Park should be recognised and its connections within the park and with the global economy should be explored. A further aim (especially for the German students) was to try to find possible differences to industrial parks in Germany. In the first part of this article I want to look at the industrial transformation of Taiwan more precisely. What was the economy based on before the fundamental changes during the last two decades? What is the industrial structure nowadays and in which direction is the economy of Taiwan developing? With all these transformations happening, the role of Taiwan in global economic networks has changed. How are Taiwanese companies situated in global commodity networks? With Taiwan being the leading nation in the construction of Personal Computers and Motherboards amongst others and the Hsinchu Science Park being a major assembling site of these, I am going to use these industries as an illustrating example for Taiwan's industrial development. In a second part I want to present the Hsinchu Science Park in closer detail, especially in looking at way industrial transformation influences the development of a concrete locality. Which importance has the Hsinchu Science Park for Taiwan and its industrial transformation? In this chapter I also ask which sorts of companies are located in the Science Park and if there are any economic connections or ties with foreign companies.

Industrial Transformation of Taiwan

The industry in Taiwan has been transforming drastically since the end of the Second World War. Starting from an economy based on agrarian production and labour-intensive industries only since the 1990s the shift to the production of capital- and technology-intensive industrial commodities and services has taken place. Although Taiwan has developed into a high-tech country and its industries produce 53% of all laptop PC's and 70% of all motherboards worldwide (figures of 2001) for example, many of its companies remain unknown. Wang describes them as "heroes without a name in the world market" (Wang 2003). Why are Taiwanese companies (despite their leading role in the IT industry) not established as recognised brand names? How is Taiwan's connection to the world economy, which linkages to brand companies have been created? Which role do Taiwanese companies play in world wide production networks?

A good starting point to address the role of Taiwan in the world economy is the concept of "Global Commodity Chains", which was developed by Gary Gereffi, Miguel and Roberto Korzeniewicz. A global commodity chain is defined as "a network of labour and production processes whose end result is a finished commodity" (Hopkins et al. 1986). Thereby a global commodity chain consists of different involved actors such as households, companies and states, which are interconnected with each other in one production network. The crucial question hereby is how the different production steps are combined and which relations exist between the different actors. Next to that it is important to analyse, in which part of the network the most value has been added and the highest profit is thus generated (Gereffi et al. 1994).

The governance structure in commodity chains can be divided into two characteristic types: producer-driven and buyer-driven commodity chains. In producer-driven commodity chains the producer coordinates the network and thus determines, what is going to be produced and in which way. Examples are heavy industries such as the automobile production. In contrast, buyer-driven commodity chains are usually found in such fields, where retailers and brand-named merchandisers are involved (Gereffi et al. 1994). Here not the production itself is relevant, but the highest value is added in the area of design and marketing. The latter sort of commodity chain is the one, in which the Taiwanese Personal Computer industry is integrated.

Although the Personal Computer industry in Taiwan began developing in the 1970s, it was not until the 1980s (when American multinational companies entered the Taiwanese market) that the industry became an exporting industry. However Taiwanese companies were not more than assembling subcontractors or more precisely "original equipment manufacturers" (OEM), for American firms mainly. In the OEM model the producer is in charge that "the finished product is made to the precise specification of a particular buyer [...] who then markets the product under its own brand name, through its own distribution channels." (Wang 2003) The multinational companies during this period took advantage of Taiwan's low-cost labour and high engineering capabilities (Chen et al. 2002). At this stage of development the most value was added by the American companies, benefiting from high turnover through production processes such as marketing and design.

In Taiwan small and medium sized enterprises (SME's) developed mainly in the personal computer industry and specialised their production to small segments. The reason that Taiwan's industrial structure was dominated through SME's was because of state policy, which did not promote the development of big sized private-owned firms (Wang 2003). For example, in 1993 more than 55% of all manufacture exports came from SME's (Chen et al. 2006). This industrial structure enabled small start-ups to enter the computer industry and

thereby specialise on specific components. Hereby an interwoven social network of component producers necessarily came into existence, in which a high competence was developed (Chen et al. 2002). One advantage of SME's is that they have the capacity and flexibility to adjust to changes in demand and technology (Wang 2003). Being so small of size, these companies were not presenting a competitive threat for the multinational companies. Thus a high strategic relationship could be created, in which the multinational firms helped their subcontractors to increase their quality and capabilities. Other than providing technical assistance the brand name producers as well transferred technology to their subcontractors (Chen et al. 2006).

Next to that, the Taiwanese Personal Computer industry acquired technology and skills from overseas. Either through contacts with overseas workers or as spin offs from American companies (Chen et al. 2002.) Altogether these production networks transformed themselves into learning networks through a high amount of linkages and informal channels between the different subcontractors as well as between the brand firm and their producers. Furthermore, agglomeration raised the capabilities of the producers through an increasing demand (Wang 2003). Beginning in the 1990's the more labour-intensive production processes were as well outsourced by the Taiwanese companies to mainland China, in which labour and land costs are on average lower than those in Taiwan nowadays. Mainland China has thus emerged as the most important overseas manufacturing base of Taiwan, with foreign direct investments exceeding 34.4 billion US$ between 1991 and 2003. These developments resulted in the strengthening of Taiwanese industrial competitiveness and allowed Taiwanese companies to specialise on the more technology-intensive production processes (Chou et al. 2007). In sum, manufacturing capabilities of the Taiwanese producers have been increasing and a functional upgrade in the commodity chain has been achieved since the 1980's.

However the subcontractors began producing for more than one multinational company. And thus is gaining economies of scale. This production arrangement enabled Taiwanese IT companies to integrate their knowledge into many computer systems. This development facilitated them on the one hand to increase their production skills; on the other hand they began receiving advanced information about the final market. Whilst producing for a range of companies they have even outpaced their buyers in regards about market information. This has changed the governance structure in the commodity chain dramatically. The Taiwanese Personal Computer industries have developed from pure subcontractors to active participants in the global commodity chains. Additionally the value in the commodity chain was increased by some Taiwanese companies, which became ODM (own design and manufacture) producers for brand name firms, meaning that they assumed control of all or parts of the design process (Wang 2003).

Nevertheless the personal computer commodity chain has stayed a buyer-driven mostly until now. One reason for this "stagnation" is that in most cases only brand names have access to the final markets so far, at least in Europe and Northern America. Another factor is that an OEM production model tends to lead to a path dependency, in which companies follow their previous production path (Wang 2003). The question remains open, in which way the Taiwanese industries are going to develop within their production networks. Furthermore it stays in question if Taiwanese companies are going to increase their access to the final market as well in Europe and Northern America in the coming decade.

Hsinchu Science Park

The Taiwanese economy and industry is based on cooperation with brand name companies of North American or European origin (as shown in the example of the personal computer industry). With the state promoting the development of SME's a densely interconnected network has been established. How are these production networks constructed spatially?

Which interdependencies between buyers and subcontractors exist on a local scale? Which role do Science Parks play for the development of the Taiwanese economy? In the following chapter I am going to focus on the Hsinchu Science Park, not only is it the biggest one in Taiwan, it is as well the first one established. At the beginning I am going to present some general facts about the Hsinchu Science Park and highlight the economic linkages. Based on these facts I am going to discuss the importance of the Science Parks to the Taiwanese economy.

The Hsinchu Science Park is located in the north-eastern part of Taiwan. It was created as the first of five Taiwanese Science Parks in the year 1980 with the aim: "to introduce high-tech industries and attract talent to Taiwan, promote the upgrading of Taiwanese industries, balance regional development and drive national economic development" (http://eweb.sipa.gov.tw). In the last thirty years, five stages of development have been completed; nowadays it includes an area of more than 1,500 hectares.

Figure 14: Hsinchu Science Park
Source: Annual Report 2007

The importance of the Hsinchu Science Park for Taiwan is not only in its function as a research and development centre, but as well as a major contributor to economic development. With a total revenue of 32,5 Billion US$ and employment rates exceeding 100,000 since 2003 the Hsinchu Science Park has a great impact on Taiwan's economy. For example, in 2007 the parks revenues accounted for almost 15 percent of Taiwan's total gross domestic product (Hsinchu Science Park, Annual Report 2007). Next to that, the Science Park is regarded as one of the most important ones worldwide. For example the Institute for Strategy and Competitiveness accounts the Hsinchu Science Park as one of the top three Science Parks worldwide in terms of world production shares and growth rates (ISC 2004). Altogether the Taiwanese high-tech industry in many areas has been concentrated in the Hsinchu Science Park (Chang et al. 2005).

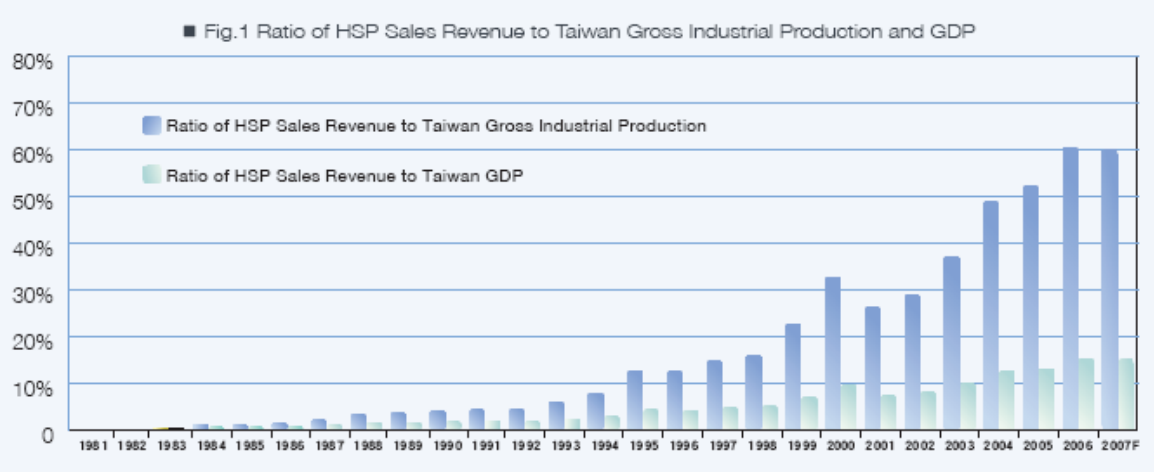


Figure 15: Ratio of HSP Sales Revenue to Taiwan Gross industrial Production and GDP, Hsinchu Science Park
Source: Annual Report 2007

The Park itself and its 384 companies have specialised in six industrial areas: Integrated circuits, personal computers, telecommunication, optoelectronics, precision machinery and biotechnology. A high international connectivity seems to exist, with 49 of these companies being foreign owned. Important to foreign openness are the so called “returnees”. Meaning employees, who have returned to Taiwan with an overseas educational background. These over 4,500 “returnees” have played a critical role to the development of the science park “[...] by introducing leading-edge technologies and management skills that have improved the high-tech and sustainable development of the Park.” (http://eweb.sipa.gov.tw). Additionally the Taiwanese state has been supporting Hsinchu Science Park companies to recruit qualified personal overseas in the so called “Taiwan Overseas High-Tech Talent Recruiting Mission” (Ministry of Economic Affairs). International connections within global commodity chains and positioning in those seem to be essential for the development of Hsinchu Science Park. In 2004 aims for the future were to increase the added value of the foreign industries located in the park. The development of the Hsinchu Science Park has been regarded as a success story, with other industrial zones mainly in China trying to transplant the experience through economic ties or retired personal of the Hsinchu Science Park Administration Bureau (Chou et al. 2007).

With the emergence of globalisation, innovation has become a crucial factor for local economies. At the same time regional divergences have been strengthened. This condition applies as well for the Taiwanese industry, which (as shown) has transformed from a labour-intensive to a capital- and technology- intensive one. Especially in the area of innovation, specific industrial clustering has important advantages (Chang et al. 2005). Practically Science Parks offer agglomeration conveniences, with many similar industries being situated in the nearby area. With the clustering of similar industries, local production networks may be established and companies may specialise on specific components. Thus is creating a competitive production network – such as the personal computer industry in Taiwan. Hereby different forms of technological cooperation between companies may take place. These networks could, for example, involve licensing or the transfer of technology (Chang et al. 2005).

Furthermore local proximity stimulates innovation through the possibility of face-to-face communication (Chang et al. 2005). This sort of communication can either be on a direct way by companies cooperating together or by more informal networks, meaning the information exchange between employees of different companies on a private basis. Next to that, information is passed on by workers, whilst changing their working place. Furthermore,

academic institutes focused on Research and Development gather around industrial clusters. Reasons for this process may be a win-win-situation. In this context academic institutes benefit from research stimulates and companies profit from qualified personal. At the same time the establishment of academic institutes contributes to further regional clustering. Altogether Research and Development is regarded as an indispensable component to ensure the success of a Science Park (Chou et al. 2007). Furthermore, a knowledge spill over between companies may take place, while these are approaching new sources of knowledge with the aim to achieve competitive advantages. In conclusion, clustering helps companies to apply new knowledge and as well to commercialise it (Chang et al. 2005). Hence the development of Science Park is a crucial part of sustaining and increasing economic competitiveness.

Studying industrial transformation

The aim of the field trip day in Hsinchu Science Park was to gain knowledge about Taiwan's industrial transformation. The idea behind the program planning was that the students explore the field by themselves and investigate. How does the Science Park function and which current developments are taking place? Which further relevance do Science Parks have for the Taiwanese economy?

The functions of the Park should be understood. Lead questions in this context: Which companies exist and which importance do they have in their own companies' chain hierarchy? In which kind of industry do they produce mainly? What is the structure of the area, is it only a Science Park or an independent, self-surviving community? Do the employees live there or can a high mobility be seen? If so, is there a public transport system existing or do people use their own vehicles? What is the structure of the spatial usage of the park, do certain companies group together?

Being a special area within Taiwanese boundaries, the Hsinchu Science Park itself has been undergoing a lot of changes. During these developments it has gained some new spaces. It is important to explore, how the Science Park is changing. Questions to be answered in this context are: Which changes are in the Science Park such as construction works visible and exactly what is being build? Which new industries are developing and which have existed for a longer period of time? Is any further transformation of the Taiwanese economy and industry going on? Are there any economic interconnections within the park? Do linkages with foreign countries or companies exist, for whom are the products or services produced? Do economic linkages within the park exist: are suppliers or service companies developing? Which future developments of the Hsinchu Science Park are possible, is there any available space for new building complexes?

Spatial usage plan

Regarding the aim to gain more knowledge about the Hsinchu Science Park it seemed necessary that the students should explore the area on their own, following specific task. Therefore six groups seemed appropriate, regarding that the Science Park covers more than 1,500 hectares, which is more than one single group can investigate in only one afternoon. Next to that the development of the Science Park in various stages made it an interesting task to see, if different developments have occurred during the existence of the Science Park during the last three decades. The task was therefore to draw a spatial usage plan in the individual area of the six students groups. Two major assignments for the investigation were planned. First of all the provided maps should be labelled by the groups. Hereby the space should be classified into: industrial companies, suppliers, service companies, and living and recreation areas. As well as a numeration of the labelled and classified objects should be made. Secondly additional information should be gained about the classified objects on a separate piece of paper. These parts should allow the groups to think about important factors for the development of a science park such as the Hsinchu Science Park.

Next to that the lead questions should be answered.

Field day
The expectation to the field day in Hsinchu Science Park was therefore to explore the industrial transformation of Taiwan on a practical basis. However it turned out to be not possible to enter and explore the Hsinchu Science Park as a pedestrian due to safety requirements and regulatories regarding visitors. Next to that a limited time schedule made it impossible to realize a field investigation effectively, because we only stayed half a day.

The exploration of the Hsinchu Science Park turned out thus to be a theoretical one at the parks administrative building. At the administrative building lectures were held about the Hsinchu Science Park, regarding its development and visions. Additionally maps and models of the area gave an overview of the different parts. Especially the importance of Hsinchu Science Park for the transformation of Taiwanese industry was illustrated. During the different presentations many of the lead questions could be answered. However the practical experience was diminished to a bus drive through the Hsinchu Science Park. At least this gave an impression of the production sites within the area.

Conclusion

During the last three decades the economic profile of Taiwan has undergone drastic transformations. Although industrial production was the keystone of Taiwan's development, the focus has shifted to more specialised industries. The establishment of Science Parks such as the Hsinchu Science Park has played a crucial role. Capital- and Knowledge-intensive industries such as the in the area of Personal Computers have become the target of development. However not only have the sorts of industries changed, but as well the position of Taiwanese companies in Global Commodity Chains altered.

In the 1980's Taiwan was a low labour cost country and labour-intensive productions were outsourced by "Western" brand name companies to Taiwan. The process of subcontracting of Taiwanese firms turned out to be the starting point to integration in the world market. Production networks were established, in which the policy of the Taiwanese government influenced the creation of SME's mainly. These SME's specialised on specific segments of production and thus whilst working together, created networks. The small size of the Taiwanese companies provided no threat to the subcontracting brand name firms, so these were willing to transfer technology and knowledge. Specialisation and gaining know-how enhanced the capabilities of Taiwanese companies. Thus not only the value added by Taiwanese companies was increased, but as well an upgrade in their function within the global commodity chain was made. Examples are the shift of Taiwanese firms being responsible for design in the ODM- model and the outsourcing of the labour-intensive production processes to mainland China. Furthermore, the intertwined connections in global commodity chains of Taiwanese companies have allowed these to gain knowledge of the final market and thus having strategic knowledge.

Science Parks have helped to establish these global networks and have increased the rate of economic development in Taiwan. Providing the space of industrial clustering, these Science Parks offer advantages regarding innovations. On the one hand through a spatial proximity of related industries, thus creating the possibility of face-to-face communication and on the other hand innovations are enhanced through the different forms of connections between academic institutes and the industrial companies, enhancing the capabilities in the area of Research and Development. The Hsinchu Science Park is hereby not only the most important one in Taiwan, but is as well regarded as one of the most influential ones worldwide (ISC 2004).

The Hsinchu Science Park is one location, where the transformation of Taiwan's economy can be seen. Although the practical part of the field trip could not be realised, the aim of understanding these changes was achieved and the lead questions for the field day could be answered. With various lectures held in the park's administrative building, the industrial transformation of Taiwan could be illustrated and documented. Furthermore, the brief insight in the Hsinchu Science Park made the modernity of parts of Taiwan's economy visible. Taiwan no more is a labour-intensive production site, but a country, in which the companies are specialised in knowledge-intensive, high-tech-industries.

References

Chang, Su-Li, Hu, Tai-shan and Lin, Chien-yuan (2005): Role of Interaction between Technological Communities and Industrial Clustering in Innovative Activity: The Case of Hsinchu District, Taiwan. In: Urban Studies, Vol. 42, No. 7, 1139-1160

Chen, Shan-Yu, Yu, Fu-Lai and Yan, Ho-Don (2006): Adaptive Entrepreneurship and Taiwan's Economic Dynamics

Chen, Tain-Jy and Ku, Ying-Hua (2002): The Development of Taiwan's personal Computer Industry. In: The International Centre for the Study of East Asian Development: Working Paper Series, Vol. 15

Chou, Tsu Lung and Lin, Yu Chun (2007): Industrial Park Development across the Taiwan Strait. In: Urban Studies, Vol. 44, No. 8, 1405-1425

Gereffi, Gary and Korzeniewicz, Miguel (1994): Commodity Chains and Global Capitalism.

Hsinchu Science Park Annual Report 2007

Hopkins, Terence and Wallerstein, Immanuel (1986): Commodity Chains in the World-Economy Prior to 1800. In: Review, Vol. 10, No.1, 157-170

Internet Sources

ISC (2004): available on: http://data.isc.hbs.edu/cp/getProfile?profile=Clusterprofile_0516.pdf, 27.02.2009

Ministry of Economic Affairs: available on: http://hirecruit.nat.gov.tw/english/html/message_dis.asp?page_no=08_01, 12.03.2009, http://wwww.sipa.gov.tw, 22.03.2009

Wang, Jenn-hwan (2003): The Making of Unknown Heroes: National System of Learning, OEM, Taiwan's IT Industry (draft only)

7

Taiwan's Transportation System - A Short Overview

by Ivo Garloff, Hamburg

Introduction

The topic of this paper is the development of Taiwan's transportation system, including a short introduction to the main goals and achievements of transportation in general and the meaning of transportation for a state and it is economy. In the first chapter the topography is described one of the main causes of problems while planning and building transportation-infrastructure. After this a quick overview over Taiwan's population development, because a growing population has growing needs in transportation and the available space must be shared between the different forms of land usages, such as settlements and transportation infrastructure (roads, rails, airports and the needed infrastructure for maritime traffic, harbours). The second chapter will deal with the topic of road transportation. This is the most important transportation mode nowadays and the history of it is development in Taiwan will be shown there. The third chapter will deal with the development of the Railway system as the second biggest transportation mode, while the fourth chapter's topic is the aviation. This should give the chance to give a complete overview of the development of Taiwan's transportation system, even without mentioning the harbours , which are not as important to the inland transport in Taiwan (no inland waterways like rivers or canals on which passenger or freight transportation would be possible). Dealing with the harbours would go far beyond the scope of this paper.

Transportation is the indicator of a working economy. Transportation development is often equalised to economical achievement (e.g. the comparison of highway traffic and the GDP in Freie und Hansestadt Hamburg 2000:5). In a modern society transportation should take an important role in government planning and the development of a well organised and effective transportation system should be one of the main goals of every country.

Without a working transportation system a modern economy can not be listed under the top economies of the world. Every economy was always linked to it is trading and trading is always linked in negotiating distances. Perishable gods (fish, fruits, in general: food) need a fast transport when they need to be transferred over long distances, in modern "just-in-time"-production nearly no factory would be able to work without a perfect transportation system. But even the tourism sector would be in trouble when nobody would take the trip to it is sites. And how should resources raised if it were impossible to get to the mines or oilfields? The question is: how is transportation differentiated? It should be divided in traffic by feet and bicycle, in motorised individual transport (with cars, trucks, motorbikes), in public transport and in sea shipping (or even other ways of shipping e.g. with a river ferry or with river boats). Also very important is aviation and rail transport, which can not be simply put in the upper categories. In this paper the differentiation will done between road, rail and air transport. In this way the development of a transportation system is easy to show.

Topography

One of the main challenges of transport planning is always the topography of a country. On flat lands with no physical limits to infrastructure building it is no big problem to introduce a nearly perfect transportation system, but in reality, with mountain ranges, swamps, rivers or

deep valleys it is not that easy. Infrastructure also always needs space. If you do not have the space, when it is limited by other space-needing factors like settlements, industrial production and agriculture or by topographic disadvantages (mountains, sea, …), the planning is much more time consuming and more expensive.

There are some disadvantages Taiwan has for transportation planning. First, around 60% of the Taiwanese area, which is about 36.000 km², is mountainous regions (Council for Economic Planning and Development 2008, p.23). The main chain of mountains runs from the far north to the extreme south and reaches heights from over 3.000m, while the highest peak, Yu Shan, is nearly 4.000m high. This fact made the building of transportation infrastructure in Taiwan always a difficult topic.

Population

An important element for transportation planning is the population development of a country. More inhabitants mean more traffic and more traffic participants and the development of the population number must be considered for the future needs of transportation infrastructure.

Taiwan's population development is nearly stagnating at the moment (Figure 16). After the forces of Chiang Kai-shek retreated from the main land to the island in December 1949 and the quick rising of over 2 million people in this year, the population was still fast rising. There were growth rates of close to 4% in the 1950s.

The growth rate fell in the following years. In 1960 it was 3.5%, in 1965 3.0 and in 1970 2.4%. This loss of growth rate by 0.1% a year was a trend until 1985, after this year the changes were not that intense anymore. Today the growth rate fell to 0.3% (in 2007) and in the future years there will be a total stagnation or even a negative growth rate, like in many industrial countries these years (Council for Economic Planning and Development 2008: 24).

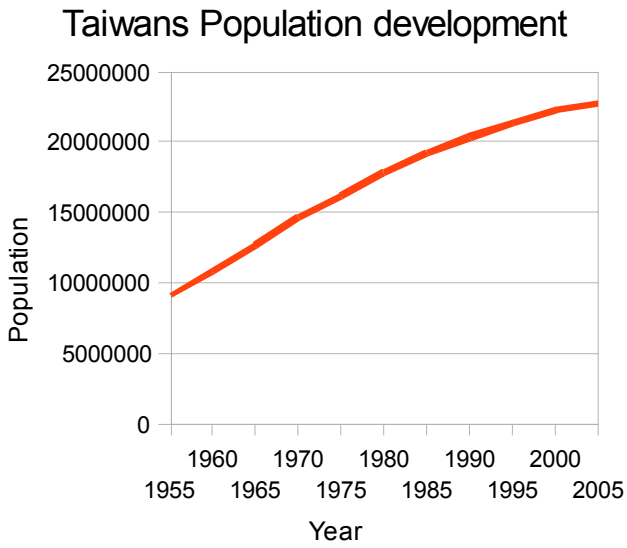


Figure 16: The development of Taiwan's Population from 1955 to 2005
Source: Council for Economic Planning and Development 2008

The intense population changes in the past 60 years were a big challenge for building infrastructure. Intense Infrastructure projects were managed and a changing modal split, first just from railroad and bicycles over the domination of scooters to today's high numbers of cars, was always the biggest challenge in transportation.

Road Transportation

Road transportation is the most important transportation mode. On the roads the main traffic takes place, not only meaning cars and trucks, but also bicycles and even pedestrians. First of all this chapter will be dealing with the highway and road development from the 1950s until today. Next, there will be a short view on the numbers of motor vehicles and in the end some important facts and figures.

Highway and road development

The first big road systems in Taiwan were built under the Japanese government, after the occupation in 1895. The main Japanese interest in the island was about the agricultural potential. Mainly the production of rice rose intensively in the years from 1895 to 1945, in the time between 1900 and 1938, for example, by 450 percent (Martellaro 1996:358). The Japanese Empire was also interested in other agricultural products like bananas, pineapples, sugar cane and tea, which all were exported to Japan. To get this output a well build transportation system was needed. So, the Japanese built, beside the railroad system, about 4800 km of highways and roads to get the agricultural products to the harbours. About one-third of these roads were highways, the rest were country and village roads, paved as well as unpaved. Most of these unpaved village and country roads were built by the villagers themselves to link their village to already established roadways, so not all these roads were build under the command of the Japanese Government (Martellaro 1996:360f.). After the arrival of the 2 million mainlanders in 1949 the big development in establishing an adequate network of roads took place. Before there were two unlinked networks in the east and in the west of the island, nearly complete divided by the main mountain range, and in the time between the 1950s and the 1080s the two linking highways, the central and the southern Cross-island Expressways, were built under big efforts. During that time the total highway system was divided in three different categories: rural, district and provincial roads all supervised by the Taiwan Highway Bureau (THB). In the mid-1960s just one-fifth of the highways were paved (Martello 1996:361ff.) but the total length of highways was rising, due to the building activities. Especially the total length of provincial highways nearly doubled in the time from 1950 to 1970 (Council for Economic Planning and Development 2008:131).

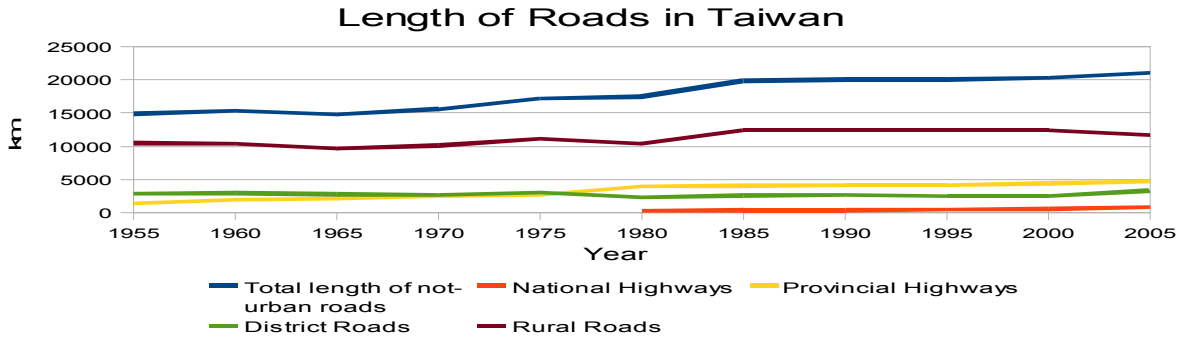


Figure 17: Length of roads in Taiwan
Source: Council for Economic Planning and Development 2008:131

In the 1970s the growing economy placed bigger demands on the transportation system. Exports became a more and more important meaning for Taiwanese manufacturers and the population had a higher need for transportation. This progress for economic changes is shown in the expansion of paved roads (between 1970 and 1980 by over 50% or more than

5.000km) and in the number of registered vehicles (see chapter Motorization). In the time between 1970 and 1980 the total road length raised by nearly 2.000km, all types of routes were build in these years (Council for Economic Planning and Development 2008:131), the whole highway system got improved and expanded. The total length of gravel and dirt roads fell in that time from about 9.000km to about 5.100km. This shows that gravel and dirt roads in this time became paved, in addition to road building (Martellaro 1996:369).

The development in the 1980s was mainly caused by the prospering economy. The growth got a rapid speed, bringing with it the needs of more and better roads and highways. Over 2.400km of highways and roads were built in that time, mainly between 1980 and 1985. Also the road paving was brought on, in 1980 around 70% of all roads were paved, in 1990 this number had increased to around 85%. Taiwan's highway system became one of the best in Asia in this time, mainly by the increase of the new national highways and the modernisation of the roads (Martellaro 1996:372ff.).

Nowadays Taiwan has about 21.000km of highways and roads. About 1.000km are national highways, 5.000km are provincial highways and 3.360km are district roads. The remaining more than 11.000km are rural roads. Today's network of the most important highways is shown in Figure 18.

Figure 18: Taiwan Highway Network;
Source: http://www.gio.gov.tw/taiwan-ebsite/5gp/yearbook/2004/P213.htm

Motorisation

Very important for the development of Taiwan's transportation infrastructure is the development in motorisation (Figure 19).

In the figure is shown that the fast rising number of motor vehicles began in the 1960s. First, nearly only motorcycles were used, the time of cars began in the 1970s. This was caused by the beginning economic wealth of the population and the economic changes. From the 1980s more and more private cars were registered, but it is numbers could not reach the numbers of motorcycles, which even today are 2.5 times higher than the numbers of cars.

This intense uprising of motor vehicles in Taiwan did bring some major problems to infrastructure development. While the length of non-urban roads just raise from 1955 to 2005 by less than 50% the numbers of motor vehicles exploded. Traffic problems could just be solved by big modernisation measures (like paving the streets, see chapter Highway and Road Development) and improving the highway network.

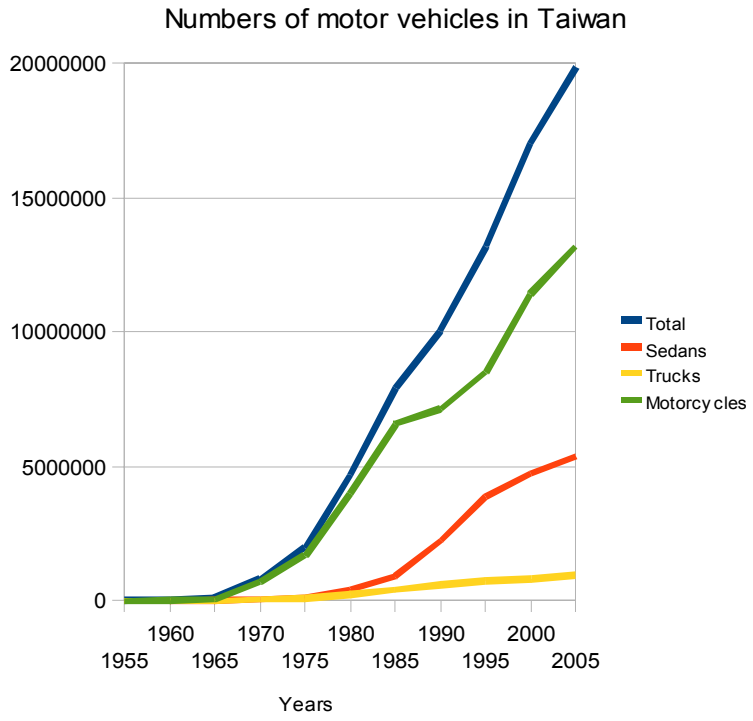


Figure 19: Numbers of motor vehicles in Taiwan
Source: Council of Economic Planning and Development 2008:132

Rail Transportation

The second very important modes in land transportation beside the Road Transportation are the Railroads. First tracks on Taiwan were built under Japanese Government, about 960km of rails until 1945. A main line from Keelung to Kaohsiung connected the main ports on the west coast. On the east coast Hualien and Taichung were linked by 175km of rails. These two rail networks (west and east) were not linked in this time, the railway was only used for transporting agricultural products to the harbours (Martellaro 1996:361).

After 1949 the railroad system was placed under the authority of the Taiwan Railway Administration (TRA). The (from the Japanese inherited) system was improved but no major changes in the route length were made (Figure 20). At the beginning of the 1950s rail

transportation was the only affordable way to travel long distances for most of the Taiwanese population, main long distance traffic was by railway because motor vehicles were not common. Roadways were not a competitor to the railway system in that time. With the uprising of road traffic the railway lost some of it's meaning, between the years 1953 and 1966 the total number of passengers (a year) went up from 84 millions to 139 millions, while the passengers in motor vehicles gained more than 300% (107 to 438 millions) (Martellaro 1996:364f.). In the 1970's the growing popularity of air-travel brought another competitor to the railway. The passenger numbers declined to 128 millions in 1979.

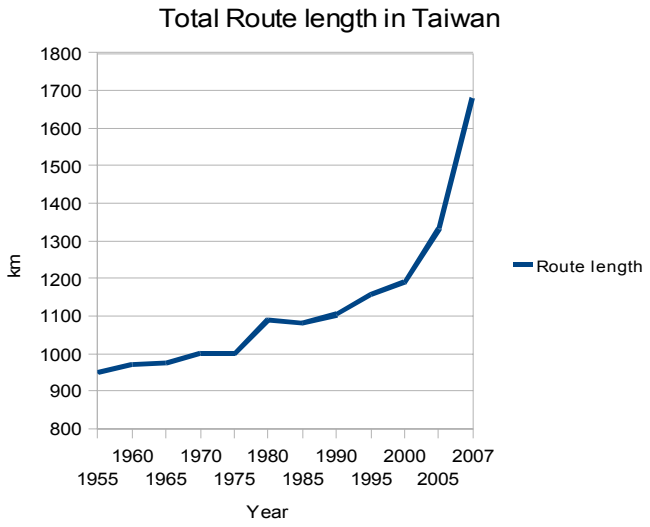


Figure 20: Total route length in Taiwan
Source: Council for Economic Planning and Development 2008:130

Even with a look on the passenger-kilometres (Figure 21) one could see after a straight increase until the mid-1970s took place. From 1970 to the mid-1990s there were nearly no changes in the numbers. In 1996 the Taipei Rapid Transit system began to operate for the first time, a major advancement in Taiwan's transportation system. Starting with just about 11km of track length in the first year (very small change in the total route length) the Metro had a heavy influence on Taipei's traffic. In the following years more and more lines in the Metro-Network were built, influencing the total amount of passenger-kilometre (Figure 21). The next big step for the railway system was the initiation of the High Speed Rail (HSR) in 2007. The great changes in route length (Figure 20) were caused by the 335km of high speed rails from Taipei to Kaoshiung, (also the increase in Figure 21, between 2005 and 2007), the new build Metro in Kaoshiung with it's, in comparison, short track length influences the figure not that strong.

With these two new systems the TRA closed open holes in their service in the past years. Now there is the chance to deal with road traffic problems by changing the modal-split in urban and long-distance traffic, to the advantage of the whole railway system.

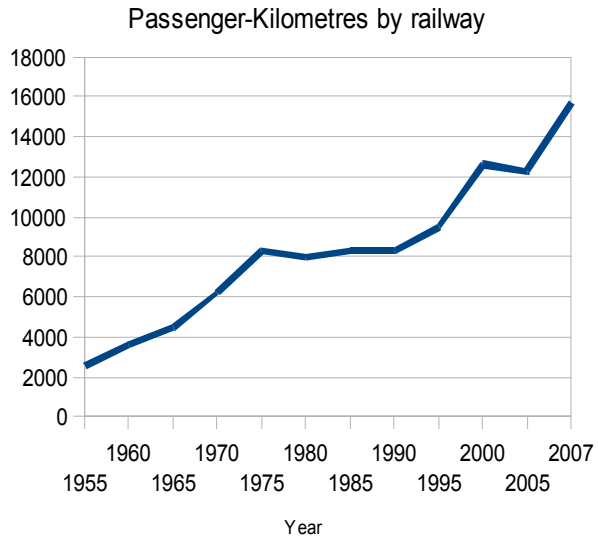


Figure 21: Passenger-Kilometres by railway in Taiwan
Source: Council for Economic Planning and Development 2008:134

Aviation

Aviation plays an important role in modern transportation. Aviation became important to Taiwan's transportation in the 1960s, having two non-military Airports (Taipei and Hualien) in the 1970s. These two airports were placed under the Civil-Aeronautics Administration (CAA).

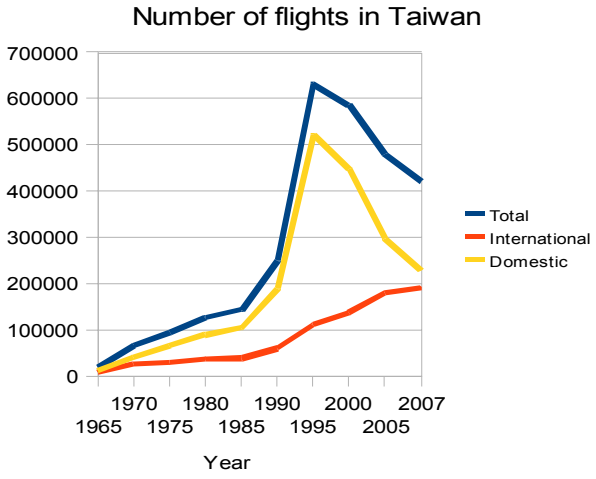


Figure 22: Total flights in Taiwan
Source: Council for Economic Planning and Development 2008:135

Many other airports in Taiwan are owned and operated by the nation's airforce and are also available for civil aviation. In the 1970s the international airport Taiwan Taoyuan was build, giving Taiwan a modern and important airfield for international aviation.

The development of the aviation should be divided in two different categories first the international flights and second the domestic flights. International flights have a main importance to an island country like Taiwan. Aeroplanes are, beside ships, which become less and less important, the only carriers which relate the country to the rest of the world. The domestic flights were the fastest link in Taiwan between the north and the south coast,

so the numbers of domestic flights increased faster and were higher than the numbers of international flights (Figure 22). From the 1990s the number of domestic flights got higher and higher while the increase of international flights was not that fast. This is because of the planes used on short distances are smaller (compare to Figure 23) as well as a growing importance of air travel to the national economy of Taiwan. In the mid 1990s the numbers of domestic flights fell intensively, with a better highway system this expensive way in travelling became less important.

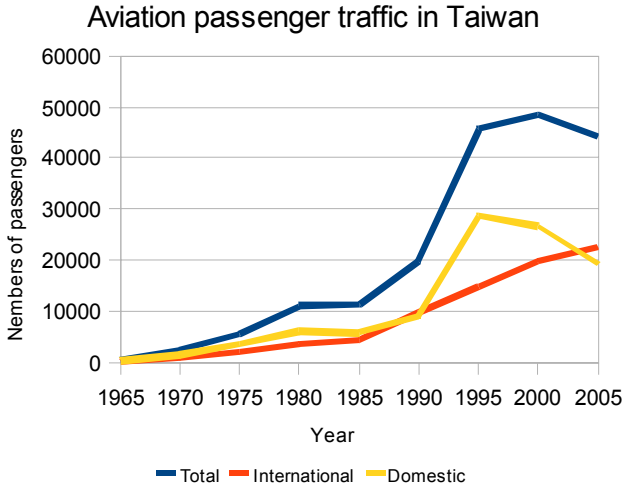


Figure 23: Total numbers of aircraft passengers in Taiwan
Source: Council for Economic Planning and Development 2008:135

The total number of passengers is shown in Figure 23. There one can see the clear trend of comparably rising passenger numbers on international as well as on domestic flights. In the beginning 1990s the domestic aviation had a quite important rule, today the numbers of international passengers are higher because of the decrease of domestic passengers. Short way flying is not attractive to travellers any more, the time savings are getting smaller because of the effective and fast road and rail connections. With the invention of the HSR the longest possible distance in Taiwan is now faster done by rail then by plane.

Conclusion

Based on the transportation system build under Japanese Government today's road, rail and aviation system is one of the most modern in Asia. The dramatic economy growth in the past 40 years was a big challenge for transport planning especially the extreme increase in numbers of private automobiles has outpaced road development, a problem which is common in many industrial countries. The railroad system is nowadays adequate to Taiwan's needs, with the HSR and the fast growing Taipei Metro Taiwan is ready for future developments and changes. Many other developed countries (especially in Europe) have a much longer transportation history but Taiwan takes advantages from their experiences and builds a highly effective transportation system.

References

Council for Economic Planning and Development (2008): Taiwan Statistical Data Book. Yuan
Freie und Hansestadt Hamburg (2000): Verkehrsentwicklungsplanung Hamburg
Martellaro, Joseph A. (1996): The development of Taiwan's Transportation system. In: International journal of transport economies, Volume 23, Book 3:357–378. Pisa

8

Taiwan: A Geological Overview

by Maren Horn, Hamburg

Introduction

The field trip to Taiwan in September 2008 was mostly led by political, economical and cultural geographic topics, for example city development, agriculture and religion. Physical geographic topics were less objects to our interest, nevertheless one could hardly avoid to deal with it. Most of the distance was done by bus, through impressive landscape especially in central Taiwan and the eastern coast. During our stay we visited sites which where strongly damaged by earthquakes and experienced two small earthquakes. Taiwan's formation was due to the strong geological activity which is still ongoing. Therefore, some typical natural resources like marble and limestone can be found and are exploited in Taiwan. A famous marble area is situated on the east coast of the island, where the field trip led us to Tarokko National Park. Unfortunately the short stay in Taiwan didn't allow us to deal more with the exploitation of natural resources such as marble. The march through the Tarokko gorge showed us the impressive forces of geological activity as marble rock was lifted some hundred meters MSL. To understand Taiwan's landscape, appearance of natural resources and natural hazards such as earthquakes the following text gives an overview of Taiwan's geology.

Overview of Geographical Frames and Geological Setting of the Main Island

The main island of Taiwan is located between 120° - 122° of longitude and 21°- 25° of northern latitude. About 80% of the main island's area of 35.899 km² is mountainous. Higher areas are located in the center with elevations up to 4000 m above mean sea level (MSL). Towards the west coast elevations are getting smoother, the majority of the area lies between 0 and 250 m MSL as it can be seen on the topographic map of Taiwan and towards the east of Taiwan a longitudinal valley splits a smaller coastal range from the central mountain (Figure 24). The topographical setting gives an impression of the geological background of the island. The central, mountainous part of the island was lifted up; where as the flat west coast consists mostly of sediment layers. The satellite imagery emphasizes again the rift system[12] of the east coast. The longitudinal valley forebodes that two different geological plates encounter in this area (compare Figure 25).

[12] A rift system is a geological depression zone due to a fault system or plate tectonic in the vicinity of the area. Great rift systems are for example the East African Rift and the Red Sea Rift, smaller are the Rhine Rift and the Oslo Graben.

Figure 24: Topographic map of Taiwan
Source: UNHCR, Global Insight digital mapping 1998

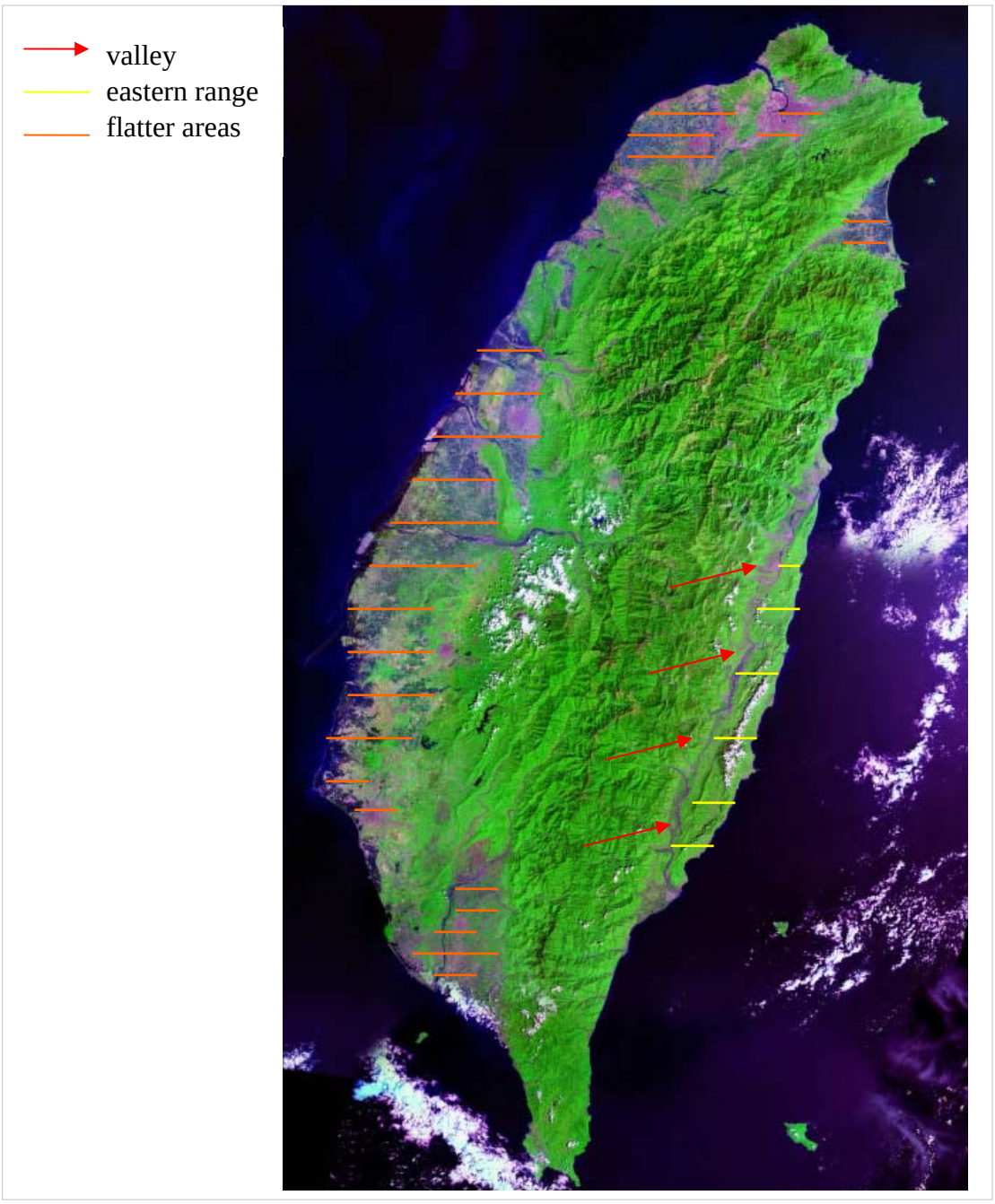


Figure 25: Satellite image of Taiwan
Source: Geology.com 2006

According to its geology, Taiwan can be divided into five major physiographic regions (Figure 26). There are the Western Coastal Plain, the Western Foothills, the Hsuehshan and Backbone Ranges, the Tanano Basement Complex and the Eastern Coastal Range. The East longitudinal valley divides the Central Range from the Coastal Range, and Taiwan in two bigger tectonic provinces. The western province belongs to the Eurasian continental shelf, the Eastern Coastal Range to the Philippine Ocean Plate. The very south of the main-island, the Hengchun peninsula and the southern Central Range, represent the northern extension of the accretionary terrain which results from the subduction of the Eurasian below the Philippine plate (Klose 2007). Details of the chronological evolution of the different strata are also charted in the geological map, Figure 26. The younger strata are the alluvial plains,

foothills and terraces in the western part of the island. The central mountain ranges are mostly Oligoscene and Mioscene. The eastern region is divided into a younger part: the Eastern Coastal Range with Pleistoscene conglomerate and volcaniclastic sediments which are neighboured to magic igneous rock (dated unknown). To the west of the longitudinal valley lies a late Paloeozoic to Mesozoic schist and metamorphosed limestone, also known as the marble belt.

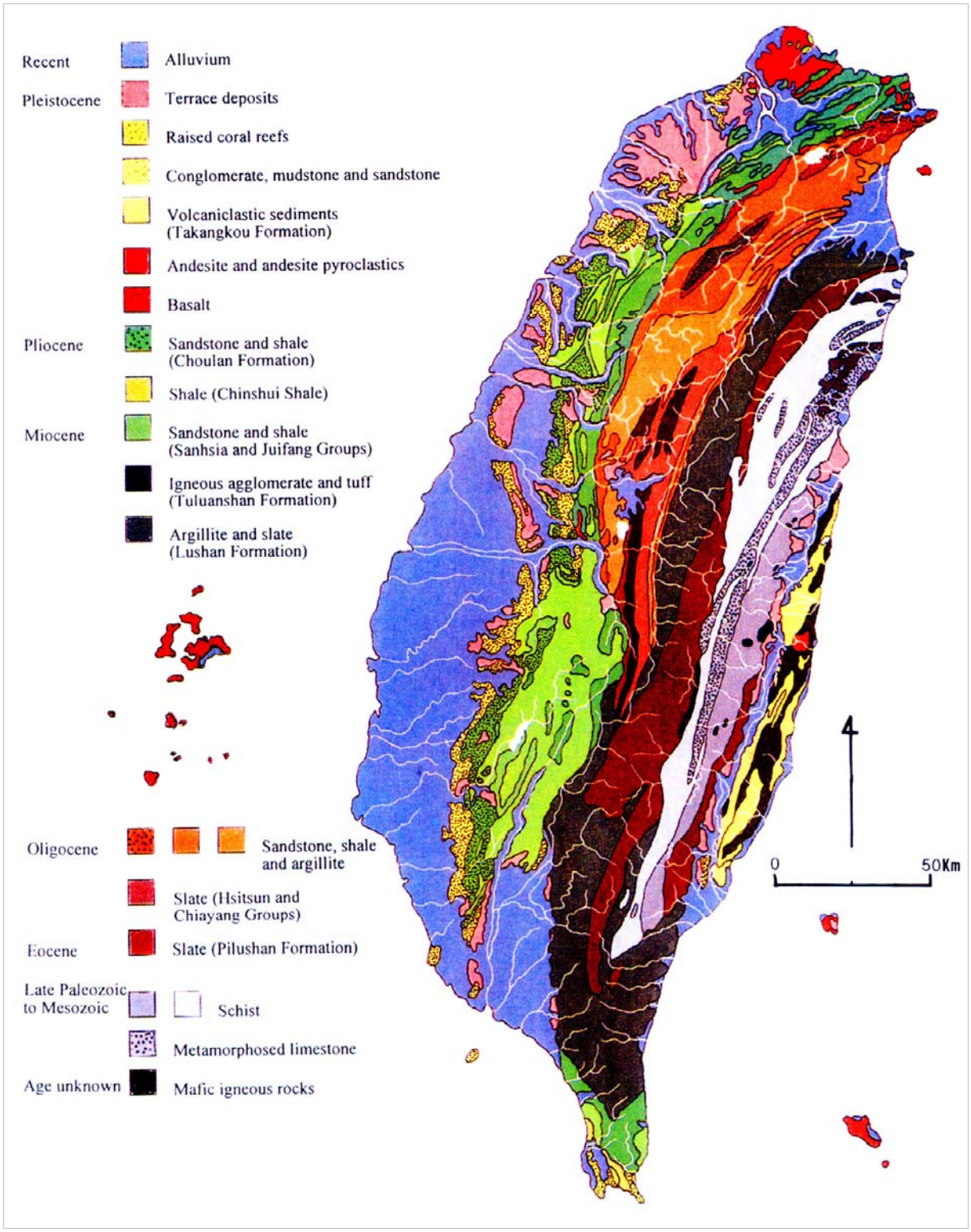


Figure 26: Geologic map of Taiwan, redrawn from Ho 1986

It is striking that major rock formations of Taiwan are shaped as long narrow belts roughly parallel to the long axis of the island. The rock belts (except the younger alluvial plains) are becoming younger from the west towards the east of Taiwan. These matters are due to the geographical exposure of Taiwan and to the very special geological setting: Three active plates encounter at the eastern borderline of Taiwan. Taiwan therefore lies in between a very unstable region (cf. Central Geological Survey, MOEA). The constant plate movements are still shaping the region. The extensions in the lithosphere due to the plate tectonics are released in severe earth quakes. Examples of the natural hazards are given in the vicinity of Taiwan.

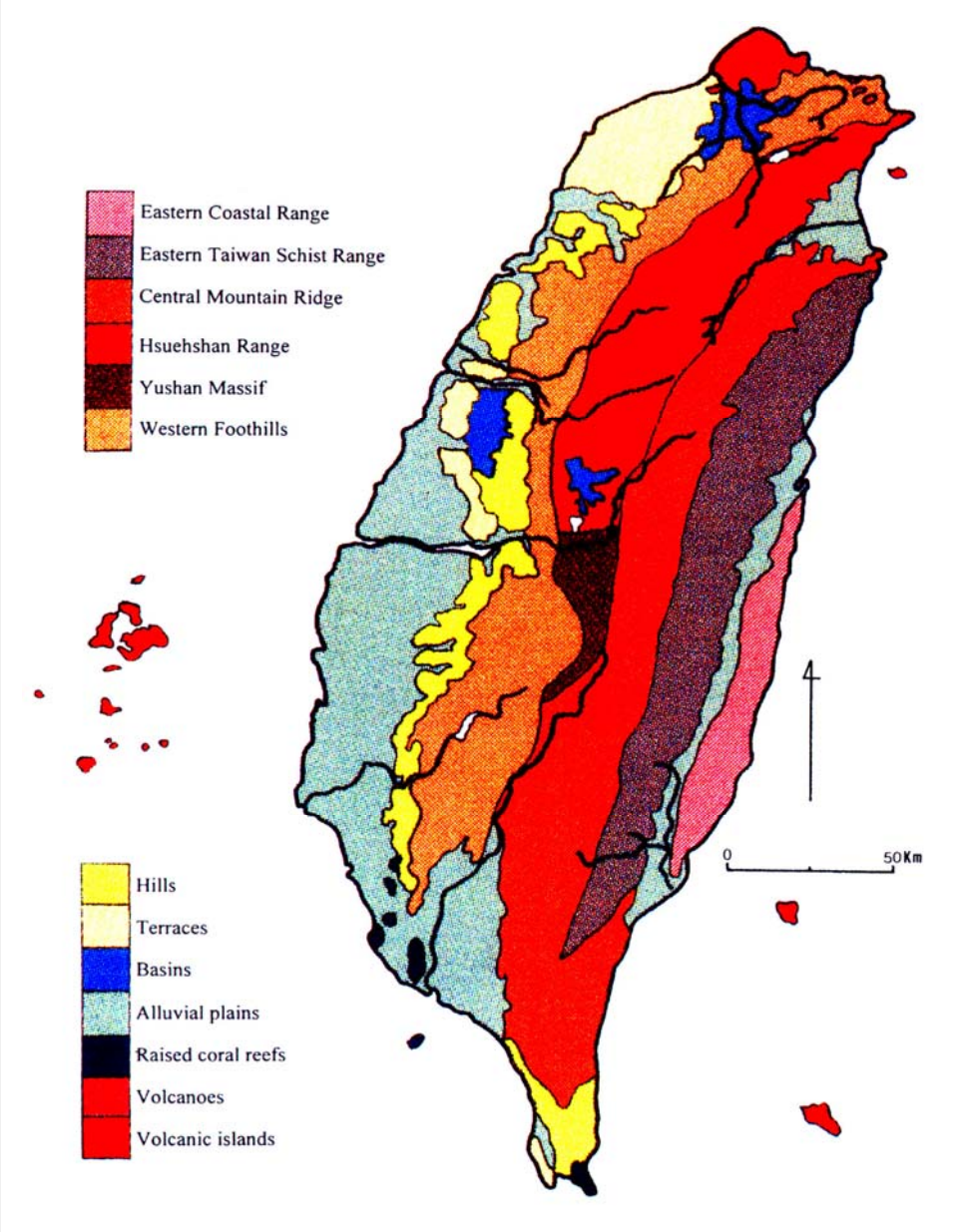


Figure 27: Major physiographic regions of Taiwan's main island, redrawn from Lin 1959

Tectonic Settings of Taiwan

The island has originated due to the active subduction of the Asian plate through the Philippine Sea plate (blue arrow in Figure 28). The subducting process compresses and lifts partly the border of the Philippine Sea plate and shapes the relief of the Eastern Coastal Range. The mentioned longitudinal valley designates the border of the Eurasian plate and the subduction area. It can be regarded as the forarc-basin of Eastern Coastal Range. Incidentally, the build-up of the major mountain ranges is showing the accumulation of several imbricated passive margin wedges (red labelled in Figure 28). The issue of the activity of thrust fault system can be seen through the volcanic and metamorphic rock formations throughout the main part of the island.

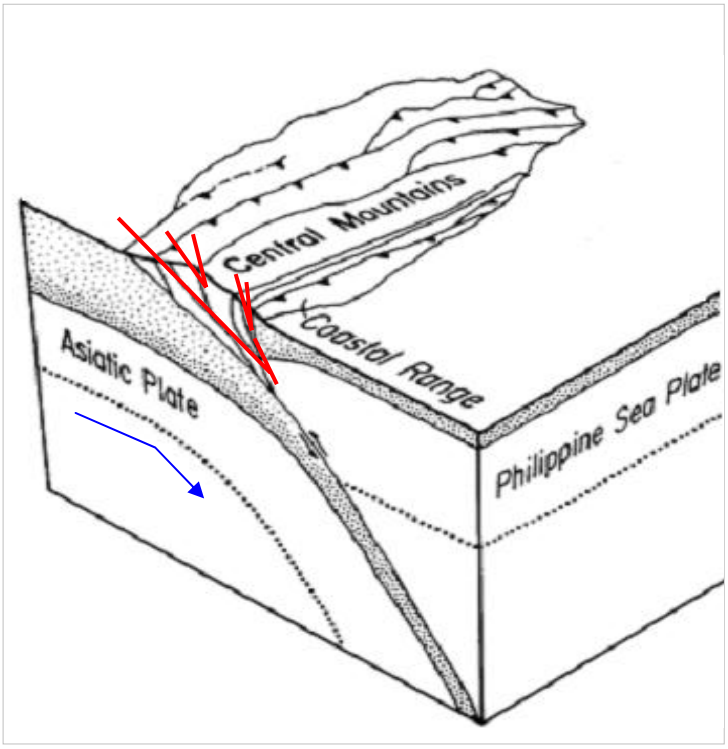


Figure 28: Subduction of the Asiatic plate through the Philippine sea plate
Source: (Liou and Hsiao 1999)

The northern part of Taiwan's main island is geologically concerned by another direction of plate movement. The Philippine Sea plate is at the same time obducting the Asian plate and subducting itself by descending obliquely beneath the Ryukyu island arc to the north-east of Taiwan's main island. The blue arrow in Figure 29 shows the second movement of the Philippine Sea plate, the oblique subduction beneath the Ryukyu trench.

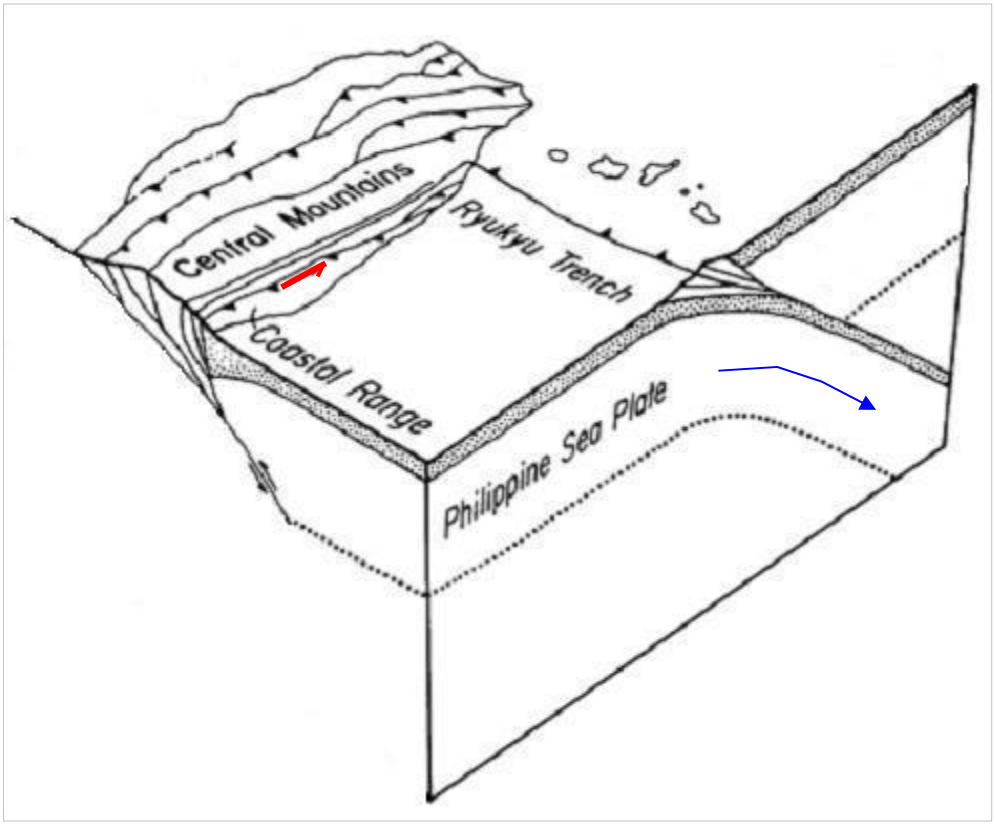


Figure 29: Subduction of the Philippine Sea plate beneath Ryukyu trench
Source: (Liou and Hsiao 1999)

Because of the oblique convergence of the Philippine Sea plate to the north of Taiwan, the main fold-and-thrust belt (red labelled in Figure 29) is subjected to crustal stretching and rifting due to the flip of subduction of the Philippine Sea plate (Teng 1996). The Pleistocene Tatun volcanic group in the very north of Taiwan manifests the subducting activity of the Philippine Sea plate. Figure 29 shows also five islands off northeast Taiwan: Pengchiahsu, Mienhuahsu, Huapinghsu, Chilungtao and Kueishantao. These islands are all of volcanic origin and are ascribed to the same volcanic belt and stage as the Tatun volcanic group. They represent the western end of the Ryukyu volcanic arc (Central Geological Survey, MOEA).

To sum up, concurrently the Philippine Sea plate overrides the Asian Plate along the Manila trench to the south and is being subducted to the north-east of Taiwan. Figure 30 shows the complex movement of the plates at the border of Taiwan's main island.

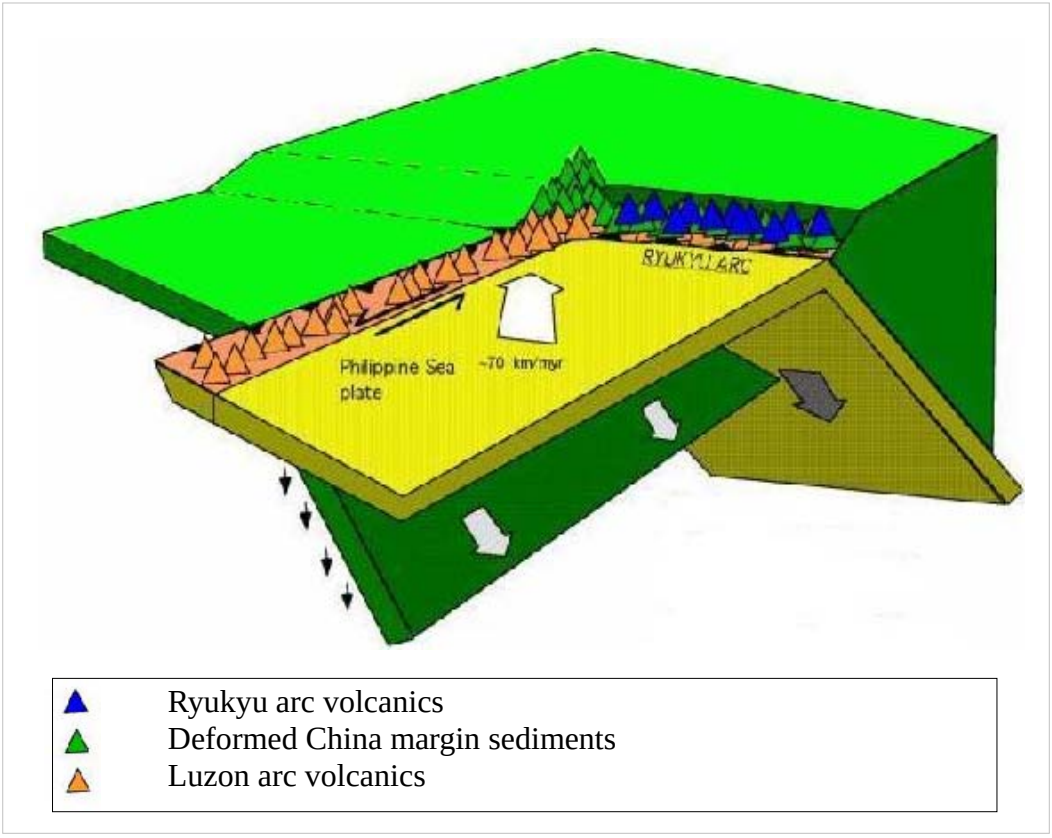


Figure 30: Plate tectonics to the east and north-east of Taiwan,
Source: Modified after Clift et al. 2003

Along the strike-slip fault (Figure 30: orange triangles) a left-lateral slip has taken place since the Pliocene (Tsai 1978). Relative to the Asiatic plate, the Manila trench is moving westward with time, where as the Philippine trench appears to be propagating northward. Its present convergence rate is estimated between three and seven centimetres per year in NW-SE direction (Lewis and Hayes 1983).

The on-going oblique collision of the Luzon volcanic arc with the Asian continent in the vicinity of Taiwan lasts about four million years. The two well-defined subduction systems of opposite polarity have big impacts on the region. Crustal indentation, seismicity, folding and thrusting are reflecting the ongoing strong activity of plate tectonics. This seismic unstable region is a part of the circum pacific seismic belt, labelled in grey in Figure 31 (Liou and Hsiao 1999).

Figure 31 gives an overview of the regional plate tectonics between the different plates and their moving direction; see blue labels for relative direction.

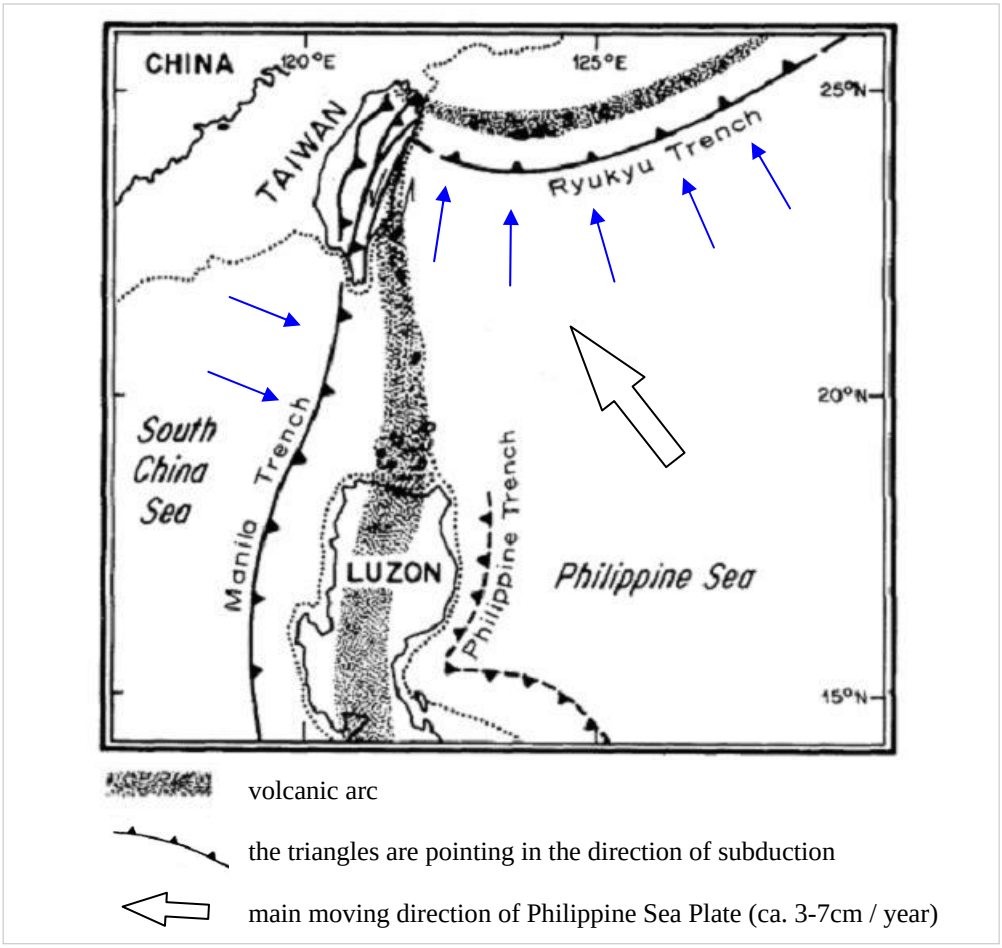


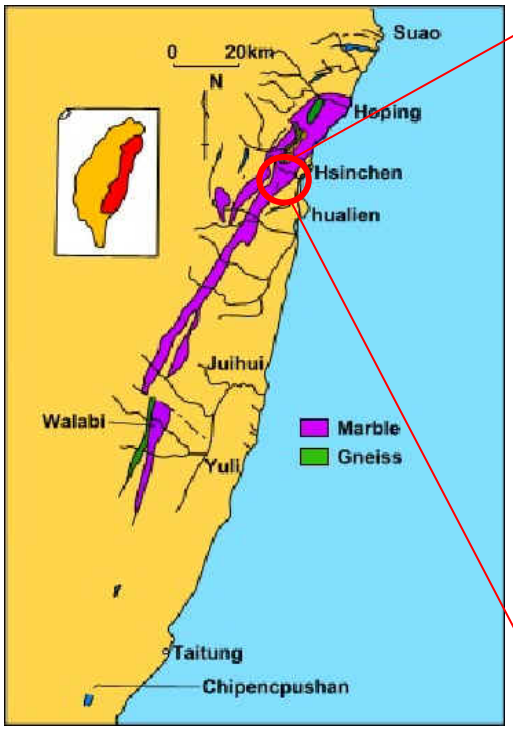
Figure 31: Overview of plate movement in the vicinity of Taiwan
Source: Modified after Ernst et al. 1985

Marble Belt

The tectonic setting led to a marble belt in the pre-Tertiary Tananao schist of eastern Taiwan (Figure 32). The belt stretches from Suao in the north to Taitung in the south. Marble is beside limestone one of the most important natural resources of Taiwan. This longitudinal belt constitutes the most important marble resource in Taiwan. The sizable reserves of marble are estimated at 300 billion tons (JGCHINA 1999).

The marble results from the metamorphism of limestone composed mostly of calcite (a crystalline form of calcium carbonate, $CaCO_3$). Conditions producing widespread regionally metamorphosed rocks are given especially on the east coast of Taiwan, where orogenic events are ongoing. The collision of Luzon volcanic arc with continental Asian plate produces extreme compressional forces required for the metamorphic changes. During the process of subsidence sedimented limestone gets under increasing pressure and temperature which causes a complete recrystallization of the original rock into an interlocking mosaic of calcite or aragonite. The purity of the crystallized marble depends on the purity of the originally limestone. Therefore marble shows a wide range of colors. White marble results from very pure limestone. A big variety of colors is due to various mineral impurities such as clay, silt, sand, iron oxides, or chert which were originally present as grains or layers in the limestone. Very common are green marbles resulting from originally high magnesium limestone (Vinx 2005). In the Taiwanese marble belt different types and

purity of marble can be found. The walk through the Tarokko National Park offered an impressive view on the uplifted marble, picture in Figure 32.



Tarokko Gorge [Tarokko National Park, source M. Horn]

Figure 32: Marble belt between Suao and Taitung, eastern Taiwan
Source: JGCHINA 1999

Nature Hazards due to Geological Activities

The Earthquake danger is omnipresent in Taiwan, as the island arose as a result of plate tectonics which is still continuing with “high speed” (convergence rate NW direction 7 cm/year). The opposite polarity of the plate-tectonics release tensions and forces which are propagating through the whole region. Figure 33 shows the distribution of the earthquakes in the region at the time of the Chi Chi earthquake 1999 (Liou and Hsiao 1999).

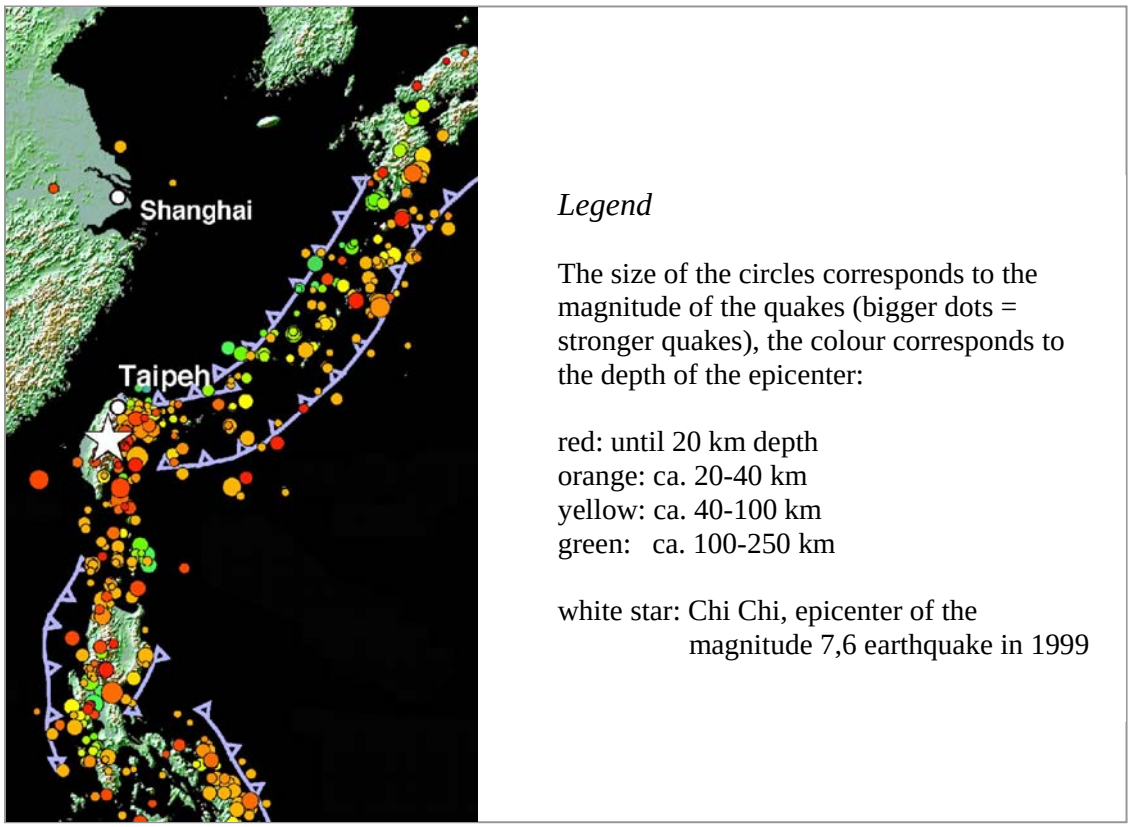


Figure 33: Earthquakes in vicinity of Taiwan at the time of the Chi Chi earthquake, modified after: GFZ Potsdam

Because of the length of the fracture zones (Luzon and Ryukyu volcanic arc) the earthquakes can also trigger tsunamis in the east and South China Sea as well as in the Philippine Sea. The following article shows the tsunami alert from Dec. 2006:

> "TAIPEI, Dec 26 2006 (Reuters) - Two major earthquakes struck southern Taiwan on Tuesday, triggering fears of destructive waves as Asia marked the second anniversary of the Indian Ocean tsunami. The quakes, also felt in Hong Kong and southern China […] the tsunami alert was soon lifted" (Youn 2006)

Even if the tectonic setting in the vicinity of Taiwan can trigger tsunamis, Taiwan itself is not in the direct route of tsunami waves.

Conclusion

Taiwan is situated in an area of high seismic activity. Its landscape, natural resources and natural hazards are directly linked with the geological setting of the region. In all three dynamic plates encounter in the vicinity of Taiwan and therefore are not only shaping the landscape but also influence human life. Even though natural heritage and resources can be exploited, Taiwanese have to deal with large scale natural disasters such as the Chi Chi earthquake in 1999.

References and Internet Sources

Central Geological Survey, MOEA: General Geology and Geologic Provinces of Taiwan.
url: http://www.moeacgs.gov.tw/english2/twgeol/twgeol_generalgeol.jsp.
state: 25.04.2008

Clift, P.D., Schouten, H., Draut, A.E. (2003): A general model of arc-continent collision and subduction polarity reversal from Taiwan and the Irish Caledonides. in Larter, R. and Leat, P., (Editors), Intra-Oceanic Subduction Systems; Tectonic and Magmatic Processes, Geological Society of London, special publication. in press.
url: http://images.google.de/imgres?imgurl=http://www.abdn.ac.uk/~wpg008/Taiwan.jpg&imgrefurl=http://www.abdn.ac.uk/~wpg008/connemara.html&h=453&w=702&sz=135&hl=de&start=1&um=1&tbnid=mh2kfNfuvpFWHM:&tbnh=90&tbnw=140&prev=/images%3Fq%3Dsubduction%2Bpolarity%2Breversal%2Btaiwan%26um%3D1%26hl%3Dde%26sa%3DN
state: 22.04.2008

Department of Mines, Ministry of Economic Affairs (2003): The Mineral Status of Taiwan
url: www.gemeed.cl/medios/pdf/taipeimexico.pdf
state: 06.04.2008

Ernst, W.G., Ho, C.S., Liou, J.G. (1985): Rifting, drifting and crustal accretion in the Taiwan sector of the Asian continental margin. In: Tectonostratigraphic Terranes of the Circum-Pacific Region - Circum Pacific Energy & Mineral Resource, Earth Sci. Series, No.1, 375-390.

Geology.com (2006): Satellite image of Taiwan
url: http://www.geology.com. state 01.02.2008

GFZ Potsdam: Distribution and strength of earthquakes
url: http://www.gfz-potsdam.de/news/foto/taiwan/tektonik.gif
state 06.02.2008

Hsieh, C.F. and Shen, C.F.: Introduction of the flora of Taiwan, 1: geography, geology, climate, and soils. Physiographical Regions of Taiwan
url: http://tai2.ntu.edu.tw/fot/V1/V1INTRO-s-p.pdf, state: 06.02.2008

Ho, C. S. (1986): An Introduction to the Geology of Taiwan: Explanatory text of the Geologic Map of Taiwan. - Central Geological Survey. Taipei, Taiwan, RO China. 192.

JGChina (1999): Marble belt – Taiwan
url:http://images.google.de/imgres?imgurl=http://jgchina.zsu.edu.cn/v11999/html/cqr/images3.jpg&imgrefurl=http://jgchina.zsu.edu.cn/v11999/html/cqr/cqr1.htm&h=534&w=364&sz=25&hl=de&start=1&um=1&tbnid=LS__Ajuxow9LkM:&tbnh=132&tbnw=90&prev=/images%3Fq%3Dtaiwan%2Bmarble%26um%3D1%26hl%3Dde%26sa%3DN, state: 02.04.2008

Klose, C. (2007): Rezente und vorzeitliche geomorphologische Formungs- und Prozessregionen und ihre klimatischen Rahmenbedingungen in den obersten Höhenstufen des Hochgebirges von Taiwan
url: http://www.diss.fu-berlin.de/2007/2/ , state: 18.04.2008

Lewis, S.D. and Hayes, D.E. (1983): The tectonics of northward propagating subduction along Eastern Luzon, Philippine Islands. In: Hayes, D.E. (ed.): The tectonic and geologic evolution of Southeast Asian Seas and Islands. AGU, Monograph 27:57-78. Washington

Lin, C.C. (1959): Geomorphology of Taiwan. In: WenSieng:424. Taiwan

Liou, J.G. and Hsiao, L.Y. (1999): REPORT on the Chi-Chi (Taiwan) Earthquake. Tectonic Setting and Regional Geology of Taiwan.
url: http://www.iris.washington.edu/news/events/taiwan/taiwan99reports/chi-chi4.html , state: 06.02.2008

Subduction polarity reversal / flip
url:http://images.google.de/imgres?imgurl=http://www.abdn.ac.uk/~wpg008/Taiwan.jpg&imgrefurl=http://www.abdn.ac.uk/~wpg008/connemara.html&h=453&w=702&sz=135&hl=de&start=1&um=1&tbnid=mh2kfNfuvpFWHM:&tbnh=90&tbnw=140&prev=/images%3Fq%3Dsubduction%2Bpolarity%2Breversal%2Btaiwan%26um%3D1%26hl%3Dde%26sa%3DN
state 19.04.2008

Teng, L. S. (1996): Extensional collapse of the northern Taiwan mountain belt. Geology 24:949-952

Tsai, Y.B. (1978): Plate subduction and the plio-pleistocene orgeny in Taiwan. Petroleum geology of Taiwan,15:1-10.

UNHCR, Global Insight digital mapping Europa Technologies Ltd. (1998): Topographic map of Taiwan

Vinx, R. (2005): Gesteinsbestimmung im Gelände. München: Elsevier GmbH

Youn, D.: Big quakes off Taiwan trigger tsunami alert. 26 Dec 2006 15:33:54 GMT
url: http://www.alertnet.org/thenews/newsdesk/SP117790.html, state: 18.04.2008

9

Remembering the Damages of a Natural Hazard – The 921 Earthquake

by Lisa Busch, Hamburg and Hunter Yen, Taipei

Introduction

The 921 Earthquake, also called Chi – Chi Earthquake, struck Taiwan at 1:47 a.m., local time on September 21st. 1999. Its epicentre was situated at latitude 23.8°N and longitude 120.8°E in a depth of 10 km. The earthquake had a magnitude of 7.6. (Risk Management Solutions 2000: 1) and was the most disturbing earthquake since 1935 – more than 2400 people were killed.

On September 4th. 2008 our student group made an empirical field study in Chi – Chi concerning the topic '921 Earthquake'. Even in 2008 there could still be seen damages on buildings in the region of Chi – Chi. Watching damaged houses, the damaged Wuchang palace and the damaged Shih – Kang dam, learning in the 921-Earthquake Museum of Taiwan and talking with affected peoples helped to understand and to keep in mind the strength of this earthquake.

During my researches and the empirical field study it became clearer and clearer that the 921 earthquake was one of those natural catastrophes which a country won't forget. But why is it so important to remember such an event? Wouldn't it be better to forget this terrible disaster instead of keeping it in mind?

Tectonic Setting of Taiwan

Taiwan is a country with a high rate of earthquakes, as the island is seismically very active. The Central Weather Bureau (CWB) registers approximately 15 000 seismic operations per year (http://www.cwb.gov.tw/eng/index.htm).

The island of Taiwan lies on a compressive tectonic border between the Eurasian Plate and the Philippine Sea Plate (Liou and Hsiao 1999). The present convergence rate of the Pacific Plate is about 10 cm/year in a WNW – direction, the convergence rate of the Philippine Sea Plate amounts to 7 cm/year in the same direction. The Philippine Plate is subducting under the Eurasian Plate beneath the Ryukyu island arc, north and east of Taiwan. South of Taiwan the Eurasian Plate is subducting under the Philippine Plate along the Manila trench. These two subduction systems have opposite polarity. Therefore, Taiwan is an unstable region with high seismic activity and active processes of faulting and compressions of the earth crust (Klose 2006:11 et seq.).

Most of the epicentres of earthquakes are situated in the eastern and southern part of the island (Klose 2006:14). The Chi – Chi Earthquake, with a magnitude of 7.6 and 1300 aftershocks, was the earthquake with the highest registered magnitude since 100 years – but it took place in Chi – Chi in the middle of the island.

The Chi – Chi earthquake can be associated with the Chelongpu and the Shuangtung faults (Liou and Hsiao 1999). As illustrated in Figure 34 both faults run parallel to each other through the region of Nantou. Near Fenyuan, the Shih – kang dam has been destroyed by the upheaval of some sections of soil.

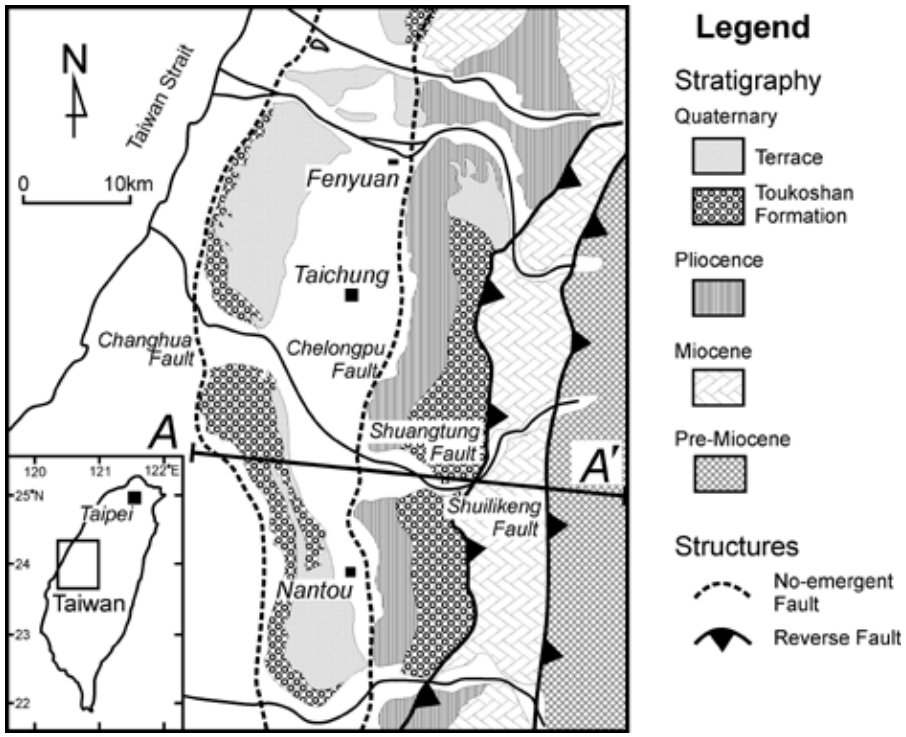


Figure 34: Schematic map showing the traces and general geology of the 921 Source: Earthquake region (modified after Ho 1986) (Liou and Hsiao 1999).

The hypocentre of the earthquake was located at a depth of 10 km, close to the Shuangtung fault near the spot where both faults cross (Liou and Hsiao 1999).

Damages and Losses of the 921 Earthquake

The Chi – Chi Earthquake caused heavy damages. 50652 homes were completely destroyed, another 53615 were seriously damaged. The earthquake caused 2455 death and 8000 injured people (Yao-chi 2005:8).

The economic losses added up to US $10 to 12 billion. The power outage cost another US $ 600 million (Risk Management Solutions 2000:2). The supply of electrical power, water and gas was interrupted for several days. Extensive switchyards and substations were damaged, such as high-voltage transmission towers. Telephone service was totally unavailable. Although two nuclear power plants in the north of Taiwan were not damaged, the transmission of electrical power to the south of the island was interrupted (According to EQE International 2002:6).

Landslides caused damages to piping of water, gas and the electricity supply system. The Hsinchu Science Based Industrial Park was hardly struck by the earthquake, although it is located 110 km from the epicentre. Most of the losses resulted from the loss of electrical

power. As 345 kV transmission towers and a switching station were damaged, the whole Science Park had no electrical power for several days. The interruption of business cost $50 million to $ 100 million per day (EQE International 2002:3).

Personal Experiences

On our trip through Taiwan we made several experiences concerning natural hazard, especially earthquakes. We learned facts, heard experiences of inhabitants of Chi – Chi and made our own experiences concerning the 921 earthquake. The following part of the article is divided into three parts. At first I want to describe the impressions which our group got during our observations, afterwards I present the results of two interviews with inhabitants of Chi – Chi and at last I want to introduce the book “The Budding Earth. Stories of the 921 Post-Quake recovery Area in Taiwan.”

Impressions of German and Taiwanese Students

Our student group visited the Shih – kang dam, the destroyed Wuchang Palace in Chi – Chi, the 921 Earthquake Museum of Taiwan and made a empirical field study in Chi – Chi. During this observations and we made several experiences which are presented on the following pages.

The Shih – Kang dam

The first place we visited was the Shih – kang dam where a major damage of the 921 earthquake concerning water supply took place. The Shih-Kang Dam crosses the Ta-Chia River where it begins to spread towards the Taiwan Strait. It measures a height of 25 m, a length of 375 m and a volume of 141,300 m³ (according to JSPS Project report 2003:15). The dam was built in 1977 to hold back water from an area of 1,061 km² in the Chung-Yang Mountains. The capacity of this water reservoir is about 3.38 million m³. The dam is not reparable and now functions as a memorial park. On Picture 1, the sunken side of the dam can be seen. The stones, which can be seen on the left side of this picture function as memorial boards. They are labelled with the longitude and latitude of the epicentre and the date and time of the main shock. The dam can be entered on this part of the dam.

Picture 1: The damaged Shih – kang dam (photo: L. Busch)

The soil beneath the dam consists of sand and gravel which the river has carried over hundreds of years. Under this upper stratum a laminated mass of mud stone, silt stone and sand stone of the Pliocene Epoch, the Tertiary Period, can be found (JSPS Project report 2003:15). Before the dam could have been built up, the shallow stratum of sandy and gravely soil had to be cleared away up to the rock surface.

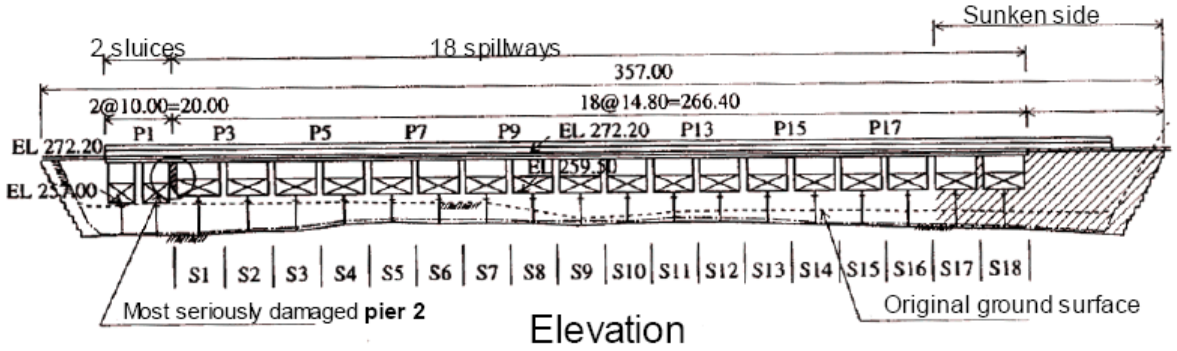


Figure 35: Plan of the Shih – kang dam, showing the division of the dam into 18 spillways and 2 sluices. The dotted line marks the original ground surface
Source: JSPS Project report 2003:16

Figure 35 shows the Shih – kang Dam and the underlying soil strata.18 gates, all 12,5 m high and 36 m wide (S1 to S 18), function as spillways. On the left side of this figure two sluices can be seen. The dotted line in the lower part of the figure, called 'Original ground surface' shows the surface of the underlying rock of the Tertiary period. Especially in the middle part of the river bed, this stratum isn't very huge. The distance between rock surface and soil surface is about 3 to 4 m and reaches 10 to 13 m depths on both sides (JSPS Project report 2003:15).

During the necessary geological investigations preceding the construction of the dam, the rock was excavated and tested on its compressive strength. The strengths of the compression which effect on the rock were some 100 kgf/cm² or less (JSPS Project report 2003:15). The Water Resources Bureau, Ministry of Economic Affairs, Taiwan didn't find a clear proof of existence of a fault.

After the Chi – Chi Earthquake struck this dam, experts found a connection to the CheLungPu fault which runs through the Shi – Kang area but which had no effect on the dam before. The CheLungPu fault seemed to be branched in further thinner separate branches east off the known trace in direction of the dam (JSPS Project report 2003:15). It can be seen on Figure 36.

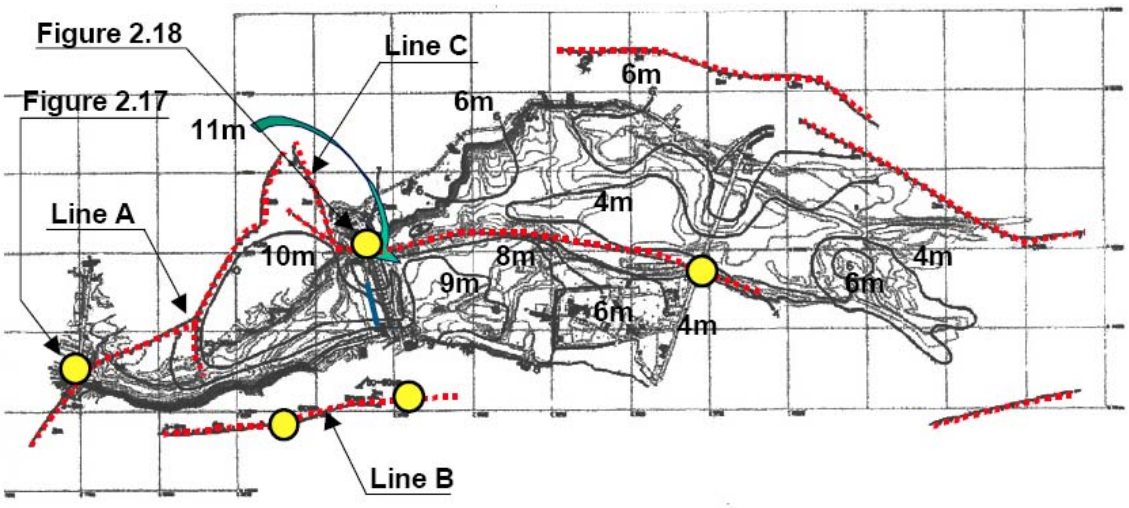


Figure 36: Ground upheaval in Shih – kang area
Source: (after Kung 2001). Thin and thick contour lines show the original configuration and ground upheaval caused by faulting (JSPS Project report 2003:17)

Figure 36 shows the varying ground upheavals in the area of the Shih – kang dam can be seen. On this figure the dam is situated next to the yellow point marked with figure 2.18. The values of meters point out how high the surrounded area has been uplifted. Lines A to C describe different fault borders.

Line A marks a fraction of the extended CheLungPu fault where the fault ascended about 6 meters. Shortly after the uplifting of this area, the fault border, called line C, came out hundred meters in east direction of line A. The uplifting of this fault border is responsible for the damage of the Shi – Kang dam. Spillways No. 16 to 18 were destroyed. As illustrated in Figure 36, Line C crosses the northern end of the dam. The uplifting of the area south of this line amounts to 10 to 11 meters in the area around the dam. (JSPS Project report 2003:17)

Because there is little water in the Ta-Chia River, it is possible to see the uplifted areas. On Picture 2 the Shih – kang dam is lying in the background. In the foreground the underlying rock can be seen.

The destroyed Wuchang Palace in Chi – Chi
On our way from the Shih – kang dam to the city of Chi – Chi we visited the 921-Earthquake Memorial Park of Wuchang Palace (Lane 34, Min Shen Road, Chichi Town, Nantou County.). This temple collapsed during the 921 earthquake and has been left unrepaired to serve as a memorial to the victims of the Chi – Chi Earthquake.

It was very impressive to see the destroyed temple. It hasn't fallen in ruins - it seems to have "sat down". The first floor does not exist anymore, because the second floor fell down to the first floor. On Picture 3 the compressed stanchions can be seen. They were bent by the weight of the upper lying floor.

Picture 2: The Shih – kang dam (photo: L. Busch)

Many myths and legends have grown up around the 921-Earthquake Memorial Park of Wuchang Palace which was built to worship the Hsuantian God of North Pole. The Taiwanese students translated the information panels and told us the following stories: Legend says that the temple survived the first temblor of Sept. 21 but in the dreams of the temple keepers the deities asked to be removed quickly from their temple nevertheless. The next day an aftershock struck the temple, the second floor came down and most of the content suffered damages (according to http://taiwanauj.nat.gov.tw/ct.asp?xItem=21593&CtNode=118).

Picture 3: Compressed stanchion of Wuchang Palace (photo: L. Busch)

Empirical field study in Chi – Chi

We arrived at the train station of Chi – Chi in the middle of the day. The students were divided into six groups with 5 team members. Every group got a map of Chi – Chi, wherein a route was drawn. The routes weren't the same, but several groups observed the same streets. The routes of the different groups can be seen on Figure 37 – they are marked by different – colored lines. The routes were coordinated in view of the fact that at least two groups observe at least one equal street. Every group (for example A) has been dedicated to a partner group (for example B), which has observe at least one equal street. After the field study the partner groups have separated into six pairs consisting of one member of group A and one of group B to compare their results.

Figure 37: Map of Chi – Chi. Routes of the six groups marked by different colours
Source:
(http://maps.google.de/maps?f=q&source=s_q&hl=de&geocode=&q=taiwan,+jiji&sll=51.151786,10.415039&sspn=15.90403,33.574219&ie=UTF8&ll=23.82669,120.785944&spn=0.011306,0.016394&z=16&iwloc=addr)

Every group had the task to have a look at the buildings in the streets they were walking through and to mark visible damages in the map. The groups haven't seen any damaged houses but ruins which show, that there has been standing a house before.

In addition to this, they had to look, which material the people used to build their houses and to consider, if the houses had been build before or after the earthquake. This task had the following reason: Although only 3,8% of the destroyed houses were mud- brick houses, 47,6% of all victims died in houses of this type. Liao et al. came to the conclusion that <<the poor seismic resistant capacity of mud-brick residence is found to be the major factor that caused great loss of lives>> (Liao et al. 2004:29 et seq.). After reading the study from Liao et al. concerning <<Deaths related to housing in 1999 – Chi – Chi, Taiwan, earthquake>>, it seems obvious to me that we wouldn't find mud brick houses in Chi – Chi but I wanted to prove this guess. In the closing meeting the students corroborated this estimation. According to the observation of almost all groups, the majority of houses seemed to be built after the

earthquake.

Due to the fact, that we only had one hour left, this part of the empirical work failed shortly. Most of the groups concentrated on the interviews.

A phenomenon which could be seen in Chi – Chi and in other Taiwanese cities is the spreading of open front walls in the ground floor of buildings. To serve as sale areas, most of the houses have no wall in front of the street and only two big pillars support the upper lying floors. Because of the fact, that not the whole length of the front is made of concrete or bricks, this part of the house isn't as stable as the rest of the house and represents a danger for the whole house. A remark in the EQE Briefing proves this impression to be true: "The <<softer>>first story of many older buildings collapsed as a result of severe ground shaking […]." (EQE International 2002:4)

The 921 Earthquake Museum of Taiwan

The remarkable building of the 921 Earthquake Museum was built 2003 and is situated in the Wufong（霧峰） Township of Taichung（台中）. The five buildings of the museum were built within the ruins of the Guangfu（光復） Junior High School which had been damaged during the 921- Earthquake (according to http://www.921emt.edu.tw). Some of the former school buildings are still standing and deal as visual aids. Beside some extra pillars which support the buildings, everything has been left as it was. The museum preserves "the signs of seismic action, record[s] the historical occurrence of the 921 earthquake and provid[es] the public and school realistic earthquake education teaching materials." (National Museum of Natural Science: 2).

In the first hall, the Chelongpu（雞籠埔） Fault Preservation Hall, the visitor can inform himself about the earth's structure, earthquakes and seismology. Models and multimedia stations help the guests to understand the tectonic background of the world and especially of Taiwan. Foreign guests can make a guided tour in English – for self studies all descriptions are also in English. Picture 4 shows the Fault Preservation Hall. On the left side of the picture, the information boards, models and multimedia stations can be seen.

Picture 4: Learning in the Earthquake Museum of Taiwan (photo: L. Busch)

The most impressive part of the museum is the athletic field of the former school, which was raised about 2.5 meters as a result of the earthquake. Standing next to this high “wall” illustrates the power of this earthquake. Because of the fact, that the lines, which mark the courses on the field are still there, the raising of the earth seems more impressive.

On the way to the gallery of pictures the visitor passes some broken classrooms. Seeing this ruins and watching a film, which shows the same room just before the earthquake, makes clear how sudden and surprising an earthquake can change lives totally.

The gallery of pictures, the Hall of Images and the Passageway of Hope show pictures of the surface ruptures along the ChelungPu Fault, of observed damages, injured people and rescue teams. Especially the Hall of Images affects the visitors by seeing (pictures of) desperate and hopeless people who are searching for related people or neighbours or who are standing in front of the ruins of their houses. In one of the rooms a TV shows the news which were sent shortly after the earthquake. The impressive and shocking pictures distraught many of the students and made them sad, because watching this news reminded them how sudden lives can be broken.

In the Earthquake Simulation Area a special vibrating platform simulates the tremors that the people in the earthquake punished area felt on Sept. 21 1999 at 1:47 a.m. local time. For visitors who never experienced an earthquake before, this simulation is a chance to get an idea of how an earthquake feels.

After these shocking and sometimes disconcerting experiences the museum concentrates on hopeful aspects. Pictures of rescue teams and rebuilding processes make sure, that life goes on. In the Earthquake Engineering Education Hall the visitor gets informed about modern earthquake-resistance technology, disaster prevention and readiness.

Although the German students haven’t experienced an earthquake before, the museum helped to understand the strength of such an earthquake.

Experiences of inhabitants of Chi – Chi

The German and Taiwanese students interviewed some inhabitants of Chi – Chi concerning their experiences during the 921 earthquake. The interviewed people had to answer the following questions concerning personal experiences: “How did you get through the earthquake and the time after the earthquake? How long did it last, till you could live your life as ‘before’?”, about political help: “What did the government do to help you and the other inhabitants of Chi – Chi? What does the government do to protect you against following earthquakes?” and regarding the future of Chi – Chi: “have the residents of Chi – Chi been able to rebuild their life? Are there people still left homeless in Chi – Chi? Are you optimistic about the future of Chi – Chi?” The following examples show different experiences, which were made. Both weren’t taken down synchronously, but are written after notes which the students took during the interviews.

“I was at home when the earthquake happened. My houses was damaged, but not destroyed. After the earthquake we slept in a tent next to the house. We had no water and no electricity. After a half year we could live our life nearly as before the earthquake. Everyone helped. Neighbours helped each other to remove the bricks and to rebuild their houses. Also the government helped. They gave a kind of credit and NGO’s helped rebuilding the houses. To protect us against following earthquakes, the government made videos and gave us lessons where we learnt how to act during an earthquake. Nike sponsored a whole tent village where many people lived in after the earthquake. Today there are no homeless people anymore the residents of Chi-Chi have been able to rebuild their

houses and lives. And the future of Chi-Chi? I'm optimistic, but since the earthquake there are too many people here, too many tourists. I prefer life before the tourists came here."

Another woman made strange experiences before the earthquake happened: "There were lights on the sky. I wondered what those lights may be, they looked like northern lights. In addition to this, the animals behaved in a strange way. They were very nervous and searched for shelter. But I had no panic – I didn't think, that it could be an earthquake.

After the earthquake fire brigades and militaries came to clean up the city. There was very much dust in the air and we were afraid of diseases. But after a couple of months, I think one or two, we went back to our houses. We were afraid of possibly following earthquakes.

Today there are no homeless people. People who lost their houses, or whose houses were damaged, became money from the government to build new houses or to repair their old ones. As there were no more job opportunities after the earthquake, many people left Chi-Chi. Directly after the earthquake many tourists came to see the damages, but in our days they come to see the landscape."

"Stories of the 921 Post – quake Recovery Area in Taiwan"
In "The Budding earth", the stories of 20 communities from the recovery zone are written down. The President of Republic of China, Chen Shui – bian, the Premier of Republic of China, Frank Hsieh Chang – ting and Kuo Yao Chi, the Executive director of the 921 Earthquake Post – disaster Recover Commission, wrote forewords wherein they describe their experiences, their hopes and gratitude.

All published stories describe successful rebuilding processes. For many communities the motto 'a crisis is a chance for a rebirth' became real after the destruction by the earthquake. Here are some examples:

The Taomi Reconstruction Committee of the Taomi Community in Puli Township, Nantou County, for example decided to transform their village into "an educational base with the combined features of organic agriculture, ecological conservation and tourism" (Yao – chi 2005:15). The Members of the Songhe Community in Heping township, Taichung County lost half of the village's houses and built 29 bamboo cottages by using traditional Taya designs and building techniques (according to Yao – chi 2005:85). The 921 incident was an opportunity to bring back the traditional Taya culture to Songhe.

In Seshui in Dayan Village (Yuchi Township, Nantou County) the 921 Earthquake destroyed 41 of 48 houses. The fact, that the already bad situation of this agricultural community became still harder by the effects of the earthquake, let Ye Rui – mei think about alternatives to the former kind of industry. She discovered that the original community industries of her homeland were pottery and tea and accomplished the reconcentration on these sections of industry (according to Yao – chi 2005:102 et seq.).

These few examples shall give a short impression of how this terrible event has been used for transformation leading to something good.

Reasons for Remembering the Damages of this Earthquake

Finally I want to answer my questions from the beginning: Why is it important to remember such an event? Wouldn't it be better to forget this terrible disaster instead of keeping it in mind? The Executive Director of the 921 Earthquake Post – disaster recover Commission, Kuo Yao – chi, explains, that the rebuilding processes which were introduced in the book

“The Budding Earth”, can serve as examples of “how to survive and recover from disaster” (Yao – chi 2005:11). He also points out that these stories “remind people of the preciousness of life experience” (Yao – chi 2005:11).

By seeing and reading how the affected people helped each other and made their contributions to the rebuilding processes of their communities, we see the flexibility and vitality of these people and “[…] are inspired by their strength to survive and courage to rebuild” (Yao – chi 2005:5). Although many people lost everything they showed persistence, vitality and hope. It raises hope that if something as terrible as this event happens again, affected people will survive and it’ll all come to a good end.

Most of the German students haven’t experienced an earthquake or its effects before. So we got to know the effects of a powerful earthquake and established connections between theoretical knowledge about earthquakes and the real event of Chi – Chi. It is very important to learn on examples - to connect theoretical knowledge with practical examples. If we now talk about earthquakes, we combine our knowledge with pictures, thoughts, impressions and experiences. In addition to this the students were sensibilized to the relationship between earthquakes and human society in general, too.

In Chi – Chi I intended to show the students how badly an earthquake can damage a whole village and how the population got through this catastrophe. By making interviews and taking a look on the houses of Chi – Chi, the students got in touch with affected people and hopefully made processes of emotional learning. Additionally, they came in contact with kinds of earthquake management. In the 921 Earthquake Museum of Taiwan we got the book “The Budding Earth. Stories of the 921 Post – quake recovery Area in Taiwan.” written by Yao – chi. Reading it, the students will hopefully remind the people and their experiences they got to know in Chi – Chi.

At least I hope that the students had respected the damages in Chi – Chi and the Shih – kang dam as formed by a strong earthquake. Because of the fact, that there are hardly any earthquakes in Germany, it is important not to lose sight of the natural disasters which struck other countries. In the 921 Earthquake Museum of Taiwan the students hopefully learned a lot more, than only theoretical facts about the earthquake. The intentions of the founder of this museum were the following ones:

> “It is hoped that visitors will learn more about earthquake, understand the destructive power of nature and the cause of earthquake, absorb correct damage mitigation concepts, find out how to protect themselves and help others in the event of an earthquake, understand the relationship between earthquakes and human society, and experience the vitality of life after a catastrophic act of nature.” (National Museum of Natural Science: 3)

The visit to the museum helped to combine thoughts and impressions. We reminded the facts about the Chi – Chi Earthquake, saw new pictures and pulled together what we saw and experienced until than.

Remembering the damages of the 921 Earthquake helps to keep in mind, that a disaster like this can happen again, that although it could happen again, people will get through it and that it is important to reduce risks of earthquakes and to have a good earthquake precaution system. The 921 Earthquake was the best recorded earthquake in the world and the results

of numerous reports were used to develop new earthquake – resistance technology, earthquake forecast – systems and earthquake - resistant constructions.

For people who haven't experienced the effects of an earthquake before, it is important to have the possibility to learn exemplarily by this event. Such a catastrophe can strike everyone. And although this catastrophe only struck Taiwan, it is important for foreign people not to ignore this event but to help the assembled people and to learn from it

I would like to finish with words of Huang Yong – huang:
"It happened, we can't change that. What's important is to learn a lesson from it, don't let it happen without learning anything, don't let the same thing happen again a few years from now." (Yao – chi 2005:87)

References and Internet Sources

Central Weather Bureau Taiwan (CWB): available on: http://www.cwb.gov.tw/eng/index.htm) (last access: 28.01.2009, 14:25)

EQE International (2002): EQE Briefing: ChiChi, Taiwan Earthquake of September 21, 1999 (M7,6). (available on: http://www.absconsulting.com/resources/Catastrophe_Reports/Chichi-Taiwan-1999.pdf)

JSPS Project report (2003): Control of Failure Modes of Civil-Infrastructures Experiencing Large Soil Deformations Caused by Surface Fault Ruptures. Tokyo. (available on: http://shake.iis.u-tokyo.ac.jp/home-new/projects/2003/manuscripts/Ch02c.pdf)

Klose, C. (2006): Rezente und vorzeitliche geomorphologische Formungs- und Prozessregionen und ihre klimatischen Rahmenbedingungen in den obersten Höhenstufen des Hochgebirges von Taiwan. Berlin (available on: http://www.diss.fuberlin.de/diss/servlets/MCRFileNodeServlet/FUDISS_derivate_000000002642/00_titel.pdf?hosts last access on 09.01.2009)

Liao, Yen-Hsiung et al. (2004): Deaths related to housing in 1999 Chi-Chi. Taiwan, Earthquake. In: Safety Science 43 (2005) (available on: http://cmbi.bjmu.edu.cn/news/report/2008/eq/28.pdf) (last access on 13.11.09)

Liou, J.G. and Hsiao, L.Y (1999): Tectonic Setting and Regional Geology of Taiwan. Stanford. (available on: http://www.iris.washington.edu/news/events/taiwan/taiwan99reports/chi-chi4.html) (last access 05.01.09, 10:19)

Map of Chi – Chi: (available on: http://maps.google.de/maps?f=q&source=s_q&hl=de&geocode=&q=taiwan,+jiji&sll=51.151786,10.415039&sspn=15.90403,33.574219&ie=UTF8&ll=23.82669,120.785944&spn=0.011306,0.016394&z=16&iwloc=addr) (last access: 02.02.2009: 13:16) (http://taiwanauj.nat.gov.tw/ct.asp?xItem=21593&CtNode=118) (last access 21.01.09, 11:25).

National Museum of Natural Science: 921 Earthquake Museum of Taiwan. Guidebook. Taiwan (R.O.C.)

Risk Management Solutions (2000): Event Report. Chi – Chi, Taiwan Earthquake

Robbins, C. (2001): Chi Chi Rebuilt: Returning to the Epicenter of the 9-21 Earthquake. In COMPASS MAGAZINE, September 2001. VOL. 8, ISSUE 9. (available on: http://www.taiwanfun.com/central/taichung/articles/0109/0109CoverStory.htm#interview) (last access: 25.01.09 18:33)

Yao – Chi, K. (ed.) (2005): The Budding Earth. Stories of the 921. Post – quake recovery Area in Taiwan. Published by the 921 Earthquake Post – disaster Recover Commission, Executive Yuan. Taiwan

10

National Parks in Taiwan

by Anja Wangemann, Hamburg and Yu-Chi Tseng, Taipei

Introduction

Already in the end of the 19th century the idea of national parks was developed. To protect the nature and the creatures living in this area, the "Yellowstone National Park" was built in the USA. In this article we want to point out the history of the national parks and the idea behind them. After that there will be a short introduction about the different categories of national parks given by the "International Union for Conservation of Nature" (IUCN), a non-governmental organisation (NGO).

Additionally there will be listed some problems that can be associated with national parks in general. The specific part of this article is about the National Parks in Taiwan, especially "Taroko National Park" that we visited during our fieldtrip.

History of National Parks Worldwide

The first national park in the world was established in 1872. The "Yellowstone National Parks" is located in the USA in parts of Wyoming, Montana, and Idaho. Before the European colonisers occupied the land it was used by Native Americans that lived there for over 11,000 years. In the 17th century indigenous tribes, like the Apaches and Navajos, acquired horses and iron weapons of the Spanish encounters to control and protect their land. Later in the beginning of the 19th century French Canadian Trappers came from the north to the Yellowstone plateau.

On March 1 in 1872 the law of the first national park was signed by the President Ulysses S. Grant. The idea to manage "wild lands for recreational use" (Haines 1977:156) was a result of a campfire discussion in 1870 and became three years later reality. (Haines 1977)

Nowadays nearly every country has signed areas as national parks. The IUCN published a list of all protected areas worldwide in 2003. It says that circa 11.5% of the global land surface is protected (this number does not include the marine protected areas). All over the world exist 68,066 protected areas with IUCN Management Categories. The definition of IUCN of protected areas is:
"An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."(IUCN, 2003:2, United Nations List of Protection). Next to this definition there are over 34,036 protected areas that have not assigned one of the categories of the IUCN[13].

In Germany there are 14 national parks but not all of them are also accepted by the IUCN-guideline. Taiwan has established seven national parks, six of them are terrestrial and one is a marine protected one. In 1982 the first national park named "Kenting" was set up. Over the

[13] http://www.unep-wcmc.org/wdpa/unlist/2003_UN_LIST.pdf, last access: 20/1/2009

years six other parks were established, the last one in 2007 the "Dongsha Marine National Park".[14]

The next part of the article deals with the categories of the IUCN and why they are important for nature conservation.

The Different Categories of the IUCN

The "International Union for Conservation of Nature" IUCN is a non-governmental Organization established in 1948 and describing itself as an organization that …"helps the world find pragmatic solutions to our most pressing environment and development challenges. It supports scientific research, manages field projects all over the world and brings governments, non-government organizations, United Nations agencies, companies and local communities together to develop and implement policy, laws and best practice."… (IUCN, http://www.iucn.org/about/, last access: 25/1/2009). In partnership with the United Nations and lots of other NGOs the first global environmental organization tries to influence the behaviour of the people concerning nature. Trying to establish an international standard for protected areas the IUCN created six different categories[15] that define protected areas:

Category Ia:
Strict Nature Reserve: protected area managed mainly for science
Category 1a is describing an area of land or sea that occupies outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring. An area that belongs to this category is the Yala National Park in Sri Lanka, it needs the highest level of protection.

Category Ib:
Wilderness Area: protected area managed mainly for wilderness protection
Category Ib is a large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition. These areas are also strictly protected, but there is the possibility of a limited number of visitors. It's not allowed to build modern infrastructure, pipe lines etc. These conditions exist for example in the Mongolian national park "Bogd Khan Mountain".

Category II:
National Park: protected area managed mainly for ecosystem protection and recreation
Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible. The goal is on the one hand to protect biodiversity and nature, but on the other hand education and recreation should be guaranteed. The whole intact ecosystem is in the focus. Also the role of the indigenous people should not be neglected, because they are important to understand the symbiosis of nature and human beings. An example for an area of this category is the "Nyika National Park" in Malawi.

[14] http://np.cpami.gov.tw/en/, last access: 1/29/2009

[15] All categories are assumed of the IUCN: Dudley, Nigel (2008) Guidelines for Applying Protected Area Management Categories

Category III:
Natural Monument: protected area managed mainly for conservation of specific natural features
Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance. Examples for a natural monument are the Montserrat Nature Reserve and Natural Park in Spain. The areas of category three are usually smaller than in the first two categories. Monuments can be waterfalls, tracks, cliffs, rocks forms etc.

Category IV:
Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species. In these areas the intervention of humans is not forbidden. The focus is on protecting key species that live there, one example is the “tembawang gardens” in Borneo that contain a high level of biodiversity.

Category V:
Protected Landscape/Seascape: protected area managed mainly for landscape/ seascape conservation and recreation
Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area. “Vanatori Neamt Natural Park” in Romania is part of this category. The interaction of humans is expected. Different from category four the whole landscape and seascape parties included, so these areas are bigger in general.

Category VI:
Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems
Area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs. For example, the San Francisco Peaks National forest in the USA is important for lots of Native American tribes. The aim is to show how sustainable contact with the ecosystem is possible.

All categories handle with the protection of land and sea areas. The difference between them is the possibility of humans to be involved in the process of creating nature. While the first category tries to ban any human interference, the last categories involve humans in nature making’. The question should be if there are places left that can be considered as untouched nature and if saving nature for tourism in national parks is an advantage for saving biodiversity. Problems related to national parks in general will be presented in the next part.

Problems

When people think about national parks, they always think about areas that are built to protect the environment and the species that live in there. This is the side of national parks most of the people want to see and the people that operate in national parks make visualise. But there is always another side, which people cannot see first. This paragraph handles with some of these problems.

First of all, national parks often depend on money earned by tourism. They are financed by entrance fees, donations and government aid. Often the so called ‘nature’ has to be produced: People have to leave their homes, this is often accompanied with violence. The concept of the untouched nature is an invention of the western world. First of all, it was established in Western countries, later the concept was exported to countries of the so called “Third World”. Historically it is very difficult to find nature untouched by humanity. Almost every part of the world is adopted or culturally characterized by people, so that some scientists (like Bätzig 2005 in: Pedersen 2008) describe ‘nature’ nowadays as “second nature”.

People who lived in areas that are nowadays national parks or protected areas are often indigenous. By building the “Yellowstone national park” nearly all natives were dispersed with violence. Unfortunately violence is often an instrument and a common practice to take away land from indigenous people. This disagrees with the requirements of the IUCN which say that the setup of a national park is only allowed if indigenous people or their lifestyles are not dispersed.

Another problem is the integration of indigenous people into the job market. This often means that they have to become a part of the market based system which is the opposite of their former life. On the one hand people have to give up their traditional and cultural way of life, to be part of the system; on the other hand they are dependent on the market and cannot live their former model of subsistence farming.

As we could see in the Taroko National Park, another part of a new life in the national park is working together with the “owners” of the park. The indigenous people of the “Sedek aborigines” are working in a hotel on their native land. It is in the middle of the national park and looks like a tribal village. The Sedeks that used to live in this area for a long time are now the owners and employees of the Hotel. They are cooking their traditional meals, selling their handcraft wares and in the evening their children show the tourists their traditional dances and songs. Unfortunately the tourists listen next to the old songs to Christian songs, what shows the colonialism of indigenous people very clearly. Although the feeling during the stay in the hotel is very nice, you never loose the feeling of a show. The people seem as if they have to sell their traditions to earn some money. Another possibility would be the complete banishment from their land, like seen at the sun-moon-lake. Here the ancient land was flooded by water and is now a tourist place. Since years the Thao-Aborigines are fighting to get back their land; nowadays they have to live in small cottages for the transition. This problem also shows that the indigenous people in Taiwan are confronted with problems originating from destroying nature and the annexation of land. This is a worldwide phenomenon which can be associated with the setup of national parks.

Next to the social component of the national park conflict you have important ecological problems. On the one hand it is really useful to save nature while reducing the access for humans (except the indigenous); but on the other hand protected areas often rise as a result of environmental destruction. Big companies and governments buy “nature” areas as compensation of destroyed land, for example. The pretence is to save the biodiversity -g but to save the nature at another place biodiversity is destroyed somewhere else. (Pedersen 2008)

The idea of national parks and protected areas is in general not a bad one, but there are a handful problems that are resulting from the so called “nature protection” when it is seen as a remedy to earn money or compensate nature destroying.

National Parks in Taiwan

The Taiwanese island is famous for its high variety of plants and animals, much of them are endemic species. This results on the one hand of the geographical location and on the other hand on the topology. In Taiwan you can find the whole spectrum of climate zones which increases biodiversity.

The National Park Act was the trigger for the Ministry of Interior to think about nature conservation, recreation and education with the help of national parks. They were divided into different zones: areas for limited use, the recreation areas, the cultural/ historical areas, the significant scenic areas and the ecological protection areas. Finally the first national park "Kenting" was built in 1982.

To protect especially the endemic species in 1996 the Council of Agriculture of China told the TESRI (Taiwan Endemic Species Research Institute) to build a group for plant protection. In former times the TESRI just protected endemic animal species. Today 20% of the land area is protected. There are seven national parks, 19 Nature Reserves, 6 Forest Reserves, 17 Wildlife Refugees and 32 Major Wildlife Habitats.

Observations about national parks, mainly from Yushan National Park:
In reality just the national parks try hard to manage and achieve the stipulated goals of the National Park Law. Consequently only 322,804 hectares of the land (about 8.5 percent of Taiwan's land area) are really protected in Taiwan. There are two main problems about national parks, according to natural observation in Taiwan:

The conflict between different groups of people, of course including indigenous people
It is quite difficult to discuss with the people of the different tribes that live in various places (national parks). Indeed, the government did hurt indigenous people by limiting their use of land and forbidding hunting or gathering. There are great disputes about this. Some (even including few indigenous people) argue that young indigenous people now only hunt for money and market. The way they hunt is not a traditional and because it belongs to their culture. This includes that the way the people hunt nowadays damages or destroys nature. Others fight to regain the right for hunting to recover their tradition that has fallen away from Japanese colonization. After protection, illegal hunting and arguments over 20 years, now the Forest Bureau tries to design hunting season mainly for indigenous hunters to renew the practice their old ceremonies. Although it is just an experiment in a particular area, it could help to save cultural events.

The conflict between visitors and nature
Another problem is the lack of an environmental ethic or philosophy in Taiwan which results in a passive preservation. When looking back to the history of Taiwan, it is surprising that there was a successful establishment of national parks in Taiwan. During that time was only economic development that highlighted and became to the source of legitimacy of the government, but still national parks were build.

First the government and the national parks were not able to earn lots of money with the entrance of the parks. Usually, the significant scenic areas and the ecological protection areas are the main protected area and occupied about 70% of the land of the park in Yushan, Sheipa and Taroko National Park (These three parks are famous for mountains from 300m to almost 4000m high). Only staff, some hikers and scientists would move about here by the permits from NP. The headquarters only manage to monitor the environment and try to maintain low intensity of use, such as fixing the existing trails or building for hikers and

scientists.

A new way to get more money is that the government forces national parks to help popularizing so-called eco-tourism such as hiking or mountain-climbing. The future will show, if the programme is successful and what are the consequences for the nature. More tourists are good to earn money, but on the other hand the source of stress for the nature rises.

A good example for a popular tourism-area and national park status at the same time is “Kenting National Park” in the south of Taiwan. A small area is signed as the “real” protected area. The rest of the park is full of tourists. Kenting has beautiful beaches. The maritime area around the southern peak of the island is also signed as a part of the national park, because rare coral reefs rest there. But to amuse the tourists exactly in this area water sports like skiing and banana-riding are offered. The consequence is that the coral reefs and the animals that life there are prevented from a protected life.

Another consequence of the tourists is trash that is everywhere both as at the land and in the water. A so called protected area where visitors have to pay, the owner of the national park tries to show the nature. The problem is that visitors cannot see real nature, because everything is arranged. There are stony ways, planted gardens and sometimes old trees and gorges. The category five of the IUCN describe that interactions of humans are expected. It is important to ask the question, when reaches the limit of human interaction, to call an area national park?

References and Internet Sources

Haines, A. L. (1977): The Yellowstone Story - A history of our first National Park,

IUCN: Dudley, Nigel (2008): Guidelines for Applying Protected Area Management Categories, http://www.iucn.org/about/, last access: 25/1/2009

Pedersen, Klaus (2008): Naturschutz und Profit-Menschen zwischen Vertreibung und Naturzerstörung. Münster: UNRAST-Verlag

UNEP: http://www.unep-wcmc.org/wdpa/unlist/2003_UN_LIST.pdf, last access: 20/1/2009

National Parks of Germany

http://www.deutsche-nationalparks.com/nationalpark_bayerischer_wald.shtml, last access: 1/29/2009

National Parks of Taiwan

http://np.cpami.gov.tw/en/, last access: 1/29/2009

http://np.cpami.gov.tw/en/index.php?option=com _content&task=view&id=338&Itemid=117, last access: 1.2.2009

http://www.gio.gov.tw/taiwan-website/5-gp/yearbook/ch12.html , last access: 1.2.2009

http://np.cpami.gov.tw/en/index.php?option=com _content&task=view&id=338&Itemid=117, last access: 1.2.2009

http://www.gio.gov.tw/taiwan-website/5-gp/yearbook/ch12.html , last access: 1.2.2009