Effects of Land Policy on Hybrid Rural-Urban Development Patterns and Resilience:
A case study of the territorial development in the Bangkok Metropolitan Region

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Abstract

This article illustrates the relationship between land policy, the shaping of hybrid rural-urban development patterns, as well as their effects on resilience enhancement in the specific context of Thailand. It aims to provide a better understanding about potential impacts of land policy on resilience enhancement of urban systems to planners and policy makers. The article examines the impacts of diverse development policies applied to two selected areas in the Bangkok metropolitan region (BMR). Preliminary results show that the customary land policy, which encourages small-landholdings with civic-led and area-based approach, is likely to bring more positive impacts regarding resilience enhancement to the urban system than the modernised scheme, which promotes large-landholdings with state-led and sector-based management approaches. This is because the hybrid rural-urban development patterns resulting from the customary land policy tend to generate a better environment to cope with the change, which prevents the urban system to shift to undesired stages. This is by enhancing the capability of the urban system to absorb disturbances and to retain essential conditions while undergoing changes, as well as to learn and to adapt to the changes.

Keywords: land policy, hybrid rural-urban development pattern, resilience

Introduction

The concept of resilience has recently been the focus of various disciplines, including spatial planning. It is considered an essential quality for urban systems for coping with recent territorial development challenges in a world of rapid transformations. The term 'resilience' in this context refers to the capacity of an urban system to absorb and deal with undesired disturbances and reorganise while undergoing change so as to still retain essentially the same functions, structure, identity and feedbacks (Folke *et al.*, 2005). Folke *et al.* (2002) argue that a fundamental quality necessary to create resilience is the diversity of species, human opportunity and economic options that maintains and encourages both adaptation and learning processes.

According to the above definition of resilience, hybrid rural-urban development patterns, which feature a diversity of qualities, are likely and argued in this article to enhance resilience of urban systems. The term 'hybrid rural-urban development pattern' refers to a specific form of urbanisation in Southeast Asian cities observed by McGee (1991) that expresses the blend of country and city, where agricultural and non-agricultural activities coexist in close proximity to large urban centres. This specific development pattern takes place also in the Bangkok Metropolitan Region (BMR), yet with distinctive characteristics in different parts of the region. One of the arguments this article advances is that these different characteristics of the hybrid rural-urban development patterns contribute to different degrees of resilience in the area. Rigg (1995) argued that the spatial development patterns of Bangkok are shaped by the pattern of land sales by rural owners and speculators rather than any planned logic. This article argues that it is rather the land policy applied in the region, as a result of societal changes brought by the modernisation of the country, that shapes the spatial development patterns of the BMR.

The article investigates the impacts of various land policy on the shaping of hybrid rural-urban development patterns and their effects on resilience enhancement in the specific context of Thailand. The investigation focuses on two selected areas in the BMR, namely Khlongluang and Western-nonthaburi (see Figure 1). Both areas are associated with hybrid rural-urban development patterns, yet with distinctive spatial characteristics resulting from different development policies applied to each area, especially during their reclamation period. This aims to provide planners and policy makers with a better understanding about potential impacts of land policy on resilience enhancement of urban systems.

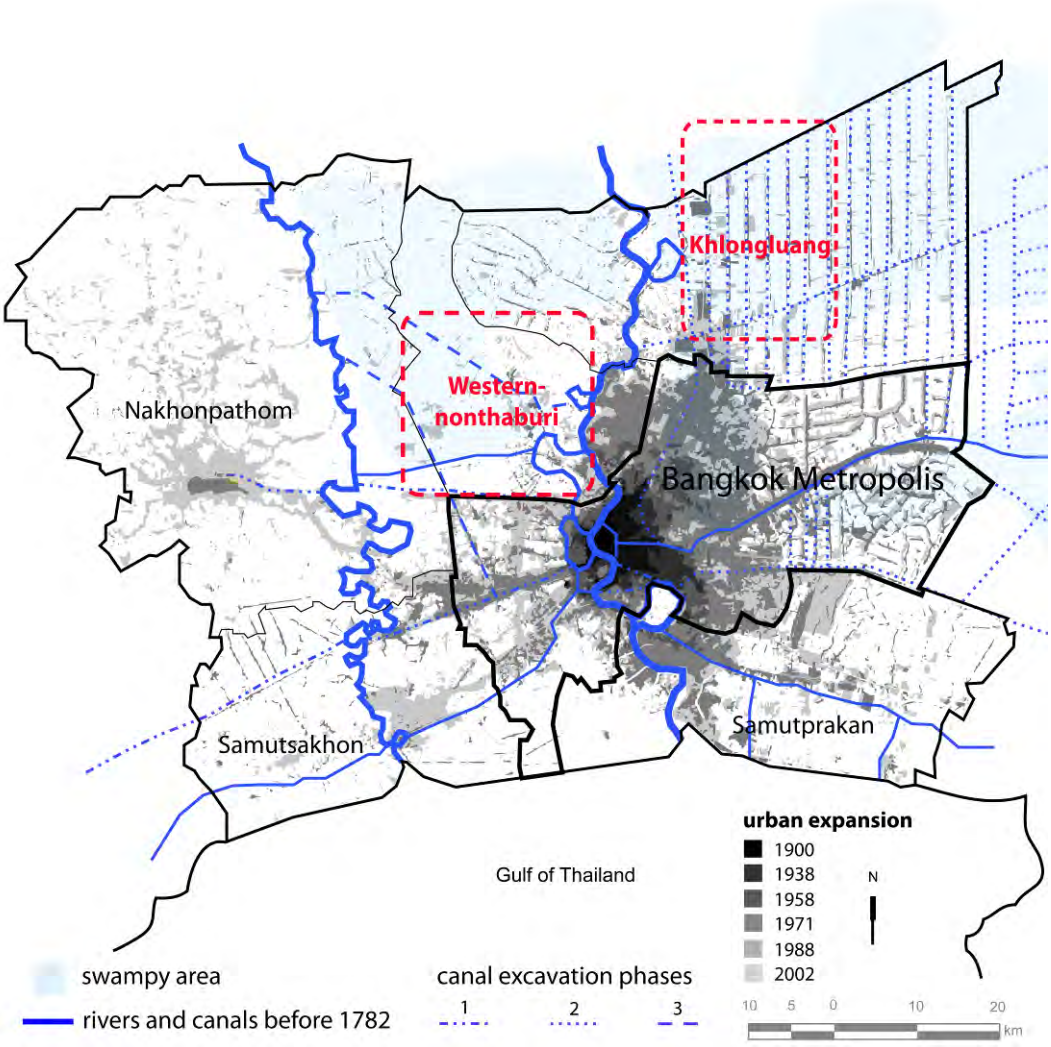

Figure 1 Main waterways, the successive phases of land reclamation and urban expansion in the BMR from 1900-2002.

Sources: Produced by combining the maps provided by Jarupongsakul and Kaida (2000), Molle (2005), Mekvichai (2007) and the National and Regional Planning Bureau, Department of Public Works and Town & Country Planning - DPT (2008).

The comparison of the spatial development patterns in the two selected areas is based on four sets of characteristics, which are (i) land tenure – in terms of land ownership and landholding size, (ii) patterns of mixed-use – in terms of function, scale and level of diversity, (iii) human-nature interaction and independency and (iv) speed of change. The four sets of characteristics are connected to three parameters that are employed to assess the degree of resilience. They are (i) absorbability and retaining capability – relating to degree of diversity of the system, (ii) learning capacity – relating to degree of human-nature interaction and independency and (iii) adaptive capacity – relating to speed of change and degree of diversity of the system.

The article is divided into four sections. The first section addresses three periods of development in the BMR from 1782 to 2010 with distinctive territorial development policies, describing also the underpinning social and economic conditions. In the second section, the hybrid rural-urban development patterns in the two selected areas are compared. The comparison focuses on investigating the impacts of different policies applied to each area on the spatial transformation of the areas. The third section examines the effects on resilience enhancement created by different spatial characteristics in the two selected areas. The concluding section summarises the observations and remarks on the effects of land policy on resilience enhancement in the context of the specific Thai societal framework.

1 Development of Land Policy in the Bangkok Metropolitan Region From 1782-2010

This section describes the changes in land policy from 1782-2010, in connection with the important steps that the social and economic structures were shifted in the BMR. The study emphasises the aspects of land policy in terms of (i) land tenure regarding ownership type and landholding size and (ii) territorial management approach regarding governance structure and tools. The content focuses on the changes in formal institutions, which are rather different from the changes in informal institutions. Formal institutions in this context refer to the legitimised organisations and regulations relating to territorial management, whereas informal institutions refer to non-legitimised rules and the ways of territorial governance.

The customary land policy in operation in Thailand was underpinned by the context of a subsistence society that promotes small-landholdings and civic-led development approaches. It has been fairly well maintained by the informal institutions with a rather slow pace of change. Meanwhile, this customary land policy had been overlaid by modernised development schemes in the formal institutions. The process of change in formal institutions, which was triggered by the pressure created by colonisation in the neighbouring countries, started in the mid of the nineteenth century. This was the first important landmark in understanding changes from the pre-modernisation period (before 1855) to the modernisation period (1855-1970s). The process then continued until the second shift took place in the 1980s that the modernised approach has slowly given way to the reintegration of territorial management with the more customary approach. This reorientation management approach was driven by sustainable development discourses and the societal changes in the region. The reorientation approach was officially stated for the first time in the Fifth National Economic and Social Development Plan (1982-1986). The consequences of these two significant shifts on changes in land policy in each period of development are elaborated as follows.

1.1 The pre-modernisation period (before 1855): *subsistence economy with customary land policy*

The customary land policy had been employed since the early period of settlement in the region (around the seventeenth century) until the title deeds system was introduced in 1901 by the Ministry of Agriculture (DOL, 2011). The policy was grounded on the concept of a subsistence agricultural-based society and the traditional Thai social structure, namely the *nai-prai* system - a form of social organisation in the specific Thai societal context associated with social classes, under the Absolute Monarchy.[1]

Land tenure: occupancy-by-use model with smallholdings

The right over the land in the customary land policy was notably related to the *nai-prai* system. The policy revealed that all the land within the kingdom was subject to His Majesty's permission to occupy. Yet all *prai* (commoners), *taht* (slaves) and foreigners, including immigrants and alien captives from wars, were allowed to own land under certain conditions, which were:

- if they were able to make it productive;
- land left uncultivated for more than five years would return to the Crown and
- the ownership was inheritable on the condition that the same family remained as occupants (Molle, 2005; Chitchang, 2006).

Despite their right over the land, those groups had to share the produce of the land with their masters, who were either nobility and/or the king (Chitchang, 2006). The above conditions, which were based on the concept of occupancy-by-use, promoted smallholdings.

Territorial management approach: civic-led with area-based development

With the customary land policy and social structure, the state controlled the territory through labour rather than controlling the land itself (Chitchang, 2006). This resulted in a civic-led territorial management approach with a rather broad development framework. The state generally reclaimed new land for development by excavation of the main waterways only. Areas beyond the main waterways remained unpopulated and inaccessible, unless settlement was made feasible by extending canals. This is because canals were the main mode of transportation and important for irrigation purposes. The extension of canals was often

[1] Before the gradual process of slave and *nai-prai* system abolition (1874-1905), the Thai society comprised of four main social classes: (i) the king - referred as the state in this context; (ii) *nai* - nobility (including all members of the royal family and the high-ranked government officials appointed by the king no matter of his nationality or social class); (iii) *prai* - commoner (including the ethnic groups), who has either to work for the state or his *nai* as appointed by the king for two months a year or to pay to the state with a certain amount of money or goods and (iv) *taht* (slave) (Chitchang, 2006).

undertaken on a modest scale by communities themselves (Tanabe, 1977; Askew, 2000). In addition, the customary territorial administration was structured with an area-based managerial system. The governance system was rather decentralised, as each province was ruled by independent governors, which would have to follow only occasional orders from the state (DOPA, 2011).

1.2 The modernisation period (1855-1970s): *economic growth promotion with modernised land policy*

During this period, the Thai society experienced two major shifts in land policy, which were influenced significantly by increased associations with westerners. Both shifts were underpinned by (i) changes in social structure, with increased influence of the urban middle classes and professionals in the territorial development process and (ii) economic changes from subsistence economy towards an export-based economy with economic growth promotion objectives.

The first significant shift was the change in the system of land tenure, from the occupancy-by-use model to the title deeds system in 1902. This was underpinned by the liberalised trade agreements (starting in 1855 with the United Kingdom and followed by agreements with several other countries) that significantly changed the economic structure of the country, along with the abolition of the *nai-prai* system (starting in 1874) that considerably changed the social structure. The shift from a subsistence to an export-oriented agricultural economy and the new peasants who were just free from the *nai-prai* system generated a dramatically increased demand for land for cultivation. Demand for land for building construction also increased to accommodate emerged trades and services. Various land reclamation projects took place in the area that corresponds to the present BMR to accommodate these increased demands for land for development. Yet different policies regarding the size of landholding were applied in different periods of reclamation, which resulted in distinctive spatial development patterns in the area.

The second shift was the change in territorial management approaches of formal institutions, which took place in two phases. The first phase started in 1892, when the customary administration with an area-based managerial system was replaced by a sector-based ministerial system to ensure effective central control of rural areas. It aimed to cope with the pressure created by the European colonisation processes taking place in neighbouring countries. A model from the colonial apparatus of administration established by the British in India was applied (Arghiros, 2001). Another significant situation that led to remarkable

changes in power relations in the Thai society was the shift in political regime in 1932 from an Absolute Monarchy to a Constitutional Monarchy.

The second phase of change in formal institutions regarding territorial management began soon after World-War II, when various planning agencies and development plans were established (RIDA, 1996).[2] These agencies and plans were influenced notably by the increased role of the international development agencies and western-trained technocrats in the country. This phase was also characterised by spatial changes, resulting from the social and economic changes taken place since the period of the first shift (Ouyyanont, 2000). After World-War II, Thailand experienced rapid economic growth[3] with the shift from an export-agricultural-oriented economy towards a more service and manufacturing-oriented economy. The rapid economic growth increased the monetisation of the peasant economy and led to an enormous urban expansion in the BMR, particularly into the unattended swampy lowlands close to the existing city centre.

Land tenure: land as a tradable commodity with title deeds system

Since the customary land tenure with the occupancy-by-use model was replaced by the title deeds system in 1902, land acquired monetary value in itself and became a tradable commodity (Kitahara, 2000). As the demand for land to support agricultural export was dramatically increased, the state launched new development policies aiming to promote farming in unoccupied areas. Different development policies were applied to different reclamation projects through canal excavation in three phases (see Figure 1).

During the first phase (1850s-1870s), land policy promoting largeholdings was introduced and replaced the customary land policy that promoted smallholdings. Canal excavation in this period was mainly for irrigation purposes and to improve transport of various kinds of goods from the west of the Chaophraya River to Bangkok. Excavation was conducted by the state, and land adjacent on both sides to the newly excavated canals was given to the aristocracy, which resulted in largeholdings (Jarupongsakul and Kaida, 2000). This occurred, however, to a relatively small area as compared to what occurred in the second phase.

[2] This includes the establishment of the National Economic and Social Development Board (NESDB), the Board of Investment (BOI) as well as the Department of Public Works and Town & Country Planning (DPT), in the 1950s.

[3] The economic growth was driven mainly by the dramatically increased foreign direct investment (FDI) caused by (i) the financial and technical aid from international agencies, such as the World Bank and the Asian Development Bank; (ii) the induced effects generated by the money spent by the American Army, which settled the military camps in Thailand during the Vietnam War; and (iii) the dramatic increase in investment of the Sino-Thai communities due to political changes in China (Askew, 2000).

The new land policy introduced in the second phase (1880s-1900s) strengthened landlordism. Concessionaires were responsible for all the cost of development. In return, the state granted ownership 1,600 metres of land on both sides of the main canal and 1,000 metres of the secondary canals to concessionaires, subject to whether or not the land was already utilised and claimed (Molle, 2005). This policy was driven by the demand for rice for exporting to Britain's colonies (Peleggi, 2007). Khlongluang is a good example of the results of this land policy.

The government was thereafter aware of potentially negative impacts created by the new land policy that promoted landlordism. This led to the reorientation of the land policy in the third phase of development. In order to abate landlordism and promote small-scale concession to peasants, the Ministry of Agriculture entrusted the reclamation projects to the Department of Canals (which became the Royal Irrigation Department in 1914) in 1902 (Kitahara, 2000), instead of giving concession to privates; in 1936, the state fixed the limit of land ownership at 50 *rai* (8 ha) per household, which was considered sufficient to make a reasonable living for a household in that time (Peleggi, 2007). The evidence of the retracing of the land policy towards the customary scheme that encouraged smallholdings was well presented in the Western-nonthaburi.

Territorial management approach: technocratic with sector-based planning

In 1892, the customary area-based managerial system along with a civic-led development approach, with only broad guidelines provided by the state, was replaced by the modernised sector-based ministerial system with a technocratic-bureaucratic oligarchy. In addition to the establishment of a number of ministries during the turn of the nineteenth century, in the 1950s various planning authorities were set up. This included the National Economic and Social Development Board (NESDB), the Board of Investment (BOI), and the Department of Public Works and Town & Country Planning (DPT).[4] Since then, technocrats formed a significant professionalised subculture within the customary bureaucratic polity (Askew, 2002). Development plans were prepared and launched, yet without any actual authority to control development until 1999 - when *phang meung ruam* (a type of land use plan)[5] was put forward with laws to support it.

[4] The NESDB was firstly named as the National Economic Development Board; the former name was replaced in 1966 (NESDB, 2009). The DPT is the integration of the two departments, i.e. the Department of Public Works and the Department of Town and Country Planning, during the administration reformation in 2002 (DPT, 2009).

[5] *Phang mueng raum* is a plan prepared by the DPT. It consists of land use planning, infrastructure planning and greenery planning. Each plan covers a period of 5 years. There were two other development plans that

1.3 The reorientation period (1980s-2010): *the philosophy of sufficiency economy with the reintegration of the customary land policy*

The changes towards a better integration of the customary land policy into the modernised territorial management policy started in the 1980s. The changes were driven mainly by the struggles of the rising middle class and grassroots through key civic movements in 1973, 1992 and 2010. These were a result of dramatic social structural changes. These movements have brought changes in power relations reflected also in the formal institutions with respect to spatial management in the BMR. These changes were substantiated in the Ninth National Economic and Social Development Plan (2002-2006) and the 1997 Constitution, which suggested transfer of the power to manage the territory effectively from the central government to the local authority and the public agency.

Land tenure: intentions to abate largeholdings

The reoriented development approach, based on the philosophy of sufficiency economy,[6] generated a number of initiatives to reform the existing land policy regarding land tenure and landholding size, aiming for a fairer society. Policy reorientation was induced by the realisation of negative impacts caused by landlordism, created partly by the modernised land policy. The initiatives included both the customary-oriented policy, such as the occupancy-by-use policy and the limitation of landholding size to 50 *rai* (8 ha), and the modernised market-oriented policy, such as an advanced land tax structure. This has been a working policy since the 1990s, yet it has not been ready for legislation, due to the conflicts of interest amongst stakeholders (Sakul, 2011).

Territorial management approach: devolution and public involvement enhancement

Starting in the 1980s, a technocratic and bureaucratic polity with extremely centralised state power has given way to a civic polity with a higher degree of devolution and public involvement (Arghiros, 2001). The changes in formal institutions occurred in the form of governmental administration reforms and several pieces of legislations that followed the 1997

significantly influenced the spatial development in the BMR, despite their lack of legitimated supports. First is the Greater Bangkok Plan 1990. It was the first spatial development plan prepared by an American consultant company in 1960 based on a finger plan concept, which allocated a series of development areas along radial transportation corridors. Second was the Metropolitan Plan 1990. It was a revised version of the Greater Bangkok Plan 1990 prepared by the Royal Thai government in 1971, by which the finger plan concept was replaced by that of a concentric circles plan (RIDA, 1996).

[6] The philosophy of sufficiency economy, suggesting a balance way of living, is the concept introduced by King Bhumibol Adulyadej of Thailand at the onset of the 1997 Asian Economic Crisis. It represented an important and visionary step in suggesting directions for reshaping management thought and practice based on the Buddhism's middle-path teaching. The concept was officially stated in the governmental document for the first time in the Ninth National Economic and Social Development Plan (2002-2006) (NESDB, 2008).

Constitution's principles, i.e. to enforce public involvement and devolution process. A good example is the reformation of the DPT. As a result of the 1999 Devolution Act, the role of the DPT under the central government was greatly transferred to the local authorities. The role of the DPT shifted to preparing development plans at the regional and the national levels that provide strategic development frameworks to the local governments. Furthermore, the DPT began to cooperate with private investors through negotiation processes soon after the 2003 Land Readjustment Act was launched, instead of using *phang mueng raum* (a type of land use plan with restrictions) as the sole measure to control spatial development (DPT, 2009).

2 The Hybrid Rural-Urban Development Patterns in the Case Study Area

This section examines impacts of distinctive land development policies applied to the two selected areas in the BMR on the shaping of hybrid rural-urban development patterns. This is for better understanding the impacts of land policy on the shaping of spatial development patterns and the consequences on resilience enhancement in the area. In this case, the diverse characteristics of hybrid rural-urban development patterns as a result of the employed land policy are the main focus of the analysis.

The term 'hybrid rural-urban development pattern' in this context refers to the spatial pattern of *desakota* as defined by McGee (1991). It expresses the blend of country (*desa*) and city (*kota*), where agricultural and non-agricultural activities coexist in close proximity to large urban centres. In other words, it refers to regions that have undergone intense processes of mixed urbanisation, with agricultural, industrial and residential functions side by side. During this process, the countryside is urbanised without the hinterland population necessarily moving into a major city. McGee (1991) argued that it is not just the visual expression of a transitional stage of urbanisation, but a unique landscape that characterises Southeast Asian cities. It is the result of specific social systems in the fringe of mega-cities, which is distinct from that experienced by western countries during their urbanisation processes.

Two areas in the BMR, which were swamp areas and left unattended before the modernisation period, are selected for detailed investigation. The two selected areas are (i) Khlongluang, located in Pathumthani on the east of the Chaophraya River to the north-east of Bangkok, and (ii) Western-nonthaburi, located in Nonthaburi on the west of the river to the north of Bangkok (see Figure 1). These two areas are selected because of their diverse spatial development patterns that clearly reflect diverse impacts caused by distinctive land development policies applied to each area, particularly during the reclamation period. Spatial

development patterns in Western-nonthaburi present impacts of the customary development scheme, whereas those in Khlongluang exemplify impacts of the modernised scheme. The differences of hybrid rural-urban development patterns are investigated in relation to four spatial characteristics, which are argued as significant affecting the degree of resilience enhancement of the area.

This section begins with a brief explanation of the spatial development in the BMR, as a result of social and economic changes, with special emphasise in the two selected areas. It follows by the elaboration of the differences regarding the four characteristics of hybrid rural-urban development patterns in the two selected areas, as a consequence of various land development policies applied to the areas.

2.1 An overview of the spatial development in the case study area

General development in the BMR

In the pre-modernisation period of development in the BMR, settlements were concentrated on the west of the Chaophraya River, where land was suitable for cultivation, mainly on the natural levees along the banks of the river and the water networks. Residential units were mixed with agricultural fields with trading communities concentrated at the main water junctions (Wallipodom, 2000). Agricultural products were mainly to supply domestic demands. Swampy lowlands, mostly on the east of the river - including the two selected areas, were left unattended.

Settlements in swampy lowlands started taking place in the 1880s to serve increasing demand of rice for export. These areas were maintained for the agricultural functions with rural environment until the beginning of the 1970s. A fundamental shift of the Thai export-oriented economy towards manufacturing production started in the 1950s and reached 68% of exports by 1989 (Askew, 2002). This shift resulted in enormous and rapid urban expansion into swamp areas, particularly along the new highways to the east and the north of the existing city centre. The urban expansion included also development of housing estates, which was driven mainly by the rise of middle class with a high purchasing power, changing life styles of urban families and the influx of rural immigrants drawn by economic development in Bangkok (Askew, 2002; Molle, 2005).

Urban expansion had, however, affected the two selected areas rather slowly. The impacts became clearly visible only around the turn of the twentieth century. The new development projects, including housing estates, factories, and public institutions, penetrated into the existing agricultural areas. Although land price was part of the reason for the sprawl,

the infrastructure development provided by the state was a more influential driving factor. The price of land in the city centre available for purchasing was extremely high as compared to that in peripheral areas, as the majority of the land is unsalable property that belongs to the state, the Privy Purse Office, and religious temples. The state development projects that extended infrastructure into these former agricultural areas thus made it possible for urban development to take place in these areas with a relatively low investment cost, as land prices there were still low comparing with other areas with the same level of accessibility to public infrastructure.

Development in Khlongluang

Reclamation in Khlongluang started to take place a few years after the second phase of land reclamation policy that granted ownership of land to the concessionaires was launched in 1885. Canals were excavated at a distance that allowed the concessionaires to own the whole newly developed area. The concessionaires, who were mostly the aristocracy, consequently became the landowners of large tracts of paddy land. Land was then parcelled and rented out to tenant peasants who were just free as a result of the abolition of *nai-prai* system a few years before (Peleggi, 2007). However, a great portion of the land had been soon left uncultivated due to the low quality of the soil with acidity problems, which resulted from the reclamation process to make the swampy land dry (Jarupongsakul and Kaida, 2000). After that, most of the land was kept for speculation purposes. It was just around the turn of the twentieth century that urbanisation became clearly visible in Khlongluang. Since then, the land use in Khlongluang has been dramatically transformed to accommodate industrial uses. This was mainly because of the extended highways linking the area to the international airport as well as to the eastern and the northern areas of the BMR that made the area to be well connected to the existing urban core areas.

Development in Western-nonthaburi

Spatial transformation took place also in the Western-nonthaburi, yet in a rather different way than what happened in Khlongluang. Settlements in Western-nonthaburi were results of the revised version of land reclamation policy launched in 1936. Here the reclamation project was executed by the state with an intention to abate large-scale concession of land. Land was distributed to peasants, who became landowners with small-scale concessions (Peleggi, 2007). The landholding size was limited to 50 *rai* (8 ha) per household. The size was even progressively reduced overtime due to subdivision of the plot through family inheritance over generations (Kitahara, 2000; Peleggi, 2007). Rice fields were

soon converted into orchards since the profit earned from orchards is considerably larger than that earned by cultivating rice (Askew, 2000).[7]

2.2 Comparison of hybrid rural-urban development patterns in the two selected areas

i) Land tenure: ownership and landholding size

Different land development policies employed during the reclamation period resulted in different characteristics of the hybrid rural-urban development in the two selected areas, especially regarding land ownership and landholding size. Khlongluang is a remarkable example of a landlordism development scheme with largeholdings, as a result of the second phase of land reclamation policy launched in 1885 (see section 1.2 for more details of the policy). The statistical data for land tenure in the central region of Thailand shows that in 1981 there were only 6.82% of landholdings with plot sizes larger than 50 *rai* (8 ha)[8]. Khlongluang was amongst those with the average size of landholdings around 170-200 *rai* (27-32 ha) (Nabangchang and Wonghanchao, 2000). In addition, most of the land was kept for speculative purposes or leased to peasants. This presents in the statistical data regarding percentage of farming tenants; Khlongluang had the highest concentration of farming tenants (almost 60%) as compared with other parts in the central region of Thailand (Nabangchang and Wonghanchao, 2000).

On the contrary, Western-nonthaburi exemplifies development outcomes affecting by the third phase of land reclamation policy launched in 1936 that reflected the customary development scheme based on smallholdings (see section 1.2 for more details of the policy). The land in Western-nonthaburi was mostly occupied by individual households, primarily for agricultural and residential purposes (Askew, 2000). The landholding size was progressively reduced from the original size when the land was reclaimed, then limited to 50 *rai* (8 ha), to between 2 - 4 *rai* (0.32-0.64 ha) (Askew, 2000). As mentioned above, this was due to subdivision of the plot through family inheritance over generations (Askew, 2000).

ii) Patterns of mixed-use: function, scale, and level of diversity

Agricultural uses in both areas have been transformed to accommodate industrial and residential functions and resulted in mixed-use development patterns; yet they occurred rather differently. Regarding functions, both areas consist of a mixture of industrial, residential and agricultural uses, yet with different proportion and spatial characteristics. In Western-

[7] For instance, an annual income earning from planting mango trees was over 17 times higher than the amount that could be earned from planting the same area with rice (Agricultural Office, Bang Bua Thong District 1994 cited by Askew 2000)

[8] This refers to the limit of landholding size introduced in the revised land policy in 1936 as mentioned earlier.

nonthaburi, residential uses mixed with orchards (yellow areas in Figure 2) were predominant, with a rather minor share of industrial uses, whereas the share of industrial and commercial uses and public facilities (such as universities, research institutes and museums) were much higher in Khlongluang (see Figure 2). Apart from location, which was a major factor underpinning these transformation processes, landholding size is another key factor contributing to those differences.

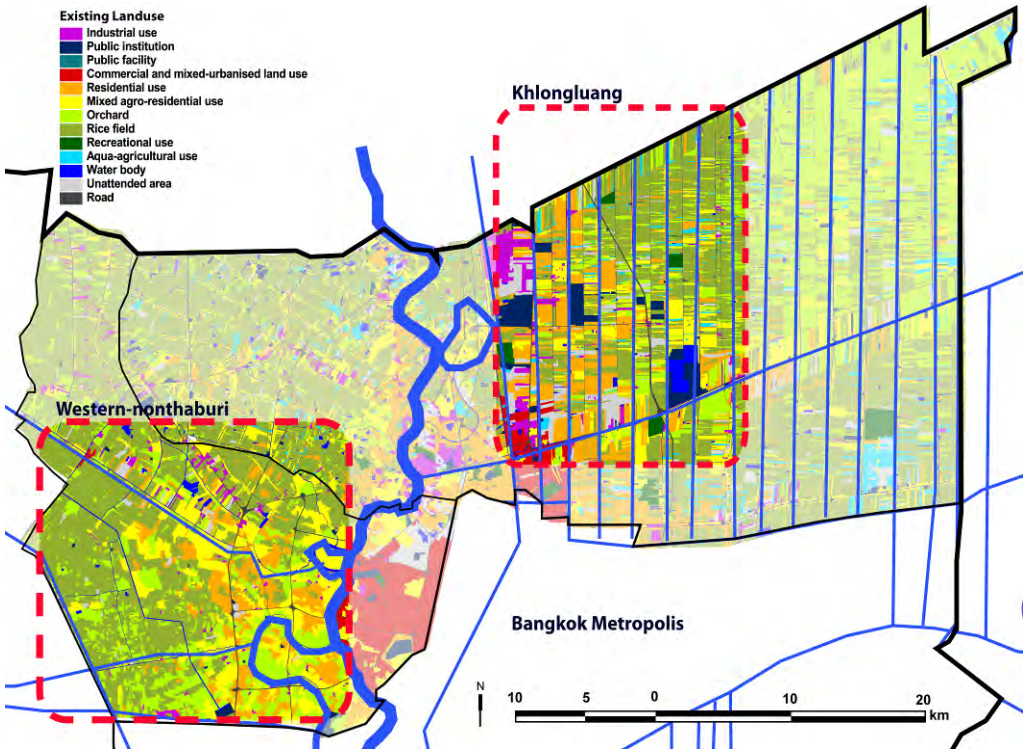

Figure 2 Land uses in Western-nonthaburi and Khlongluang in 2007

Source: Land Development Department (LDD, 2007a; LDD, 2007b)

The scale of mixing and the level of diversity of hybrid rural-urban development patterns in the two selected areas were also diverse. This was mainly the result of the different landholding size. In Western-nonthaburi, land was developed generally on the basis of small projects. Small-scale orchards mixing with residential uses were common in Western-nonthaburi, whereas large-scale farming was more predominant in Khlongluang. In Western-nonthaburi the agricultural areas were converted mainly into residential uses, either for individuals or small housing projects (see Figure 3). A small part was converted into to small-scale industries. This contrasts with developments in Khlongluang, where most of the land was occupied by large-scale development projects for industrial and residential uses (see Figure 3). One of the main reasons underpinning this was landholding size. This was because large landholdings in Khlongluang made it easier for large-scale development projects to take place than fragmentised land ownership with small landholdings in Western-nonthaburi.

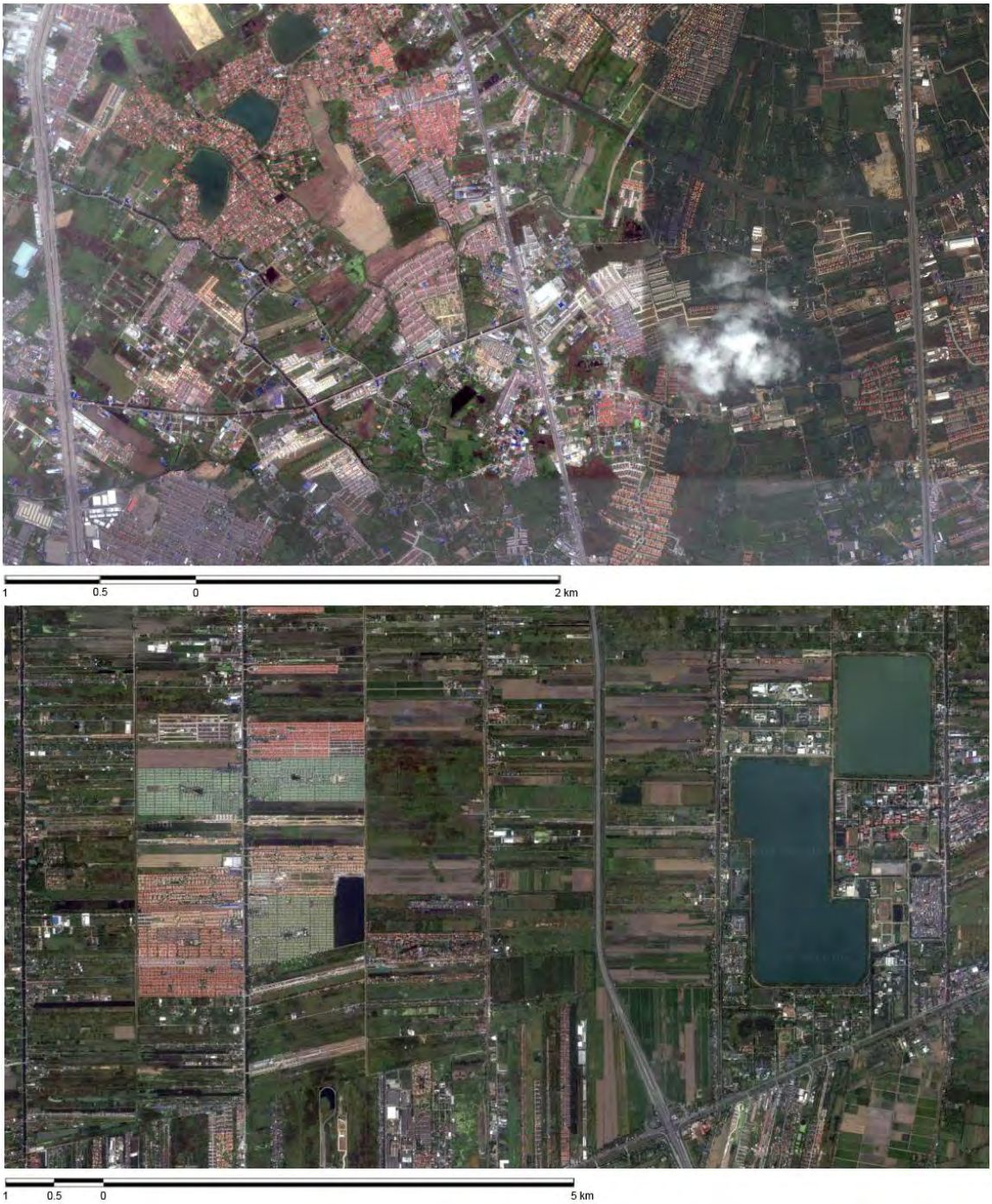

Figure 3 Aerial maps showing examples of development patterns in Western-nonthaburi (above) and Khlongluang (below) in 2010

Source: Google Maps (2010)

The diversity of responses to the economic structural changes in the second half of the twentieth century was also an important reason underpinning the differences regarding the scale of mixing in the two areas. Although the residential and agricultural uses were still predominant in Western-nonthaburi, the original land plot was subdivided for various purposes, depending on the household economic conditions. The economic structural changes

made a number of households in Western-nonthaburi more attached to non-agricultural works. Generally, only a small part of the land within a single plot was maintained for agricultural uses; the rest was parcelled for residential uses, either for the heirs of the plot or for selling to new arrivals or developers (Askew, 2000). The logic that explains a landholder selling only part of his plot is based on a strategy of maximisation of assets, with an aim to preserve parts of the land as legacy to the heirs or to retain still-productive land for agricultural activities as a supplementary source of income (Askew, 2000). This led to an even smaller landholding size in Western-nonthaburi.

Regarding the degree of diversity, development patterns at the plot scale in Western-nonthaburi were likely to provide a higher degree of diversity to the urban system. As the landholdings were rather small and owned by a household, farmers in Western-nonthaburi commonly planted a variety of fruit crops, which ripen throughout the year to ensure a continuous income and to suit the family-based labour system (Askew, 2000). This greatly contrasted with the Khlongluang case, where large-scale agricultural practices, which require intensive labour in only certain periods of the year, were predominant.

In conclusion, the evidence suggests that land tenure based on smallholding promotion is likely to form a finer degree of mixed land uses development and a higher degree of diversity than that based on largeholding promotion. These different sizes of landholding are a result of different land development policies applied to the areas during the reclamation period.

(iii) Human-nature interaction and independency

Different land development policies applied to the two districts during their reclamation period also created different degree of human-nature interaction and independency. The development patterns in Western-nonthaburi were likely to provide a higher level of human-nature interaction and independency than that in Khlongluang. The higher degree of independency of the owner on the land is underpinned by two main reasons. First, in most cases the land in Western-nonthaburi was the only piece of land the household owned and lived in. Second, the agricultural products from the land contributed to part of the family income. This contrasted with the Khlongluang case, of which most of the land was owned by huge capitalist-landlords who mainly kept the land for speculative purposes.

In addition, the aforementioned finer scale of mixed-use in Western-nonthaburi was likely to enhance more human-nature interactions than the large-scale farming in Khlongluang. This was because orchards with a variety of plants require regular interaction and attendance from the farmers throughout the year, whereas mono-functional large-scale

farming requires intensive seasonal labour in just a few times a year. Moreover, as most farmers in Western-nonthaburi were the owners of the land, having grown up and lived there most of their lives, they were likely to have more knowledge about the nature of the land and how to interact with it than the tenant farmers or the new coming households who migrated to live in a housing estate in Khlongluang.

(iv) Speed of change

As shown in various studies on land use changes in the two selected areas (Nabangchang and Wonghanchao, 2000; Hung and Yasuoka, 2000; Jarupongsakul and Kaida, 2000; Askew, 2000), the transformation process of agricultural areas to accommodate industrial and residential functions was more gradual in Western-nonthaburi than in Khlongluang. This was mainly a result of the different landholding sizes predominant in each area. Smallholdings owned by diverse owners, regarding their socio-economic conditions in Western-nonthaburi, were likely to contribute to a lower speed of change. This is because incorporation of plots for development or industrial uses is likely to be slowed down by owner-by-owner negotiations, resistance of owners to sell and slower legal procedures to incorporate a large number of plots. On the contrary, the availability of big plots owned by a single owner is much higher in Khlongluang, which resulted in a faster transformation process. The lower speed of change in Western-nonthaburi was also underpinned by the tradition to regard land as an asset to be passed on to younger generations. This contrasted with the value gave to the land in Khlongluang as being kept for speculative purposes.

3 Effects of Land Policy on Resilience Enhancement

This section examines the connections between different characteristics of hybrid rural-urban development patterns and qualities required for resilience enhancement. According to Folke *et al*. (2005), 'resilience' refers to the capacity of an urban system to absorb disturbance and reorganise while undergoing change, so as to still retain essentially the same function, structure, identity and feedbacks. The degree of resilience enhancement is assessed using the three conditions suggested in the *Report on Resilience and Sustainable Development* prepared for the Swedish environmental advisory council (2009). They are (i) the environment that supports or creates diversity of the systems, (ii) the environment that encourages learning capacity and (iii) the environment that strengthens adaptive capacity of the systems. In this article, the three conditions are adapted to three parameters for resilience assessment that connected to the four characteristics of hybrid rural-urban development patterns described in section 2, as elaborated below.

3.1 Qualities for resilience enhancement and their connection to the four development characteristics

(i) Absorbability and retaining capability

Absorbability and retaining capability refers to a capability of the system to absorb the disturbances or to retain the existing conditions while undergoing changes (Folke *et al.*, 2005). It is one of the basic qualities required for resilience enhancement of an urban system. This quality is strengthened by an environment that supports or creates diversity of the systems (Folke *et al.*, 2002). In this article, the degree of diversity is assessed from the function and scale of mixed-use of the hybrid rural-urban development pattern. The more diverse the function in the area and the finer scale of mixed-use, the higher degree of diversity the system contains. The higher degree of diversity of the system, the less likely that the system will collapse while undergoing changes (which means being more resilient). This is because an urban system with high degree of diversity allows more chance that some attributes or actors can absorb or cope with the undesired disturbances, which helps the system not to be drastically affected by or collapse due to a rapid change.

Generally, the hybrid rural-urban development patterns dominated by smallholdings in Western-nonthaburi are likely to generate a higher degree of social and ecological diversity as compared to the development patterns based on largeholdings in Khlongluang. This is due to the decision-making processes that involved diverse actors. In addition, a finer scale of mixed-uses in Western-nonthaburi, as a result of smallholding promotion, is likely to provide a higher degree of ecological diversity than the large-scale mixed-use development patterns in Khlongluang. This applies also for the consideration at the plot scale, as clearly illustrated by the agricultural practices in the two selected areas. Orchards with variety of fruit crops in a small land plot in Western-nonthaburi are likely to provide higher degree of diversity than mono-functional large-scale farming in Khlongluang.

In summary, the hybrid rural-urban development patterns in Western-nonthaburi based on smallholdings with finer degree of mixed-use are likely to create a higher degree of diversity to the urban system. These qualities enhance resilience of the urban system by promoting absorbability and retaining capability of the systems to deal with disturbances and imminent shifts.

(ii) Learning capacity

Learning capacity is one of the fundamental qualities necessary for resilience enhancement. This quality is strengthened by an environment with more human-nature interaction and independency (Folke *et al.*, 2002), as early warning signals for loss of the

system's resilience and imminent shifts to less desirable states can be better perceived through interaction processes. The early awareness enables the urban system to gradually reorganise itself to changes. In other words, the higher the level of human-nature interaction and independency, the better the environment to enhance the learning capacity, which results in a better condition for resilience enhancement of the urban system. The level of human-nature interaction and independency is subject to two characteristics of the land, i.e. land ownership and land use.

Generally, the hybrid rural-urban development patterns in Western-nonthaburi are likely to provide a preferred environment for encouraging human-nature learning processes than the patterns in Khlongluang. This is because of the higher degree of human-nature interaction and independency in Western-nonthaburi over that in Khlongluang, created by the different land ownership and land use patterns in the two areas as explained in section 2.2. Apart from the spatial characteristics, the management approach is also a significant factor contributing to resilience enhancement, especially considering it from a point of human-nature interaction and independency. The customary territorial management based on civic-led and area-based approach is likely to enhance more human-nature interaction and independency than the modernised state-led and sector-based management approach. It thus tends to enhance resilience of the urban system more than the modernised approach. This is because the customary approach is likely to encourage local inhabitants to interact more with the land as well as to interact with other inhabitants in the community.

In short, the hybrid rural-urban development patterns in Western-nonthaburi, based on family subsistence with smallholdings mixing with agricultural practices with a variety of plants, are likely to encourage learning capacity. These qualities tend to enhance resilience of the urban system more than the hybrid development patterns in Khlongluang, where largeholdings are dominant and land is used for large-scale development projects or kept for speculative purposes. The underlying reason is that more interaction and independency between human and nature is generated by those spatial characteristics in Western-nonthaburi, which is a result of land policy promoting smallholdings. These qualities create the environment that human can get early warning signals for loss of the system's resilience and imminent shifts to less desirable states. This will potentially be strengthened if applied also with civic-led and area-based territorial management approach.

(iii) Adaptive capacity

Adaptive capacity in this context refers to the capacity of an urban system to adapt to changing conditions, so as to still retain its essential conditions, such as functions and

structure. This aspect is assessed from the speed of change and the degree of diversity of the urban system as mentioned in section 2.2. The higher the degree of diversity, the more likely the system is adaptable to the changing environment. This is because the system consists of variety of physical attributes as well as diverse actors that potentially react to the situation differently. It allows more chance that some attributes or actors can be either safe from or adaptable to the disturbance. Additionally, the more diverse the system, the slower speed the system to shift into new conditions created by the change initiative. This is because diverse attributes/actors are associated with different degree of sensitivity towards changes. Some attributes/actors may response to changes immediately, whereas some may take longer to respond. In other words, the slower the speed of change, the more tendency the system can recover from changes or to get adapted to the change.

As mentioned earlier, the finer degree of mixed-use in Western-nonthaburi provided a higher degree of diversity than the development patterns in Khlongluang, in which large-scale development projects are dominant (see Figure 3). The diversity created a better environment for the urban system to adapt to the changes or disturbances. The better adaptive quality in Western-nonthaburi was underpinned by a higher degree of collective actions brought by the smallholding-based development scheme. The territorial development outcomes here were undertaken by various actors rather than the government's actions alone. This is opposite to the development scheme in Khlongluang, where most of the land belonged to capitalist-landlords and was mainly kept for speculative purposes. The spatial characteristics of land in Khlongluang led to less social contact in the community, and thus averted a collective characteristic of the community. The collective actions that involve diverse actors in Western-nonthaburi led to a slower spatial transformation process than that in Khlongluang.

In short, the hybrid rural-urban development patterns in Western-nonthaburi based on a pattern of smallholding, are likely to enhance adaptive capacity of the urban system, than the development patterns resulted from landlordism development scheme applied in Khlongluang. The underlying reason was that the ecological and social diversity of the urban system allows changes to take place with slower pace than the more monotonous ones. The diversity characteristic offers more chance and time for some attributes or actors in the urban system to prepare and adapt to the change gradually.

3.2 Evidence and expected impacts of land policy on resilience enhancement

The quality of the impacts of floods caused by intense local rainfalls in Western-nonthaburi and in Khlongluang presents an evidence of positive impacts regarding resilience

enhancement generated by diversity of the urban system.[9] The impacts in Western-nonthaburi were far less and were underpinned by a finer degree of mixed-agricultural functions, which provides more disperse permeable surfaces throughout the area. The permeable surface helps to reduce the amount of surface run-off that results in a less degree of flood in the area. The situation was different in Khlongluang, where floods caused by intense rainfalls occurred quite often. This is mainly because of the dominant large-scale factories and housing estates mixing with large-scale farming in Khlongluang. The large-scale development projects resulted in huge areas of limited permeable surface that increases surface run-off in the area, and as a result caused floods after intense rainfalls.

Land subsidence is another crucial factor causing more degree of floods, especially those caused by intense local rainfalls. Although the main cause of land subsidence is groundwater over-pumping, less permeable surface is also an important cause. Development patterns in Western-nonthaburi provide better conditions for development, resulting in less land subsidence than those in Khlongluang (see Figure 4). The higher subsidence rate in Khlongluang was caused not only by the intense use of groundwater generated by large-scale housing estates and industries with high development density, but also by its less permeable surface.

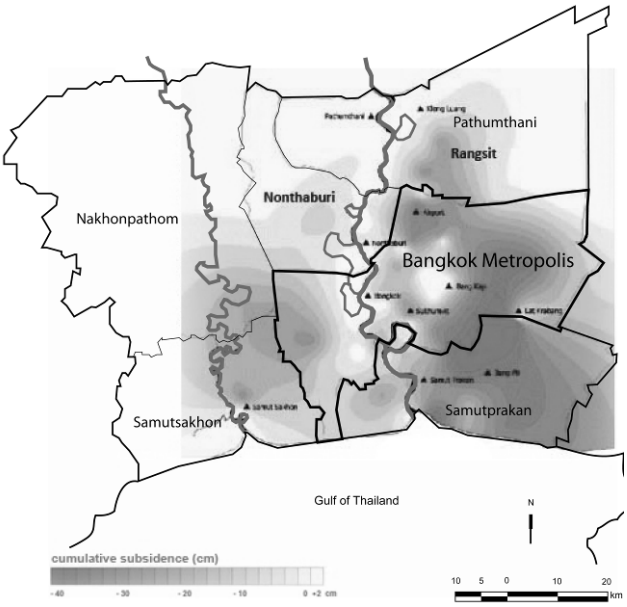

Figure 4 The cumulative land subsidence in the BMR from 1992-2000

Source: UNESCAP (2007)

[9] The analysis takes into consideration only impacts caused by intense local rainfalls, but not floods caused by water from upstream. This is because the impacts of local rainfalls are likely to represent better evidence in terms of relationship between spatial development patterns and degree of impacts. Furthermore, impacts caused by water from the upstream generally involve higher degree of government's intervention to manage water at the regional or the national scale. Due to the lack of officially recorded statistical data, the data used in this analysis is derived from the locals and field observations over years.

The above evidence supports the argument of potential positive impacts regarding resilience enhancement that are likely to occur if the development patterns encourage the absorbability and retaining capacity of the urban system. Evidence to support positive impacts potentially created by other spatial characteristics of hybrid rural-urban development patterns that contribute to the other two resilience parameters is to be further investigated. It is to prove the potentially positive impacts created by the customary land policy, promoting smallholdings with civic-led and area-based management approach, on resilience enhancement.

4 Conclusions and Remarks: effects of land policy on resilience of an urban system

The analysis through history of the territorial development in the two selected areas shows that the role of land policy on shaping the spatial development patterns is evident. The development outcomes indicate that there are differences in terms of degree of resilience enhancement generated by different characteristics of the hybrid rural-urban development patterns in the two selected areas. These differences are results of the diverse land development policies applied to the areas, particularly during their reclamation period. The differences are summarised in Table 1.

Table 1 Summary of the characteristics of hybrid rural-urban development patterns in Western-nonthaburi and Khlongluang

Characteristics	Western-nonthaburi	Khlongluang
Land tenure (ownership and landholding size)	Predominant by smallholdings owned by individual households	Predominant by largeholdings owned by capitalist-landlords
Land use (function)	Individual housing mixing with orchards, small-scale housing estates, minor share of small-scale industries	Large-scale development projects, including housing estates, industries, public facilities and farming
Diversity and scale of mixed-use	Fine degree of mixed-use with high degree of diversity	Large-scale mixed-use with low degree of diversity
Human-nature interaction and independency	High	Low
Speed of change	Slow	Fast

The above characteristics of land development in Western-nonthaburi result from the customary land tenure based on smallholdings for family subsistence. The diverse and fine degree of mixed-use creates a better environment for the urban system to cope with the change. This is because the diverse urban system presents various attributes that are associated with different degrees of resistance or adaptability to changes. The diversity also results in a lower speed of change, and thus a higher opportunity of the urban system to recover from changes. In addition, small-scale of agricultural practices mixing with residential units are likely to enhance human-nature interaction and independency. This is

because the small-scale mixing patterns are more likely to enable learning and adaptation of the urban system than the large-scale mixing patterns, by providing early warning signals for loss of ecosystem resilience and for imminent shifts to less desirable ecological states. These preferable development patterns, regarding resilience enhancement, are less likely to take place in the area to which land policy promoting largeholdings was applied. In addition to the likely positive impacts created by spatial development patterns resulted from the customary land tenure system, the customary territorial management with civic-led and area-based approach tends to contribute to resilience enhancement, as it is likely to encourage more human-nature interactions than the modernised state-led and sector-based development approach.

In summary, evidence suggests that the customary land policy, which promotes smallholdings with civic-led and area-based management approach, is likely to better enhance resilience of the urban system than the modernised ones. It seems too soon to clearly see the impacts potentially generated by the land policy in the reorientation period. Nevertheless, positive outcomes regarding resilience enhancement, as a result of the attempts to reintegrate the customary land policy and territorial management approach into the reoriented territorial management, are expected. The attempts include the enhancement of public involvement and devolution in territorial management processes. Further investigation on effects of the reoriented land policy would help to provide a better understanding on whether this reoriented approach is indeed preferable to form the type of hybrid rural-urban development that will potentially help to enhance resilience of the urban system in the contemporary Thai cultural context.

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